CHAPTER 3
AFFECTED ENVIRONMENT

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CHAPTER 3
AFFECTED ENVIRONMENT

Chapter 3 describes existing conditions for Bureau of Land Management (BLM) resource programs, resource uses, special designations, and the socioeconomic environment within the Kemmerer Field Office planning area (planning area). Management of resources and resource uses on public lands administered by the BLM is directed by a variety of laws, regulations, policies, and other requirements as summarized in Chapter 1. The Kemmerer Field Office operates under these requirements and guidance. The Kemmerer Field Office also considers Best Management Practices (BMPs) in the management of resources and resource uses in the planning area.

In addition to describing existing conditions, Chapter 3 identifies, where appropriate, management challenges for resource programs and resource uses on BLM-administered land. These management challenges were identified by the BLM's Management Situation Analysis (MSA), as well as by issues identified during the scoping process for revising the 1986 Kemmerer Resource Management Plan (RMP) (BLM 1986a). By describing existing conditions for resources in the planning area, this chapter serves as the baseline against which the impacts of the different alternatives are analyzed and compared in Chapter 4.

Overview of the Planning Area

The planning area comprises 1,424,005 acres of BLM-administered surface land and 1,579,362 acres of BLM-administered mineral estate in Lincoln, Uinta, Sweetwater, and Sublette counties in southwestern Wyoming (see Maps 1 and 2 in Volume 2). Within Lincoln County, large contiguous areas of BLM-administered lands are intermingled with state, private, and small parcels of other federal surface (Bureau of Reclamation and U.S. Fish and Wildlife Service) lands. Southeastern Lincoln County, most of Uinta County and most of the planning area lands in Sweetwater County are affected by the "checkerboard" land ownership pattern. There are no Kemmerer Field Office BLM-administered surface lands in Sublette County.

The planning area encompasses the intersection of two physiographic regions—the Wyoming Basin to the southeast and the Middle Rocky Mountains to the north and west. The Wyoming Basin comprises broad intermountain basins interrupted by isolated hills and low mountains that merge to the south into a dissected plateau. The Wyoming Basin is a shrubsteppe area, dominated by sagebrush and shadscale, interspersed with areas of shortgrass prairie. Higher elevations are in mountain shrub vegetation, with coniferous forest atop the highest areas. The Middle Rocky Mountains area generally is made up of complex mountains with many intermontane basins and plains. Elevations in the planning area range from approximately 6,070 feet above mean sea level (msl) at the eastern extent of the planning area in Sweetwater County to approximately 10,770 feet above msl at Rock Lake Peak in the Salt River Range in northern Lincoln County. The planning area generally has a dry, windswept, rain-shadow climate like much of Wyoming, but the variations in elevation have a substantial effect on vegetation types and suitability of areas for agriculture and grazing. The region generally has cold winters and dry summers below mountain slopes and cool summers and snowy winters in mountainous environments (Pitcher 1997).

The planning area includes portions of three regional watersheds—the Green River, Bear River, and Snake River basins. The northern two-thirds of the planning area are characterized by the parallel Salt River Range and the Wyoming Range, which trend generally from north to south. A series of major ridges extend the Wyoming Range to the south, including Commissary Ridge, Oyster Ridge, and the Hogsback. The Salt River Range extends to the south in a series of ridges, the most prominent of which

are the Tunp Range and the Sillem Ridge, portions of which are popularly known as the Bear River Divide. The extreme southern portion of the planning area includes foothills of the Uinta Mountains, which is an east-to-west trending mountain range mostly in northeastern Utah. To the east and northeast of the Uinta foothills is the Bridger basin, a southwestern extension of the Green River basin.

The climate of the planning area is classified as semiarid with areas of mid-latitude highland (Trewartha and Horn 1980; Martner 1986). A semiarid continental climate is characterized by seasonal variations in temperature (cold winters and warm summers) and precipitation levels that are low, but sufficient for the growth of short, sparse grass. Average maximum summer temperatures are 81-degrees Fahrenheit (ºF), while average minimum winter temperatures are 4.5 ºF.

Soils in the planning area are diverse and can vary in characteristics over relatively short distances. Soils and vegetation in the planning area generally provide rangeland suitable for year-round cattle and sheep grazing at lower elevations.

Agricultural production is an important contributor to the planning area's economy. Livestock grazing includes the grazing of domestic animals (e.g., cattle, sheep, horses, and goats) in the planning area. The public lands are often intermingled with private and state lands, which are grazed as one unit. Crops in the planning area may include wheat, oats, barley, alfalfa, grass hay, and pasture.

A variety of wildlife species occur in the planning area due to the diversity of habitats and landscapes which provide important areas for meeting all life requirements including breeding, foraging, migration, and winter range. Numerous and diverse wildlife populations are an indicator of the health of the land and environment.

A broad spectrum of outdoor opportunities within the planning area provide visitors the freedom of recreational choice. Recreational activities within the planning area include, but are not limited to, sightseeing, touring, photography, wildlife viewing, floating, mountain biking, camping, fishing, and hunting. The economy of the region is enhanced by wildlife-watching tourists, hunting, and fishing.

Since the mid-1800s, the mining industry has been a key driver in economic growth and development in the region. Coal, oil, natural gas, and trona are the most important mineral commodities in terms of employment and income, but other minerals (e.g., clay, phosphate, sand and gravel, building stone, and decorative stone) have played and continue to play a role in the development of the area.

Lincoln County

Lincoln County was established in 1911, the same year Kemmerer, Wyoming was named as the county seat. Pioneers traveling west in the mid to late 1800s generally followed the Oregon Trail. Early settlers established homesteads in the area in the late 1800s and large sheep and cattle ranches took advantage of the vast rangeland. Extensive ranch settlement in the region followed the construction of the Union Pacific Railroad (UPRR) around 1867. Coal deposits at Kemmerer brought about its settlement in 1881. Kemmerer now boasts the largest open pit coal mine in the world.

State highways 30 and 189 are the main roads through Lincoln County and both connect Kemmerer with Interstate Highway 80 (I-80). State highway 30 bisects the planning area as it generally traverses east-west through the county, including the town of Kemmerer. State highway 89, in the northern portion of the planning area, runs through the towns of Afton and Alpine.

Three important rivers pass through Lincoln County: the Bear River, Snake River, and Green River. The Bear River flows into the Great Salt Lake. The Snake River, which originates in Yellowstone National Park, crosses the northern tip of the county and joins the Columbia River before flowing into the Pacific

Ocean. The Green River, which passes the eastern border of the county, flows southward into Utah, where it joins the Colorado River. Fontenelle Reservoir, created on the Green River system, is located in Lincoln County and primarily surrounded by Bureau of Reclamation lands.

Lincoln County comprises approximately 2,274,285 surface acres in the planning area, of which the BLM administers approximately 834,888 acres. In addition, BLM administers approximately 922,700 acres of federal mineral estate in Lincoln County.

Uinta County

Uinta County was established in 1869, the same year Evanston, Wyoming was named as the county seat. Early explorers traveled west along the Oregon Trail. Fort Bridger, the oldest settlement in the county, was an important trading post on the Oregon Trail, located in a valley on the Blacks Fork River. Agriculture and energy production continue today as the primary economic commodities in Uinta County.

I-80 generally traverses east-west through Uinta County. State highway 189 traverses north from I-80 between Evanston and Lyman toward Kemmerer.

The Upper Bear River watershed drains the western portion of Uinta County. The Upper Green River watershed drains the central and eastern portions of the county.

Uinta County comprises approximately 1,237,489 surface acres in the planning area, of which the BLM administers approximately 404,785 acres. In addition, the BLM administers approximately 489,269 acres of federal mineral estate in the county.

Sweetwater County

Sweetwater County was established in 1867, the same year Green River, Wyoming was named as the county seat. Several emigrant trails passed through the county including the Oregon, California, Mormon, Overland, and Cherokee trails. In addition, the transcontinental railroad came in 1868, creating two major population centers—Green River and Rock Springs. Agriculture remains an important economic commodity in Sweetwater County, as do mineral commodities such as coal and trona.

I-80 traverses east-west through Sweetwater County. State highway 30 traverses northwest from I-80 near Granger to Kemmerer. The Upper Green River watershed, which drains all of Sweetwater County, is located in the planning area. The Seedskadee National Wildlife Refuge is located in Sweetwater County and is primarily surrounded by Bureau of Reclamation lands.

Sweetwater County comprises approximately 405,604 surface acres in the planning area, of which the BLM administers approximately 184,143 surface acres. In addition, the BLM administers approximately 167,172 acres of federal mineral estate in Sweetwater County.

Sublette County

Sublette County was established in 1921, the same year Pinedale, Wyoming was named as the county seat. Sublette County comprises approximately 13,187 surface acres in the planning area. No BLM-administered surface lands in Sublette County occur within the planning area. Federal mineral estate in Sublette County occurs under U.S. Forest Service (USFS) jurisdiction.

3.1 Physical Resources

Physical resources in the planning area include air quality, soil, and water. Each of the three resource sections includes a description of the resource, the current condition of the resource, management challenges where appropriate, and management actions.

3.1.1 Air Quality

This section describes the climate and existing air quality in the Kemmerer RMP Study Area, the area potentially affected by activities in the Kemmerer RMP planning area. Air pollutants addressed in this Environmental Impact Statement (EIS) include criteria pollutants, hazardous air pollutants (HAPs), and compounds that could cause visibility impairment or atmospheric deposition.

Regional air quality is influenced by the interaction of several factors, including meteorology, climate, the magnitude and spatial distribution of local and regional air pollutant sources, and the chemical properties of emitted air pollutants.

Climate

Eco-regions are large areas of similar climate where ecosystems recur in predictable patterns. The eco-regions of the Planning Area are classified as Inter-Mountain Semi-Desert and Southern Rocky Mountain Steppe (Curtis & Grimes 2004).

The climate of an Inter-Mountain Semi-Desert is characterized by cold winters and short, hot summers (Table 3-1). Annual precipitation is low and fairly evenly distributed throughout the year. The growing season is short (Bailey 1995).

Table 3-1. Summary of the Climate in the Kemmerer Planning Area

Climate Component	Description
Temperature[1]	Average daily maximum July temperature: 80.9 °F Average daily minimum January temperature: 4.5 °F Mean maximum temperature: 53.6 °F Mean minimum temperature: 23.6 °F
Precipitation[1]	Mean annual precipitation: 9.78 inches Mean annual snowfall: 50.9 inches Mean winter snow depth: 2 inches
Winds[2]	Mean annual wind speed: 10.5 miles per hour Prevailing wind direction: southwest

Source: Western Regional Climate Center 2006a, 2006b, 2006c
[1] Measured at Kemmerer water treatment plant
[2] Measured at Evanston airport
BLM Bureau of Land Management
°F degrees Fahrenheit

The climate of a Southern Rocky Mountain Steppe is characterized by a temperate semi-arid steppe regime. Summers are cool and precipitation is moderate with much of the precipitation falling as snow in the higher altitudes (Bailey 1995).

Climate Change

Ongoing scientific research has identified the potential impacts of greenhouse gas (GHG) emissions (including carbon dioxide [CO_2], methane, nitrous oxide, and several trace gasses) on global climate. Through complex interactions on a regional and global scale, these GHG emissions cause a net warming effect of the atmosphere that makes surface temperatures suitable for life on Earth, typically referred to as global warming, primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although GHG levels have varied for millennia, with corresponding variations in climatic conditions,

recent industrialization and burning of carbon sources have caused CO_2 concentrations to increase dramatically and are likely to contribute to overall climatic changes. Increasing CO_2 concentrations also lead to preferential fertilization and growth of specific plant species.

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies 2007[do we have reference?]). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) exhibited temperature increases of nearly 1.2°C (2.1°F) since 1900, with nearly a 1.0°C (1.8°F) increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHG are likely to accelerate the rate of climate change.

In 2001, the International Panel on Climate Change indicated that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2006) [do we have reference?] has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures.

Several activities occur within the planning area that may generate GHG emissions. Oil and gas development and production, salable minerals mining and processing, locatable mineral mining and processing, large wildfires, and use of combustion engines for recreation and transportation are some of the activities that can potentially generate CO_2 and methane.

Table 3-1 shows the average temperature and precipitation in the Kemmerer planning area. Wyoming has warmed about 0.25 ºF per decade since 1966. Precipitation in western Wyoming has stayed about the same, although precipitation in eastern Wyoming has increased up to 0.6 inches per decade, according to the NOAA Climate Prediction Center. Temperature in southwestern Wyoming has been predicted to increase by 0.25 to 0.40 ºF per decade while temperatures in surrounding locations in Utah, Wyoming, and Colorado are expected to increase by 0.40 to 1.2 ºF per decade. Precipitation across western Wyoming is expected to decrease by 0.1 to 0.6 inches per decade with the largest decrease expected in southwestern Wyoming (NOAA 2007).

Existing Air Quality

Components of air quality addressed in this EIS include concentrations of air pollutants, visibility, and atmospheric deposition, as follows:

- Air pollutant concentration is an indicator of breathable, healthy air.
- Visibility is an indicator of the ability to see the surrounding landscape.
- Atmospheric deposition is an indicator of the health of terrestrial and aquatic ecosystems.

While there is limited ambient air quality-monitoring data available for the study area, air quality is generally considered good, with no regions designated as non-attainment for National Ambient air Quality Standards (NAAQS) or Wyoming Ambient Air Quality Standards (WAAQS).

The WAAQS are shown in Table 3-2. The Wyoming standards are more stringent than the national standards for sulfur dioxide. Wyoming has adopted standards for hydrogen sulfide for which there are no national standards.

Table 3-2. National and Wyoming Ambient Air Quality Standards

Pollutant	Average Time	NAAQS ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)
Carbon Monoxide (CO)	1 hour	40,000	40,000
	8 hours	10,000	10,000
Nitrogen Dioxide (NO_2)	Annual[1]	100	100
Ozone (O_3)	8 hours	147	—
Particulate Matter (PM_{10})	24 hours	150	150
	Annual	-	50
Particulate Matter ($PM_{2.5}$)	24 hours	35	65
	Annual	15	15
Sulfur Dioxide (SO_2)	3 hours	1,300[2]	1,300
	24 hours	365	260
	Annual	80	60
Hydrogen Sulfide (H_2S)	½ hour[3]	-	70
	½ hour[4]	-	40

Sources: Wyoming DEQ 2006; EPA 2006a, 2008

[1]The standard of 100 $\mu g/m^3$ NO_2 is equivalent to a standard of 0.05 ppm (Wyoming DEQ 2006).

[2]Secondary standard only, as there is no 3-hour federal primary standard for SO_2.

[3]Average not to be exceeded more than two times per year.

[4]Average not to be exceeded more than two times in any 5 consecutive days.

$\mu g/m^3$ micrograms per cubic meter
NAAQS National Ambient Air Quality Standards
WAAQS Wyoming Ambient Air Quality Standards

Air Pollutant Concentrations

Air pollutants are defined in terms of concentrations (parts per million [ppm] or parts per billion [ppb]) for gaseous pollutants, or mass per unit volume (micrograms per cubic meter [$\mu g/m^3$]) for particulates.

The most recent representative ambient air quality data available for nitrogen dioxide (NO_2) is from the Green River Basin Visibility Study site in Sweetwater County (about 20 miles southwest of Farson). Other data have been reported since 2004 from the Jonah oil and gas field that show NO_2 and sulfur dioxide (SO_2) in compliance.

However, air quality monitors at three stations in Sublette County in the Jonah/Anticline area found elevated levels of ozone above the 8-hour ozone NAAQS of 80 ppb during the winters of 2005 and 2006. No ozone exceedances were found in 2007, but in February and March of 2008 elevated ozone measurements were measured again, leading the Wyoming Department of Environmental Quality (DEQ) to issue health advisories for the area. This condition was unexpected, because scientists did not believe high levels of ozone could be formed in the winter, due to low ambient temperatures and low solar radiation levels. The Wyoming DEQ is currently coordinating studies with other agencies and groups to analyze the recent data and develop modeling tools to help understand and predict future ozone conditions.

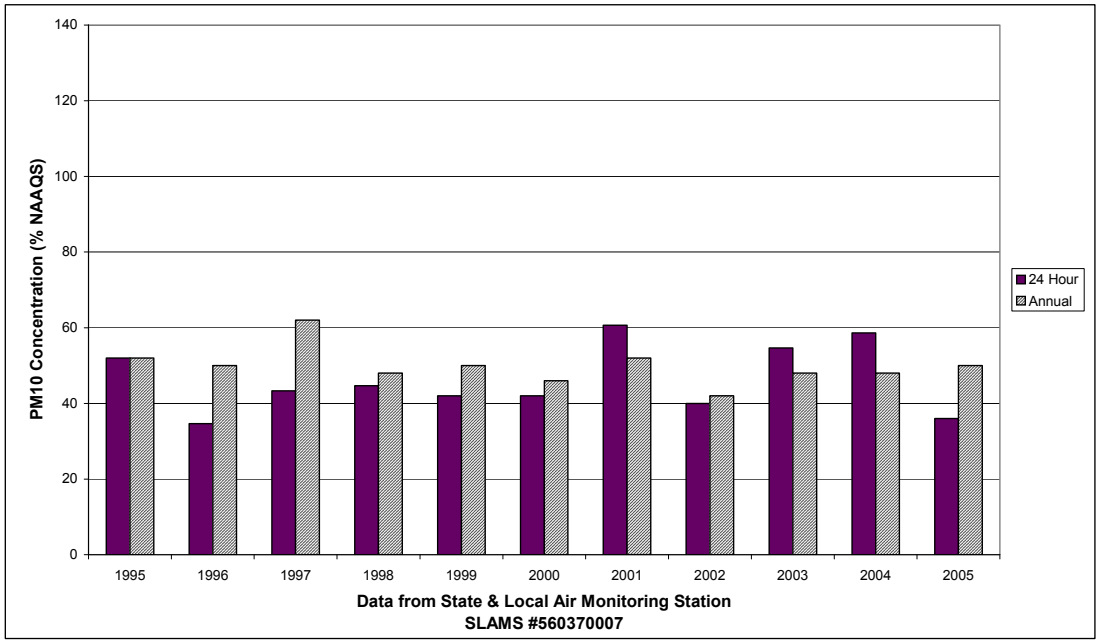
In addition, on March 12, 2008 EPA revised the 8-hour ozone NAAQS down to 75 ppb, which will make it somewhat more difficult for the area to meet the ozone standard during the peak winter period.

The planning area currently has no regions designated as non-attainment for NAAQS or WAAQS.

Figure 3-1 shows the PM_{10} (particulate matter less than 10 microns in diameter) data collected over the last 11 years at the closest state and local air monitoring station to the planning area, which is located in Rock Springs, Wyoming. The data are shown for both the 24-hour and annual averages as a percentage

of the respective NAAQS. The BLM supports ambient air quality monitoring programs within Wyoming for criteria pollutants, visibility, and air quality-related values in Class I pristine areas.

Figure 3-1. Mean Annual Particulate Matter Concentrations in Rock Springs, Wyoming



Source: EPA 2006
NAAQS National Ambient Air Quality Standards
PM_{10} particulate matter less than 10 microns in diameter

Visibility

Several national parks, wilderness areas, and national monuments exist in the study area. Table 3-3 presents a list of these areas relative to the planning area. Grand Teton National Park is the closest Class I area to the north of the planning area; the Bridger Wilderness Area is the closest Class I area to the east.

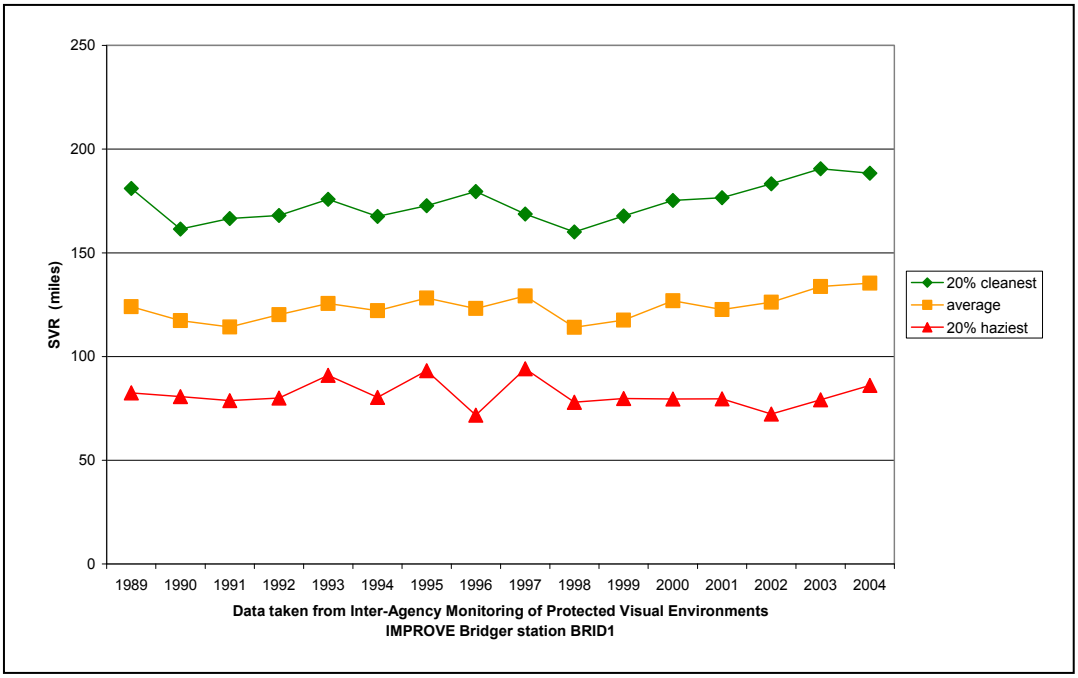
Table 3-3. National Parks, Wilderness Areas, and National Monuments in the Vicinity of the Kemmerer Planning Area

Areas	Closest Distance to the Kemmerer Planning Area (miles)	Direction from the Kemmerer Planning Area	Clean Air Act Status of the Area
Grand Teton National Park	30	North	Class I
Bridger Wilderness Area	40	East	Class I
Teton Wilderness Area	50	North	Class I
Fitzpatrick Wilderness Area	60	East	Class I
Washakie Wilderness Area	70	Northeast	Class I
Yellowstone National Park	70	North	Class I
North Absaroka Wilderness Area	100	Northeast	Class I
Bridger Butte	Within Planning Area	NA	Class II
Gros Ventre Wilderness	30	Northeast	Class II
Dinosaur National Monument	60	Southeast	Class II
Wind River Roadless Area	70	East	Class II

Source: NPS 2006
Note: Map of Class I areas can be viewed at http://www.nature.nps.gov/air/maps/images/ClassIAreas.jpg

The BLM works cooperatively with several federal agencies to measure visibility with the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE station operating in the Class I area nearest to the planning area, approximately 40 miles to the east, is in the Bridger Wilderness Area. Figure 3-2 shows the visual range measured in the Bridger Wilderness Area since 1989.

Figure 3-2. Annual Visibility (Standard Visual Range) in Bridger Wilderness



Source: Caplan 2007
SVR Standard Visual Range

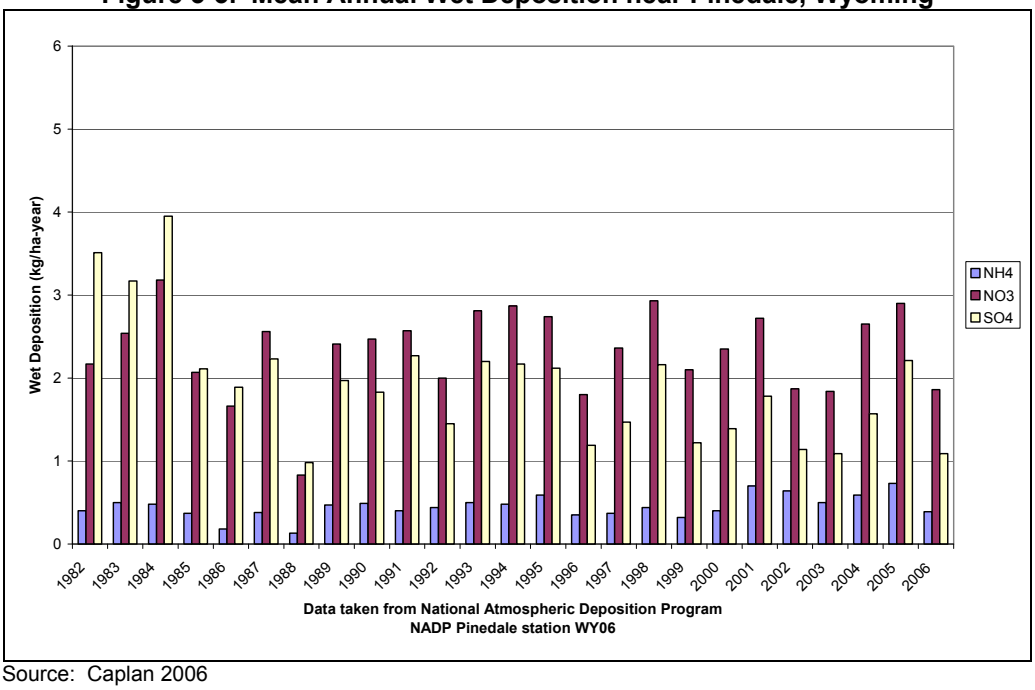
Atmospheric Deposition

Atmospheric deposition refers to processes in which air pollutants are removed from the atmosphere and deposited into terrestrial and aquatic ecosystems. Much of the concern about deposition is due to secondary formation of sulfur and nitrogen compounds, which may induce acidification of lakes, streams, and soils and impact other ecosystem characteristics, including nutrient cycling and biological diversity.

Secondary formation of pollutants occurs when primary pollutants (such as nitrogen oxides [NO_x] or SO_2) chemically react in the atmosphere to produce new compounds, such as nitrates or nitric acid, which can have direct impacts on fragile ecosystems.

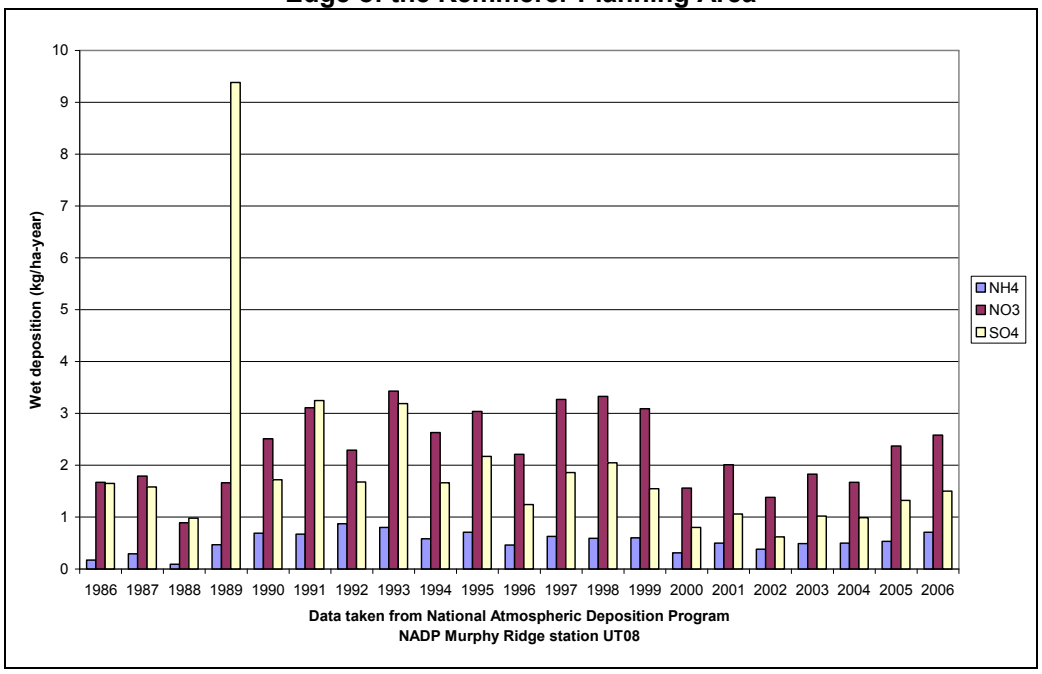
Air pollutants are deposited by either wet (precipitation) or dry (gravitational settling of particles and adherence of gaseous pollutants to soil, water, and vegetation) deposition. The BLM works cooperatively with the U.S. Environmental Protection Agency (EPA) to measure dry deposition. Three Clean Air Status & Trends Network (CASTNet) stations operate in Wyoming. The CASTNet station nearest to the planning area is located in Pinedale, Wyoming. The BLM works cooperatively with private, state, and other federal organizations to measure precipitation chemistry and wet deposition. Eight National Atmospheric Deposition Program (NADP) stations operate in Wyoming. In addition, a NADP station at Murray Ridge, Utah, is located on the western edge of the Kemmerer Planning Area. This station monitors wet deposition directly applicable to the planning area. Figures 3-3 and 3-4 present the wet deposition data collected near Pinedale (close to the Bridger Wilderness Area) and at Murray Ridge, respectively. Figure 3-5 presents the dry deposition collected near Pinedale for a period of 15 years.

Figure 3-3. Mean Annual Wet Deposition near Pinedale, Wyoming



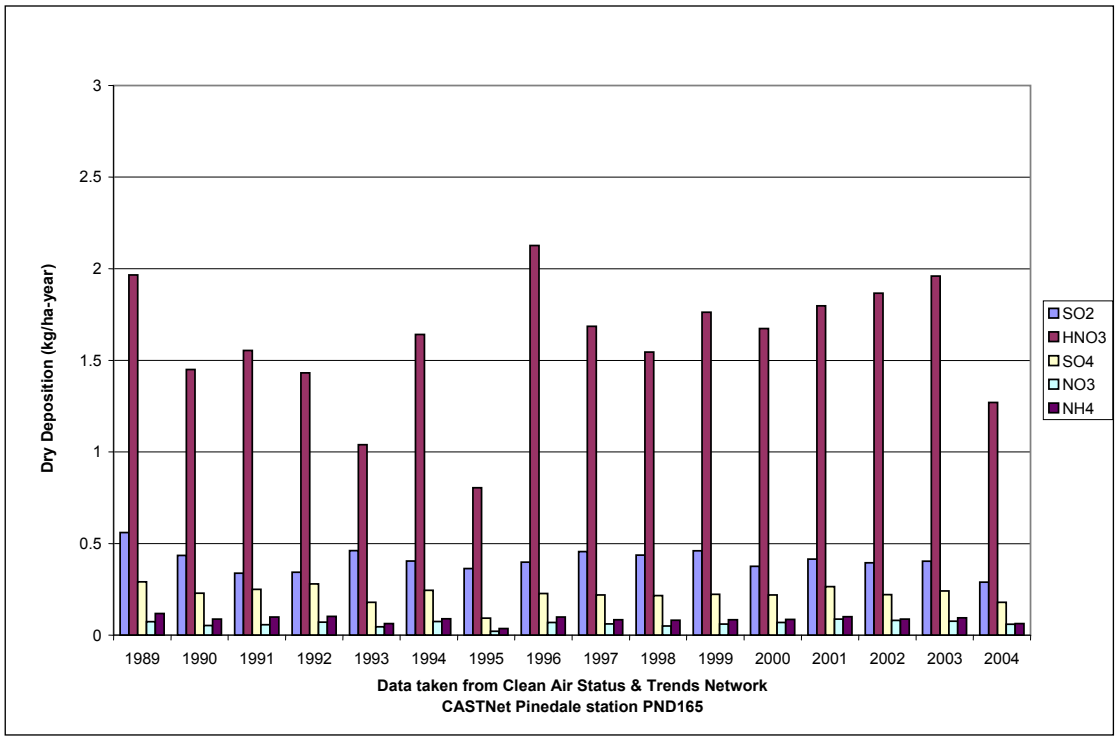
Source: Caplan 2006

Figure 3-4. Mean Annual Wet Deposition on the Western Edge of the Kemmerer Planning Area



Source: Caplan 2007

Figure 3-5. Mean Annual Dry Deposition near Pinedale, Wyoming



Source: Caplan 2007

Total deposition refers to the sum of airborne material transferred to the earth's surface by both wet and dry deposition. Total deposition levels of concern (LOCs) have been estimated for several areas, including the Bridger Wilderness in Wyoming (Fox et al. 1989). Estimated total deposition LOCs include the "red line" (defined as the total deposition that the area can tolerate) and the "green line" (defined as the acceptable level of total deposition) measured in kilograms per hectare per year (kg/ha/yr). Total nitrogen deposition LOCs for the Bridger Wilderness include the red line (set at 10 kg/ha/yr) and the green line (set at 3 to 5 kg/ha/yr).

Figures 3-3 and 3-5 can serve as an estimate for deposition in the Bridger Wilderness Area. Total nitrogen deposition near Pinedale has been equal to or less than the Bridger Wilderness LOCs over the last fifteen years. Total sulfur deposition has been well below both LOCs for the same period.

Hazardous Air Pollutants (HAPs)

HAPs include air pollutants that can produce serious illnesses or increased mortality, even in low concentrations. HAPs are compounds with no established federal ambient standards that may have thresholds established by some states and are typically evaluated for potential chronic inhalation and cancer risks. The impact of HAPs on sensitive members of the population is a special concern of the BLM. Sensitive receptor groups include children, the elderly, and the acutely and chronically ill who may be affected in homes, schools, playgrounds, and hospitals. Existing sources of HAPs within the planning area include (1) fossil fuel combustion that emits HAPs, such as formaldehyde; (2) oil and gas operations that emit volatile organic compounds (VOCs) and may emit hydrogen sulfide (H_2S); and (3) trona mining and processing.

Existing Emissions in the Planning Area

Table 3-4 presents an estimate of annual emissions that occurred within the planning area from resource types that produced substantial emissions during 2001. The planning area activities that impact air quality have not changed appreciably since 2001. Approximately the same number of oil and gas drilling rigs are operating in the planning area. These data show that the main contributors to emissions include natural gas development and production, salable minerals mining and processing, coal mining and processing, trona mining and processing, rights-of-way (ROW) corridors, and off-highway vehicle (OHV) use. Trona processing takes place on private land in a small region of the Kemmerer planning area; however, the emission plumes are visible on BLM-administered lands, especially during winter air inversions. Year 2001 activities are used to define existing air quality conditions in the planning area for comparing the impacts of future emissions from each alternative.

Table 3-4. Year 2001 Annual Emissions for Activities on BLM-Administered Land and Federal Mineral Estate within the Kemmerer Planning Area

Resource	Emissions (Tons per Year)						
	PM_{10}	$PM_{2.5}$	NO_x	SO_x	CO	VOC	HAPs
Natural Gas Development and Production	111	67	849	64	801	6,144	622
Salable Minerals Mining and Processing	290	34	20	0	3	1	0
Coal Mining and Processing	407	142	1,320	2	285	0	0
Trona Mining and Processing	1,934	1,934	4,855	5,043	4,490	7,205	473
ROW Corridors	73	54	893	21	328	85	8
OHVs	7	7	3	0	434	234	23
Oil Development and Production	1	0	6	1	2	0	0
Locatable Minerals Mining and Processing	1	1	17	0	6	2	0
Resource Roads	4	0	0	0	0	0	0
Livestock/Grazing	2	0	1	0	1	0	0
Vegetation Management	2	0	0	0	0	0	0
Year 2001 Totals	**2,832**	**2,241**	**7,965**	**5,132**	**6,585**	**13,670**	**1,128**

Sources: BLM 2003a, Potter 2006, Bott 2006

CO carbon monoxide
HAPS Hazardous air pollutants
NO_x nitrogen oxides
OHV off-highway vehicle
PM_{10} particulate matter less than 10 microns in diameter
$PM_{2.5}$ particulate matter less than 2.5 microns in diameter
ROW rights-of-way
SO_x sulfur oxides
VOC volatile organic compounds

Management challenges identified for air quality in the planning area are based, in part, on historic activities and current conditions and trends. The paragraph listed below discusses the three current primary management challenges.

The Wyoming Department of Environmental Quality-Air Quality Division (Wyoming DEQ-AQD) has the regulatory authority and responsibility, with EPA oversight, to enforce air quality standards. Federal land managers, such as the U.S. Department of Agriculture (USDA) Forest Service (USFS) and the National Park Service (NPS) have the authority and responsibility to set land management guidelines. BLM works cooperatively with these agencies to estimate potential impacts to air quality and to address air quality issues. Increased incidents of ozone alerts within the local airshed (Pinedale) challenges the roles of the stakeholders in the relationship. Second, the development of mechanisms to better characterize the current status and future trends in air quality, such as establishing long-term air quality monitoring stations, may be difficult to accomplish within current budgets. Third, BLM's ability to use management tools that contribute to reductions in air quality such as prescribed burning may be significantly reduced.

Management actions anticipated to address the above challenges include characterizing the current status and future trends in ambient air quality in the planning area, estimating potential future ambient air

quality in the planning area, determining the range of air quality issues in the planning area, and implementing actions to maintain compliance or improve air quality. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.1.2 Soil

The Kemmerer Field Office management decisions affect soil on BLM surface and split estate during minerals development. In general, soil management focuses on maintaining soil integrity, reclaiming disturbed soils, reducing erosion, and, in some cases, improving soil health.

Soils in the planning area are diverse and can vary in characteristics over relatively short distances. The distribution and occurrence of soils depend on many factors, including slope, geology, vegetation, climate, and time. Soils managed by the Kemmerer Field Office formed from a variety of parent materials, reflecting the influence of surficial geology and geomorphology.

The Kemmerer Field Office lacks a detailed soils inventory for the planning area; however, there are ongoing soil surveys that should provide much more detailed information in the future. Using existing data, soils can be subdivided into five groups based on their geomorphic characteristics. Within the planning area, soils with a high amount of silt-sized carbonates or a reddish color tend to be particularly susceptible to water erosion due to poor cohesion qualities that tend to lose aggregate structure when wet. The five soil groups, shown in Map C, are summarized below.

Soil Group 1: Overthrust Belt

Steep, sloping major ridges with narrow valleys trending north-south are found in association with the Overthrust Belt that extends south of Evanston at the Utah State line to the western divide of the Muddy Creek drainages. This area narrows to the north and tapers in the Cokeville area. Dominant parent materials include residuum formed over sediments; colluvium, including landslide and earth-flow deposits; and alluvium on footslopes and drainages. Geologic overthrusting and the resulting mixed exposures have produced variable soil textures and complex soil/geomorphic relationships. In the narrow valleys and drainages, very deep and well-drained reddish and brown soils are common. The upland ridges are characterized by soils of varying depths, both red and brown in color.

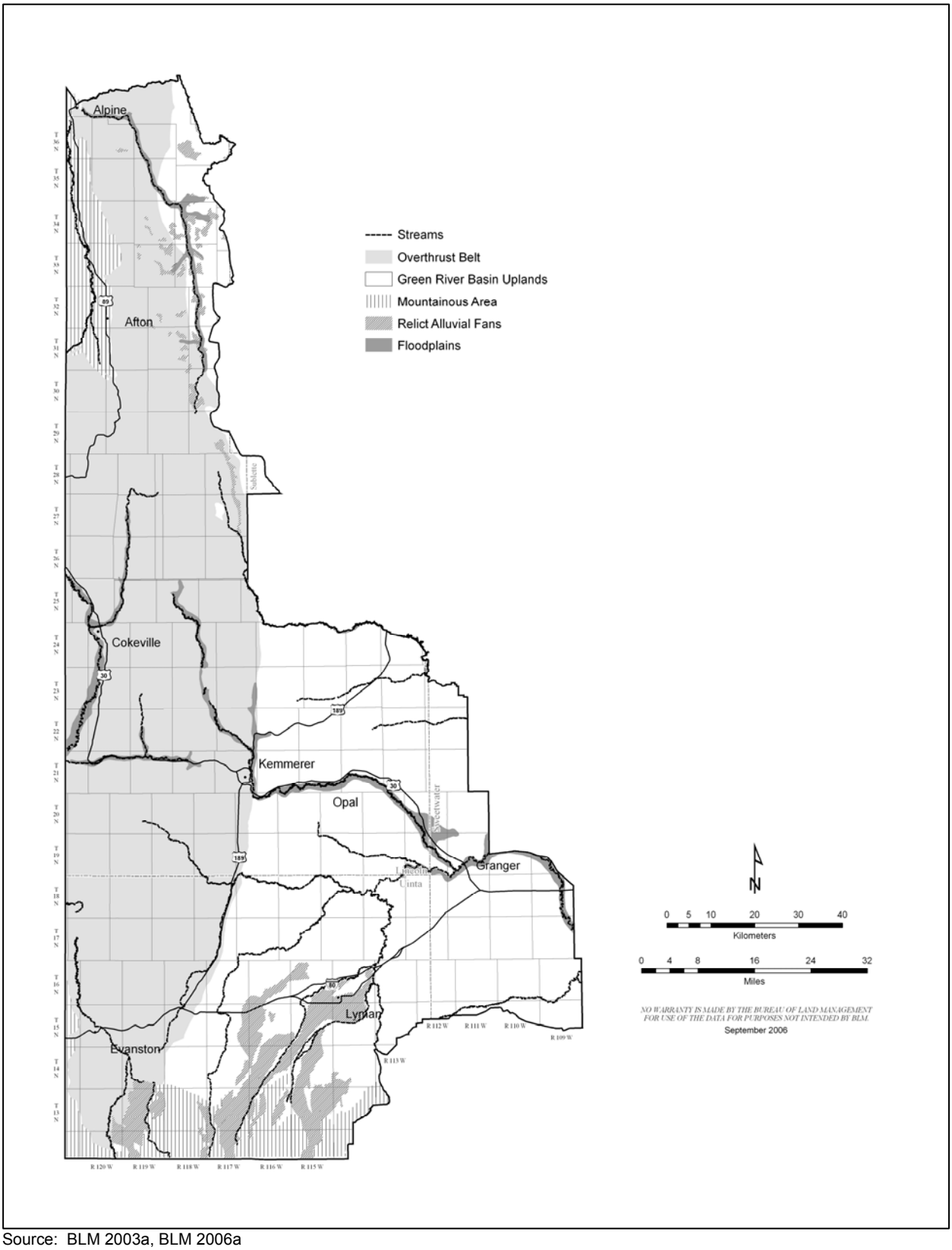
Most red soils along the upland ridges, such as along the Bear River Divide, are highly susceptible to water erosion when disturbed. Areas within the Overthrust Belt, especially low areas, are saline (high in soluble salts and sodium), which is a water quality concern in the Colorado River basin.

Soil Group 2: Green River Basin Uplands

This group is the largest in the planning area and contains the sedimentary uplands of the Green River basin. It is bounded by Oyster Ridge on the west, extends beyond the Kemmerer Field Office to the east, becomes a narrow band along Fontenelle Creek in the north of the planning area, and is bounded in the south by the foothill terraces of the Uinta Mountains. Low relief bedrock-controlled ridges, erosional sideslopes, and alluvial fans dominate the landscape. Included within this group are badlands, such as those found along Cottonwood Creek and the Moxa Arch field, and scattered clusters of sand dunes south of Shute Creek and in the Blacks Fork and Muddy Creek uplands.

Many soils in this group formed from shales producing clayey textures with poor surface water infiltration, high runoff potential, and high carbonate levels that create a high potential for water erosion. Also common in this group, are soils with surface textures that are highly susceptible to water erosion due to a high proportion of fine sands or silts with little binding material or silt-sized carbonates. Many soils in this group are susceptible to excessive wind erosion due to sandy surface textures, low organic matter, and high carbonate content. This soil group has a high proportion of saline soils, especially in low topographic areas, such as drainages and areas below marine shale outcrops.

Map C. General Soil Groups in the Planning Area



Source: BLM 2003a, BLM 2006a

Soil Group 3: Mountainous Areas

This group occurs in the northern and extreme southern parts of the planning area including Star Valley as an extension of the Wasatch and Uinta mountains in Utah. Parent materials include sedimentary rock and glacial till, resulting in soils of various textures with various rock sizes within the soil profile. Mass wasting in the form of landslides and slumping occurs on the steeper, moister slopes. Coniferous and aspen trees are often present on these moist, north-facing slopes.

Soil Group 4: Relict Alluvial Fans and High Outwash Terraces

This group, located in the extreme south-central and northwestern parts of the planning area, is found on old alluvial terraces, fans, and pediments. These landforms were created as a result of alluvial material flushing out of the canyons of nearby mountains. Glacial till (Bishop Conglomerate) occurs in the southern part of Uinta County and generally is found on high, relatively level outwash terraces, such as Leavitt Bench. Soils in this position generally are deep, with rock and cobbles throughout the profile, which may affect some land uses.

Soil Group 5: Floodplains

This group, located along major drainages, comprises a relatively small percentage of the planning area and includes riparian areas and areas of high soil productivity. Due to the influence of adjacent soils and geology, these soils are not uniform in character and can be subdivided into three groups:

- Subgroup A: These soils generally are found in the eastern part of the planning area in intermittent drainages of the Green River basin, such as Slate Creek, Muddy Creek, and the lower part of Blacks Fork River. Textures are dominated by silty clays and other clays, and are often saline.
- Subgroup B: These soils are found along the perennial upper reaches of Blacks Fork River, Willow Creek, Bear River, and Hams Fork River in the Opal area. They tend to have more rock, vary more in texture, and are less saline.
- Subgroup C: These soils are associated with the mountains and foothills of the Overthrust Belt along the perennial drainages of Smiths Fork, Upper Hams Fork, La Barge Creek, upper Fontenelle Creek, Salt River, and Greys River. They have a variable texture and are not highly saline.

The condition of soil resources affect land use management decisions due to the importance of soil in public land health and the need for productive, stable soils for resource uses and programs. Data collection, such as soil surveying, resource monitoring in compliance with the statewide BLM requirements for public land health, and identifying hazards and limits for specific uses generally are completed in support of other BLM activities related to the management of resources and programs, such as rangeland, forestry, recreation, and mineral extraction.

When undisturbed, soils in the area generally are in good condition and capable of producing forage and maintaining watershed integrity and surface water quality. Removing the stabilizing vegetation cover through surface disturbance often starts the detachment of soil particles, which then become airborne or are transported by surface water runoff, eventually to be deposited elsewhere on the landscape. Examples of the effects of vegetation removal and surface disturbance documented in this area include the following:

- Accumulation of sand against sagebrush downwind from a burn area
- Vegetation pedestals that stand inches above the adjacent unprotected, wind-scoured or water-eroded soil surface
- Sedimentation deposited into streams from nonpoint sources by stormwater runoff.

Soils are affected by a variety of surface uses that loosen topsoil and damage or remove vegetation or other ground cover, which may result in accelerated erosion. Surface disturbance may occur from activities such as forest management, OHV use, and the use of prescribed fire. Surface-disturbing activities include any authorized actions that disturb vegetation and (or) surface soil, thereby increasing erosion potential above normal site conditions. Surface-disturbing activities include construction of well pads and roads, pits and reservoirs, pipelines and powerlines, mining, vegetation treatments, or concentrated OHV cross-country travels. Accelerated erosion, soil erosion at rates higher than natural erosion rates, and exceeding the rate at which soil-forming processes can create soil in place, may result from soil compaction or other surface-disturbing activities.

Soil biological crusts are a mosaic of bacteria, algae, lichens, mosses, and microfungi that weave through the top few centimeters of soil, gluing loose particles together and forming a matrix that stabilizes and protects soil surfaces from erosive forces. On rangelands, soil crusts function as living mulch by retaining moisture, discouraging annual weed growth, reducing water and wind erosion, fixing atmospheric nitrogen, and contributing to soil organic matter. These crusts, when undisturbed, tend to occupy the nutrient-poor zones between vegetation clumps (BLM 2001c). Crusts are well-adapted to severe growing conditions, but poorly adapted to compressional disturbances from vehicles, people, or animals. The introduction of livestock, which tend to congregate in one area more than the native bison historically did, has affected soils crusts over vast areas of the West. Once soil crusts are damaged or destroyed, they recover very slowly, especially in arid climates. Recovery can be enhanced by limiting the size of disturbance so that contiguous crusts can act as a source to recolonize the disturbed area (BLM 2001c).

Physical soil crusts are different from biological crusts and generally form in coarse sandy soils with low organic matter content, high salinity, and high alkalinity. Physical crusts may form when exposed to raindrop splash on bare soil or as a result of compaction. Soils with physical crusting typically reduce water infiltration and can prevent seedling emergence (BLM 2001c).

Management challenges identified for soils in the planning area result, in part, from historic activities and new resource conflicts. Historic activities include mineral development and other surface-disturbing activities; new resource conflicts include increased use of OHVs on public lands. Managing soils within the planning area emphasizes maintaining soil and landscape integrity through efforts to minimize accelerated erosion, avoiding or minimizing destruction of biological soil crusts, establishing successful site reclamation, and, in some cases, improving soil health through implementing grazing management plans. Reclamation of surface-disturbing activities and improving grazing management have been successful in sustaining soil productivity in most cases. Accelerated erosion within the planning area is mainly the result of soil compaction by vehicles, runoff from roads, and uncontrolled concentrated flow from poorly reclaimed or unreclaimed bare ground created by surface-disturbing activities.

The Wyoming Interim Reclamation policy has a long-term goal for reclamation "to prevent any long-term unnecessary and undue degradation and provide for the eventual ecosystem reconstruction" (BLM 2007a). This policy also provides short-term goals "to immediately stabilize disturbed areas and to provide the necessary conditions to achieve the long term reclamation goals" (BLM 2007a). The policy identifies seven objectives to meet these goals. In addition, Surface Operating Standards and Guidelines for Oil and Gas Exploration "The Gold Book" (BLM and USFS 2007) and Onshore Order No. 1 provide a number of goals related to oil and gas development reclamation activities. The Gold Book states the "Long term objective of final reclamation is to set the course of eventual ecosystem restoration, including the restoration of natural vegetation community, hydrology, and wildlife habitats." Soil health is an imperative means to reach this objective. In addition, Onshore Order No. 1 states: "Final abandonment shall not be approved until the surface reclamation work required by the approved drilling permit or approved abandonment notice has been completed to the satisfaction of the involved SMA" (USDI 2007a).

Soil resources are protected through the application of site-specific use restrictions, and Best Management Practices intended to limit soil erosion, maintain soil health and loss of productivity, and minimize overall disturbance of soil resources. Some restrictions are general, such as programmatic constraints applied to all surface-disturbing activities, including restricted access during periods of wet or frozen soils or limitations on operations on steep slopes. Specific restrictions include limiting OHV access to designated areas where no highly erodible soils occur. Typically, protection of soil resources is accomplished through the application of site-specific management practices, including installing water bars or diversion channels to control surface runoff around bare soil or off a road and developing specific seed mixtures or seeding techniques appropriate to the reclamation area.

Salt and sediment yield are concerns in the Colorado River basin, of which the Green River basin is part. Salt and sediment yield are also concerns in the Bear River basin and Bear Lake. The Bear Lake Regional Committee was formed to address these concerns. Although they can inhibit vegetation growth, salts held deeper in the soil profile generally are not a substantial source of salinity to the Colorado River basin, except along drainages where bank erosion or subsurface leaching occurs. Salts in soils are a land use management challenge primarily when surface disturbance and reclamation of disturbed land occurs. Another challenge is the demand placed on soils in the planning area due to the development of mineral resources. A concern for potential salt-loading to the Colorado River from increasing development of coalbed natural gas (CBNG) in the Green River basin was expressed in the *2002 Review of Water Quality Standards for Salinity* by the interagency Colorado River Basin Salinity Control Forum (2002).

To address management challenges, management objectives for soils generally address the following: identifying and interpreting existing soil resources and condition; utilizing soil use limitation ratings for land use actions; preventing accelerated soil erosion from disturbed areas; utilizing effective BMPs; establishing successful reclamation on disturbed areas; managing activities to maintain or improve long-term soil productivity; and monitoring, evaluating, and adapting management actions, as needed. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Currently implemented management actions that apply to all alternatives include the following:

- Pursue and support ongoing soil surveys throughout the planning area.
- Mitigate projects within areas of fragile soils, steep slopes, biological crusts, and soils with low reclamation potential by requiring proponents to complete and adhere to an Erosion, Revegetation, and Restoration Plan.
- Evaluate, in areas identified as having poor topsoil (i.e., badlands, saline bottomlands, calcareous) the need for topsoil salvage and mitigate by removing vegetation and soil only over the necessary construction area, when feasible.
- Emphasize the reduction of soil erosion, sediment, and salinity contributions to the Green River, with emphasis on protecting areas with highly saline and sensitive soils.
- Restrict surface disturbance on slopes greater than 25 percent by requiring soil erosion control that ensures adequate revegetation (see Map 4).
- Restrict surface disturbance when soils are saturated, frozen, or when watershed damage is likely to occur.
- Maintain or enhance soil stability, productivity, and infiltration to prevent accelerated erosion to provide for optimal plant growth.
- Require engineering on roads proposed on BLM-administered lands where soil damage may occur.
- Require reclamation of surface disturbances, including ripping (to relieve soil compaction) and recontouring, upon completion of operations. Require interim reclamation on well locations and

similar disturbed soils to improve stability and infiltration. Perform compliance checks on all reclamation projects to ensure soil stabilization.

- Take appropriate measures (e.g., stabilize, reseed top soil stockpiles, and retain order of soil horizons) to protect soil microbial components.
- Limit development on slopes greater than 40 percent.

3.1.3 Water

Water resources include both surface and subsurface resources. The availability, volume, and quality of water resources affect other resources and resource uses, including, but not limited to, wetlands and riparian areas, biological resources, livestock grazing, recreation, and public water supplies.

The BLM is responsible for managing surface lands and federal mineral estate in a manner that maintains or enhances water quality and quantity for other uses and complies with state and federal water quality standards. The BLM coordinates with state and other federal agencies to ensure compliance with required water resource management responsibilities. The Wyoming DEQ is responsible for water quality, which includes surface and groundwater protection. The EPA and U.S. Army Corps of Engineers (USACE) are jointly responsible for administering Section 404 of the Clean Water Act (CWA) regarding wetlands and waters of the United States, and the Wyoming State Engineer's Office is responsible for administering water rights in the planning area. The Wyoming DEQ, in compliance with the federal CWA, maintains a policy of "antidegradation" of surface waters that requires that water quality be maintained or improved, especially for outstanding (Class 1, see Glossary) and high quality (Class 2) waters (Wyoming DEQ 2002).

Surface water encompasses portions of three (3rd-order) regional watersheds—Green River, Bear River, and Snake River. A relatively small portion (7-square miles) of the extreme southwest corner of the planning area is within the Upper Weber watershed (Hydrologic Unit Code [HUC] 160201) which drains to the Great Salt Lake. However, the Upper Weber watershed contains no BLM-administered lands and, therefore, is not discussed further. Perennial and intermittent streams, lakes, and reservoirs support fish through at least a portion of the year. They are listed below in association with the regional watersheds in which they occur. Map 7 in Volume 2 displays the boundaries of the regional watersheds and the major streams and water bodies within the planning area.

The Green River (HUC 140401), a tributary to the Colorado River, drains the eastern 3,680 square miles (60 percent) of the planning area. As part of the Colorado River System, land use management within the Green River watershed is subject to the Colorado River Salinity Control Act. Prominent streams in this watershed include Horse Creek, Cottonwood Creek, Beaver Creek, Birch Creek, La Barge Creek, Delaney Canyon, Fontenelle Creek, Slate Creek, Eighteenmile Canyon, Shute Creek, Upper Henrys Fork, Upper Blacks Fork, Smiths Fork, Cottonwood Creek, Middle Blacks Fork, Dry Muddy Creek, Upper Hams Fork, Lower Hams Fork, Lower Blacks Fork, Sevenmile Gulch, Big Dry Creek, Muddy Creek, Little Muddy Creek, and Albert Creek. Fontenelle Reservoir, a large surface water resource, also occurs in the Green River basin on the northern edge of the planning area.

The Bear River (HUC 160101) flows north from the Uinta Mountains then winds in and out of the Wyoming-Utah border, eventually flowing into Idaho, north of Cokeville. The Bear River drains 1,490-square miles (24 percent) of the southwestern portion of the planning area north to Bear Lake and eventually to the Great Salt Lake. Tributaries include Twin Creek and Smiths Fork. Although not directly affected by the Colorado River Salinity Control Act, any actions taken to minimize salt production, erosion, and sedimentation provide sufficient benefits to land health to justify similar land use management decisions to those taken within the Colorado River drainage. Prominent streams in the Bear River watershed that could be directly affected by BLM management include, but are not limited to, Stillwater Fork, Sulphur Creek, Pleasant Valley Creek, Yellow Creek, Saleratus Creek, Bear River-Big

Creek, Bridger Creek, Twin Creek and its tributaries, Bear River, Smiths Fork, and Thomas Fork, Raymond Creek, Huff Creek, Muddy Creek, Salt River, and Mill Creek. The larger streams in the area, including the Smiths Fork and the main channel of the Bear River would experience more indirect than direct impacts as the result of BLM actions.

The Snake River (HUC 170401) drains 957 square miles (16 percent) of the northern portion of the planning area. Although not directly affected by the Colorado River Salinity Control Act, any actions taken to minimize salt production, erosion, and sedimentation provide sufficient benefits to land health to justify similar land use management decisions to those taken within the Colorado River drainage. Prominent streams in the Snake River watershed include Fall Creek, Hoback River, Greys River, Indian Creek, and Salt River.

Proper functioning condition is the minimal desired state of physical stability and resiliency desired on all water bodies and riparian areas. According to the BLM guidance document, *Riparian Area Management, Process for Assessing Proper Functioning Condition* (Prichard 1998), the functioning condition of riparian areas and wetlands is a result of the interaction of geology, soil, water, and vegetation. Healthy riparian-wetland areas are integral to healthy watersheds. Not only is riparian-wetland condition an important component of watershed condition, it is also an indicator of overall watershed health (see Section 3.4.3 Vegetation – Riparian and Wetland Communities).

The BLM uses a process to determine whether riparian areas and wetlands along perennial streams are in proper functioning condition. The process of analysis is referred to as Proper Functioning Condition survey. The process is intended as a guide to develop management strategies. The Standards for Rangeland Health (43 Code of Federal Regulations [CFR] 4180) specify that the BLM shall ensure that watersheds are in, or making significant progress toward, properly functioning physical condition, including their upland, riparian-wetland, and aquatic components.

The categories of proper functioning condition include the following:

- **Proper Functioning Condition**: Riparian areas and wetlands are in Proper Functioning Condition when adequate vegetation, landform, or large woody debris is present to dissipate energies associated with high water flows, wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion, filtering sediment, and improving water quality. Riparian areas and wetland in proper functioning condition aid floodplain development; improve flood-water retention and groundwater recharge; develop root masses that stabilize stream banks islands and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics, which provide the water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity.
- **Functional At-Risk**: Riparian areas and wetlands in functional condition, but existing soil, water, or vegetation conditions make them susceptible to degradation:
    - Downward trend: areas trending downward or degrading
    - No apparent trend: areas without an apparent trend
    - Upward trend: areas trending upward or improving.
- **Nonfunctional**: Riparian areas and wetlands that do not contain adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and are not reducing erosion or improving water quality.

A determination of categories of functioning condition for streams in the planning area is summarized in Table 3-5. The information is shown as a percentage of the stream miles in each of the three regional watersheds with BLM land in the planning area. The monitoring of these areas is an ongoing process; therefore, the classification in Table 3-5 may not fully represent current conditions.

Table 3-5. Functioning Condition Ratings of Streams on Public Land in the Planning Area

Basin	Proper Functioning Condition	Downward Trend Functional At-Risk	No Apparent Trend Functional At-Risk	Upward Trend Functional At-Risk	Nonfunctional	Not Rated
Green River	30%	3%	43%	19%	6%	0%
Bear River	31%	13%	36%	12%	6%	1%
Snake River	89%	11%	0%	0%	0%	0%

Source: BLM 2006a
Note: Detail may not add up to 100 percent due to rounding.

Groundwater

Groundwater resources occur in the two major geologic features—the Overthrust Belt and the Green River Structural basin. These structural basins were formed by the deformation of some of the rock formations and are not the same as watersheds. The Green River Structural basin encompasses a portion of the western side of Wyoming, with the Rock Springs Uplift forming the eastern boundary. Groundwater quality varies throughout the planning area, influenced by the regional geologic structures. Groundwater in the Green River Structural basin is primarily recharged from direct infiltration of surface water and from the recharge area in the mountains to the east. Groundwater quality is highly variable but tends to deteriorate with depth and distance from recharge areas, primarily due to increasing salinity (USGS 2005).

The folded geology of the Overthrust Belt complicates groundwater sources and recharge, and directs groundwater flow to the west. The contact between the Overthrust Belt and the Green River Structural basin acts as a groundwater barrier between the two structural basins. Within the Overthrust Belt, groundwater sources are localized and variable.

Surface Water and Groundwater Quantity and Use

The condition of surface and subsurface water resources affects natural resources, as well as resource uses, economics, and public health. The Watershed and Water Resources Program primarily plays a support role in the Kemmerer Field Office. Data collection, resource monitoring, and analysis generally are done in support of other activities, such as range management, forest management, and mineral extraction.

Surface water quality and quantity are variable within the planning area, but typically are adequate to meet existing uses on public lands. Natural climatic fluctuations, such as drought, can make marginally adequate sources unreliable.

Within the Green River watershed in the planning area, Bitter Creek, and portions of Smiths Fork and Hams Fork watercourses are identified as impaired for aquatic habitat from unknown sources (Wyoming DEQ 2006). In the Bear River watershed, reaches of the Bear River are identified by Wyoming DEQ as impaired. Sediment that damages aquatic life is the cause of the impaired designation in a reach of the Bear River in the planning area (Wyoming DEQ 2006). Portions of the Salt River in Star Valley are listed as impaired mainly due to fecal coliform levels that affects contact recreation (Wyoming DEQ 2006). Portions of the Bear River, and east and west forks of Smiths Fork were removed from the impairment list since 2004 as new assessments showed reduced threats and aquatic life uses being supported. The 2006 303d list and 305b report are available on the Internet with an updated list of impaired waters in the state (http://deq.state.wy.us/wqd/watershed/Downloads/ 305b/2006/2006_305b_pdf).

Areas with high to medium-high vulnerability to affect groundwater quality are found in the alluvial floodplains of the major rivers, including the Salt, Bear, and Green rivers, as well as the floodplains of

Smiths Fork, Blacks Fork, Henrys Fork, Bitter Creek, and Sandy Creek. In general, groundwater is vulnerable in these areas due to high water tables, sandy soils, and high hydraulic conductivity rates, resulting in the rapid transport of contaminants through the soil and rock without much buffering or filtration (Wyoming Geographic Information Science Center 2003). Downstream basins, such as Bear Lake and Flaming Gorge Reservoir, also are vulnerable to receiving high amounts of substances, such as phosphate, which can run off from mining and agricultural areas as a byproduct of fertilizers and animal wastes. Phosphorus is often the limiting nutrient for aquatic plant growth. Increased levels of phosphates can lead to increased algal growth and rates of eutrophication. The management and use of resources that require surface disturbance, such as minerals, range, forestry, and recreation can affect surface water quality, mainly by increasing sediment loads, salt, and turbidity. Stream bank degradation and erosion, as well as upland sheet, rill, and gully erosion, due to poor vegetative cover and surface disturbance within the watersheds, are the predominant sources of sediment and dissolved solids found in the streams. Surface disturbance results from such activities as the construction of roads, well pads, and pipelines, as well as OHV cross-country travel and fire-suppression activities. Activities and uses that disrupt riparian areas or streambanks such as livestock and native ungulate grazing, hiking and other recreational activities, may increase sediment delivery to streams. Proper management of livestock grazing, road construction, forestry, oil and gas exploration and development, mining, and recreation, along with the proper application of mitigation measures identified in site-specific management or development plans, can help to mitigate the impacts of these activities.

Wyoming DEQ's Wyoming Pollutant Discharge Elimination System (WYPDES) permits are required by the State of Wyoming for the discharge of most produced water to surface waters of the state. Also, WYPDES storm water permits are required for construction activities that disturb one acre or more, and for many industrial activities. The WYPDES Storm Water Program requires Storm Water Pollution Prevention Plans; implementation, inspection, and maintenance of BMPs, and; may require storm water sampling. Disposal of produced water, hydrostatic test water and other waste waters to roads or the land surface is also permitted by Wyoming DEQ. Disposal of waste waters via underground injection is regulated by Wyoming DEQ or the Wyoming Oil and Gas Conservation Commission. Chapter 4, Section 4 of Wyoming Water Quality Rules and Regulations requires stopping and containing releases of oil and hazardous substances; notifying Wyoming DEQ and; cleaning up the contamination.

Water rights for surface water are allocated as established by the Wyoming Constitution under the doctrine of prior appropriation, or "first in time, first in right." However, water rights are considered property rights associated with the land and can be transferred in use or location only after a review by the Wyoming State Engineer's Office or Board of Control. Within the planning area, most water rights are used for agriculture on private and state property. On BLM-administered lands in the planning area, the primary uses of water rights are livestock production, biological resources maintenance, and oil and gas exploration and development activities.

Surface-disturbing actions within the planning area are designed to protect and enhance water resources and include avoiding highly erodible soils, implementing zero runoff programs on large-scale disturbances, and reclamation of surface disturbance. Actions to assure that potable water supplies are protected include complying with Wyoming state surface and ground water regulations, and assuring that oil and gas wells are cased and cemented below freshwater zones to prevent the contamination of aquifers. Other actions to enhance and protect water resources during oil and gas development include plugging exploration holes and reducing sedimentation during road building and other surface-disturbing activities within floodplains and near streams, in riparian areas and wetlands, and in other areas that serve to recharge aquifers.

The BLM has various water resource plans and stipulations to guide management of water resources in the planning area. Watershed plans are commonly used to address degradation of specific streams and riparian resources. Water resource protection plans and stipulations are used to prohibit development within a certain distance from surface water resources, such as streams, lakes, reservoirs, and groundwater resources (e.g., wells and springs). Other water management plans minimize damage to especially fragile areas in specific locations and water resources with special designations.

3.2 Mineral Resources

Mineral resources include the individual resources of locatable, leasable (oil and gas, coal, sodium [trona], phosphate, oil shale), and salable minerals. Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions. More information regarding the various mineral commodities is available in the Mineral Assessment Report (BLM 2004a), and can be accessed on the Kemmerer RMP revision website (www.blm.gov/rmp/kemmerer).

Other fluid leasable minerals in the Kemmerer planning area include carbon dioxide, helium and geothermal resources. These leasables have low potential for development over the planning period and are not discussed further.

The BLM has the major role in issuing oil and gas leases and permits and adjudicating mining claims for locatable minerals on National Forest System lands, and the USFS is responsible for determining what lands are available for leasing and mineral entry and under what stipulations. Once leases are issued, the USFS regulates surface-disturbing activities conducted pursuant to permitted activities on National Forest System lands. The USFS cooperates and coordinates with BLM to ensure that management goals are met, potential impacts to surface resources are mitigated, and that the land affected is rehabilitated.

3.2.1 Locatable

Locatable minerals that occur in various geologic formations in the planning area include metals (e.g., gold, silver, titanium, copper, chromium, and uranium), as well as commodities such as fire clay and bentonite. Precious gems known to occur or having the potential to occur within the planning area include diamond, pyrope garnet, and chromium diopside. Common varieties of sand, gravel, specialty stone, including moss rock, most clays, and limestone and sandstone, are considered salable minerals and are addressed in the Salable Minerals section. Mining claims have been staked for various commodities including building and specialty stone. Unlike leasable minerals (e.g., oil, gas, or coal) or salable minerals (e.g., sand and gravel), where issuance of a lease or permit is at the BLM's discretion, the discovery and location of a locatable mineral claim is at the discretion of the claimant.

Currently fire clay, considered to be locatable, is actively mined in Uinta County., north of Evanston, Wyoming. Fire clay (also known as refractory clay) is one of six types of clay mined in the United States. Fire clay is able to withstand temperatures of 1,500 degrees Celsius (°C) without deforming or melting (Harris and King 1986).

Fire clay occurs in scattered areas within the Overthrust Belt portion of the planning area. Specifically, it is known to occur in outcrops within the Evanston Formation (north of the town of Evanston in Uinta County) and in outcrops within the Frontier Formation. Occurrences are also within the Adaville Formation in Lincoln County near Elkol, Wyoming (south of Kemmerer) (Harris and King 1986). A large proportion of the total clay production in Wyoming, other than bentonite, occurs in Uinta County.

Currently, there are two companies producing fire clay in the planning area. Interpace Industries, Inc. produces refractory clay on private land from one of the Evanston Formation locations (Harris and King 1986). Interstate Brick Company produces clay from the Evanston Formation in a pit northeast of the Interpace Industries pit. In 1985, Interstate Brick Company filed for a clay patent maintaining that its clay deposit was locatable under the *Mining Law of 1872*. The patent examination concluded that some portions of the application area did in fact contain a marketable and valuable clay deposit, thus making it a locatable deposit.

Bentonite is sodium montmorillonite clay used as a binder in foundry molds, pet litter, drilling mud, and iron ore pelletizing, and is considered a locatable commodity (WSGS 2005a). It is increasingly used to form impermeable liners for waste disposal ponds. During the Cretaceous period, ash from volcanic

eruptions dropped into the seas that covered much of Wyoming. These sediments were altered over geologic time to form bentonite. In the Overthrust portion of the planning area, bentonite occurs in various Cretaceous and Tertiary-age formations. The deposits are generally linear, and consist of beds up to 5 feet in thickness. The deposits are also deformed, and of limited aerial extent (Geo/Resource Consultants, Inc., 1984). Bentonite typically has the characteristic of swelling to many times its original size when wet (Geo/Resource Consultants, Inc. 1984) and was first mined on a small scale in Wyoming during the 1880s. More substantial deposits were discovered during the 1920s (Black Hills Bentonite, LLC 2002). Although bentonite is known to occur in the planning area, there has been no commercial production. Dipping beds, coal withdrawals preventing location of mining claims for bentonite in some parts of the planning area, and other factors, such as the abundance of economically mineable bentonite elsewhere in Wyoming, have resulted in a low probability of development of bentonite during the life of the plan.

The planning area has seen little development of gemstones, and minimal production is expected in the future. Mining claims and associated exploration for diamonds occurred recently in the southeast portions of the planning area; however, no major discoveries are known to have occurred.

Although there are small deposits of various metals in the planning area, none is economically significant and very little activity is anticipated during the life of the RMP.

Management challenges identified for locatable minerals in the planning area generally are related to conflicts with other resources. The locatable minerals program involves authorizing and permitting of mineral exploration, mining, and reclamation actions on BLM-administered public lands. Operations of greater than negligible disturbance of the surface of the mining claim or site require authorization. The necessary authorizations and permits are obtained through the Kemmerer Field Office in coordination with the State of Wyoming DEQ, Land Quality Division. Regulations provide for three levels of disturbance, the last two of which require authorizations: (1) casual use, (2) notice level, and (3) plans of operations. The program also oversees proper surface use and occupancy of mining claims.

Management actions for locatable minerals generally address those areas open or withdrawn from locatable mineral entry. Restrictions on locatable mineral surface disturbance result from management actions identified in other resource programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.2 Leasable – Oil and Gas

Oil and gas reserves in the planning area have been the focus of industry attention since commercial discoveries began around the year 1900 (BLM 2003a). Oil and gas production in the Green River basin, as a whole, began with the 1916 discovery of Lost Soldier Field (Law 1995). Oil and gas exploration of the Overthrust Belt dates back to the 1890s, and this area has been the focus of intense exploration, including seismic and drilling programs, since the mid 1970s (BLM 2003a).

In simplest terms, oil and gas is most often found in the pore spaces of sedimentary rocks such as sandstone and limestone, having migrated there from source rocks, such as marine shales, rich in organic material. When source rocks become heated and are under pressure, the organic compounds break down over time, resulting in oil and natural gas. As the oil and gas develops, it migrates through the pore spaces of the rock or along fractures until it encounters a structural or stratigraphic trap with pore spaces or fractures.

In the Kemmerer planning area portion of the Green River basin, concentrations of hydrocarbons are associated with the Moxa Arch. Production in the Green River basin portion of the planning area is mainly from fields located in, and adjacent to, the La Barge Platform-Moxa Arch trend (Law 1995) in eastern Lincoln and Uinta counties and western Sweetwater County. Productive reservoirs range from Paleozoic through Tertiary in age and are predominantly sandstone.

The faulted and folded strata of the Overthrust Belt contain many structural traps for hydrocarbons in the subsurface. Twenty-nine oil and gas fields occur in the Thrust Belt Province in traps found in three of the major thrust systems (Powers 1995). In the Overthrust portion of the planning area, oil and gas production occurs in the area of Evanston and to the north, primarily in Uinta County; however, some production occurs in Lincoln County as well.

The majority of federal mineral estate in the planning area (1,118,602 acres or 71%) is considered by the BLM to have low development potential for oil and gas resources. Approximately 315,651 acres (20%) of federal mineral estate in the planning area are classified as moderate and 112,160 (7%) are classified as high development potential for oil and gas. An area of moderate oil and gas potential is located in the eastern part of the planning area in Uinta, Lincoln, and Sweetwater counties. A map showing oil and gas potential for the planning area is available in the Final Reasonable Foreseeable Development (RFD) Scenario for Oil and Gas (BLM 2006b). A smaller area of moderate potential is in Uinta and Lincoln counties in the southwestern part of the planning area. The areas of moderate potential are bordered by locations considered to have low potential.

The majority of technically recoverable federal natural gas resources within the planning area are either administratively unavailable for leasing or available subject to constraints. About 7 percent of the potential federal resources are administratively unavailable, with about 2 percent administratively unavailable by statute. All leases issued have some restrictions (i.e., standard lease stipulations); however, some leases may be issued with additional restrictions (i.e., major or moderate constraints).

Another mode of occurrence for natural gas is CBNG, where the gas is trapped in the coal when it was created. CBNG has become an economically important source of gas production, particularly in the San Juan basin of New Mexico and Powder River basin of Wyoming. The 2006 RFD contains a more detailed explanation of these processes (BLM 2006b), as well as identifying important oil- and gas-producing formations.

The 2006 RFD addressed CBNG, but potential is relatively low (BLM 2006b). Areas with low potential for CBNG resources are concentrated in the central portion of the planning area along the eastern edge of the Overthrust Belt. Two additional low-potential areas occur in the southwestern Wyoming Province portion of the planning area. The remainder of the area is considered to have no potential for CBNG.

Exploration activity for CBNG in the southwestern Wyoming Province as a whole has been low to moderate. Drilling activity has focused outside the planning area in the Rock Springs Formation and at other locations (Law 1995). The high water content of the coal has been an obstacle to economic gas production.

Several CBNG wells have been drilled on fee or state lands and one well on federal mineral estate. Additional CBNG well development may occur in the planning area if pilot-scale testing is successful.

Leasing procedures for oil, non-CBNG, and CBNG are the same. Based on the federal Onshore Oil and Gas Leasing Reform Act of 1987, all parcels must be subject to competitive sale. Lands that do not receive competitive interest are available for noncompetitive leasing for a period not to exceed 2 years. Currently, BLM holds quarterly competitive sales. Leases are issued for a term of 10 years, and expire unless they are extended, suspended, or held by production. If the lessee establishes hydrocarbon production, leases are held as long as oil or gas is produced. The federal government receives yearly rental fees on nonproducing leases. The State of Wyoming also receives 52 percent of all money generated from the sale and rental of oil and gas leases. BLM receives royalties on producing leases, of which 48 percent is returned to the State of Wyoming. According to the RFD scenario for oil and gas, approximately 1.1-million acres of 1.6-million acres of BLM-administered mineral estate contain active oil and gas leases (BLM 2006b).

Prior to drilling on a federal lease within the planning area, an application for permit to drill (APD) must be filed with the Wyoming Oil and Gas Conservation Commission (WOGCC) and the BLM Kemmerer Field Office. If BLM holds the mineral lease, but not the surface estate, BLM's permitting process is used. BLM requires a good faith effort for the operator to reach a Surface Use Agreement with the surface owner. When agreements cannot be reached, operators post a bond to ensure proper reclamation of the surface. If BLM holds the surface estate but does not hold the mineral estate the drilling permit is authorized by the WOGCC and BLM issues the operator a right-of-way for the surface use necessary for mineral development. Once the permit is approved, the company proceeds with drilling according to the applicable oil and gas lease stipulations and any site-specific conditions of approval (COAs) that are applied to the permit at the time of approval.

When an oil and gas lease is issued, it constitutes a valid existing right; BLM cannot unilaterally change the terms and conditions of the lease. Existing leases would not be affected by decisions resulting from this RMP that designate areas administratively unavailable for oil and gas leasing. New restrictions such as controlled surface use or timing restrictions in the form of stipulations could not be added to an existing lease. Existing leases would not be terminated until the lease expires. However, based on site- or project-specific environmental analysis, COAs could be applied at the APD and Sundry Notice stage, and at subsequent development stages, to mitigate potential impacts from oil and gas operations within existing lease areas, providing the leaseholder's right to develop the lease remains intact. By regulation, nondiscretionary closures to oil and gas leasing, exploration, and development would apply to incorporated municipalities and wilderness study areas (WSAs). As provided by regulation, existing pre-Federal Land Policy and Management Act (FLPMA) oil and gas leases are exempt from this restriction.

The BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the WOGCC is responsible for authorizing all operations on state and private surface land, except exploration authorized under a lease. Geophysical operations are authorized using guidance from BLM Handbook 3150-1 and the Wyoming Supplemental Handbook to 3150. Operators may apply for geophysical projects using Form 3150-4 (Notice of Intent to Conduct Oil and Gas Geophysical Exploration Operations), or if the project is located entirely on-lease, geophysical operations can be applied for and authorized under a Sundry Notice (Form 3160-5). Geophysical operations occur on leased and unleased lands and are authorized on a case-by-case basis. COAs are added to the project based on site-specific reviews in order to minimize the impacts to various resources.

As of 2003, 58 oil and gas fields were named and producing within the planning area. Table 3-6 shows production for the 58 oil and gas fields, which occurred wholly or partially within the planning area, by basin, as of 2003 (BLM 2006b).

Oil and gas reserves, both proven and potential, can be evaluated using different methods and assumptions. With the continuing increase in demand, a number of studies identify where and how much oil and gas remains to develop. The most comprehensive of these studies, completed by the U.S. Geological Survey (USGS) in 1996, looked at potential onshore oil and gas reserves in the United States. Other studies, completed since the USGS study, focus on a particular geographic region or basin. The RFD scenario for oil and gas (BLM 2006b) describes studies pertaining to the planning area, including their assumptions and results. Table 3-7 is a distillation of the RFD discussion and shows the range of estimates made for oil and gas reserves in the planning area.

The oil and gas industry impacts the economy of the planning area. Employment and income follow the drilling and production cycle, which follows the prices for oil and gas. These relationships are discussed in more detail in the Socioeconomic Resources section of this document. The baseline unconstrained RFD scenario for oil and gas projects approximately 2,040 wells (947 federal and 1,093 state and fee) to

be developed in the planning area between 2001 and 2020. Similarly, the unconstrained RFD projects 640 wells (274 federal and 366 state and fee) will be drilled for CBNG in the planning area by 2020 (BLM 2006b).

Table 3-6. Field Statistics for Oil and Gas Production in the Kemmerer Planning Area as of 2003

Field	Gas (mcf)	Oil (bbls)	Water (bbls)
Wyoming Oil And Gas Conservation Commission—Green River Basin			
Church Buttes	288,306,279	1,280,469	1,549,957
Willow Creek	410,635	66	1,276
Emigrant Springs	42,615,564	758,302	293,478
Opal	1,963,669	35,150	2,624
Moxa	6,284,808	10,965	21,433
Wilson Ranch	122,537,355	1,107,024	267,406
Bruff	743,517,641	4,273,020	3,136,255
Shute Creek	55,606,236	821,548	459,934
Storm Shelter	12,641,006	300,115	121,283
Verne	10,110,824	158,322	65,159
Whiskey Butte	169,011,591	1,431,292	644,770
Black Jack	2,778,387	91,269	13,056
Fabian Ditch	142,120,420	739,923	368,309
Sevenmile Gulch	21,459,770	165,610	55,004
Craven Creek	4,693,217	2,233	11,119
Opal Bench	1,888	0	0
Pipeline Crossing	379,854	2,044	4,394
Wild Hare Gulch	3,593,046	46,322	26,108
Henry	71,706,249	5,142,325	370,834
Big Dry Creek	812,592	62,816	14,298
Hickey Mountain	64,221	56,539	2,106
Graham Reservoir	338,020	642,692	435,419
Henry South	4,151,037	642,030	58,546
Luckey Ditch	69,351,345	9,447,331	2,125,838
Milich Ditch	1,585	7,900	1,752
Cow Hollow	106,940,099	1,472,865	596,800
Dog Spring	382,894	2,930	1,112
Taylor Ranch	6,105,418	513,147	167,707
Whiskey Springs	25,844,440	3,247,680	664,041
Legacy	1,019,244	278,854	490,509
Zeigler's Wash	3,132,886	38,741	19,863
Sugarloaf Butte	3,358,254	970,852	7,956
Dodge Rim	137,503	15,350	5,321
Trumpeter	128,481	12,336	2,673
Haven	4,031,935	97,103	61,333
Total Production	**1,925,538,393**	**33,875,165**	**12,067,673**
Wyoming Oil And Gas Conservation Commission—Prospect-Darby-Hogsback Thrust			
Spring Valley	613	60,950	83,847
Aspen	3	2,588	958
Stove Creek	0	593	0
Sulphur Creek	0	1,316	1,269
Horse Trap	1,585,753	6,194	670
Elkol	239	248	100
Lazeart	0	1,358	114
Total Production	**1,586,608**	**73,247**	**86,958**

Table 3-6. Field Statistics for Oil and Gas Production in the Kemmerer Planning Area as of 2003 *(Continued)*

Field	Gas (mcf)	Oil (bbls)	Water (bbls)
Wyoming Oil And Gas Conservation Commission—Absaroka Thrust			
Ryckman Creek	462,646,499	33,438,553	31,107,942
Yellow Creek	62,651,528	2,770,169	1,961,934
Painter Reservoir	1,177,286,105	65,922,030	47,580,651
Whitney Canyon-Carter Creek	721,290,747	9,528,037	1,121,912
Clear Creek	163,281,787	6,291,590	12,088,213
Glasscock Hollow	16,018,170	2,805,166	5,709,907
Road Hollow	45,960,001	1,784,297	266,487
Thomas Canyon	0	2,382	15,291
Woodruff Narrows	3,832,920	21,290	67,634
Anschutz Ranch East	48,940,450	2,416,574	22,265,905
Shurtleff Creek	66,142	14,287	808
Bessie Bottom	1,484,682	152,516	430,917
Chicken Creek	5,652,530	927,529	4,700,355
Session Mountain	12,922,198	158,105	13,927
Painter Reservoir East	1,093,030,917	87,658,448	14,417,091
Collett Creek	3,532,447	793,299	42,717
Total Production	**3,818,597,123**	**214,684,272**	**141,791,691**

Source: BLM 2006b (Report date: 12/31/03)
bbls barrels
mcf thousand cubic feet

Table 3-7. Summary of Oil and Gas Reserve Estimates for the Kemmerer Planning Area

	Gas – Bcf	Oil – MMB	NGL – MMB
Estimated Mean Technically Recoverable Resource Quantities			
Green River Basin/ Moxa Arch Oil and Gas	857	0	26
Green River Basin/ Moxa Arch CBNG	–	0	0
Northern Thrust Oil and Gas	1553	72	245
Northern Thrust CBNG	–	0	0
Cretaceous Stratigraphic Oil and Gas	5	49	0
Cretaceous Stratigraphic CBNG	–	0	0
Crawford Meade Thrust Oil and Gas	32	0	0
Crawford Meade Thrust CBNG	–	0	0
Hogsback Thrust Oil and Gas	335	44	10
Hogsback Thrust CBNG	–	0	0
Absaroka Thrust Oil and Gas	938	171	148
Absaroka Thrust CBNG	–	0	0

Source: LAW 1995
– Estimates for CBNG are not available
Bcf billion cubic feet
CBNG coalbed natural gas
MMB million barrels
NGL natural gas liquids

One method used to locate oil and gas reserves is geophysical exploration—a tool of the oil and gas industry involving bouncing shock waves off subsurface rock layers to determine their thickness and geometry. Shock waves are produced by an energy source and instruments record the waves when they return to the surface. The energy typically comes from the detonation of explosives in a shallow drill hole or from a heavy weight either dropped or vibrated on the ground surface. The resulting shock waves are picked up through a line of sensors, or geophones, connected to a recording truck. Geophysical exploration is done using existing roads, when feasible, but also requires off-road travel.

Generally, there are two kinds of seismic surveys: two-dimensional (2-D) and three-dimensional (3-D). The 2-D surveys comprise single or multiple linear lines with their receivers and source points in the same line extending up to several miles in length, whereas 3-D surveys are conducted over a grid pattern and their source lines and receiver lines are separate. As a result, 3-D surveys can encompass more than 100 square miles.

The BLM is responsible for authorizing and administering geophysical exploration operations on all public surface lands within the planning area, while the WOGCC is responsible for authorizing all operations on state and private surface land, except exploration authorized under a lease. At the leasing stage, standard oil and gas stipulations apply (see Appendix H). Refer to Map 19 for existing oil and gas leases.

Management challenges for the oil and gas program include conflict resolution between mineral resource programs (e.g., oil and gas vs. trona) and complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

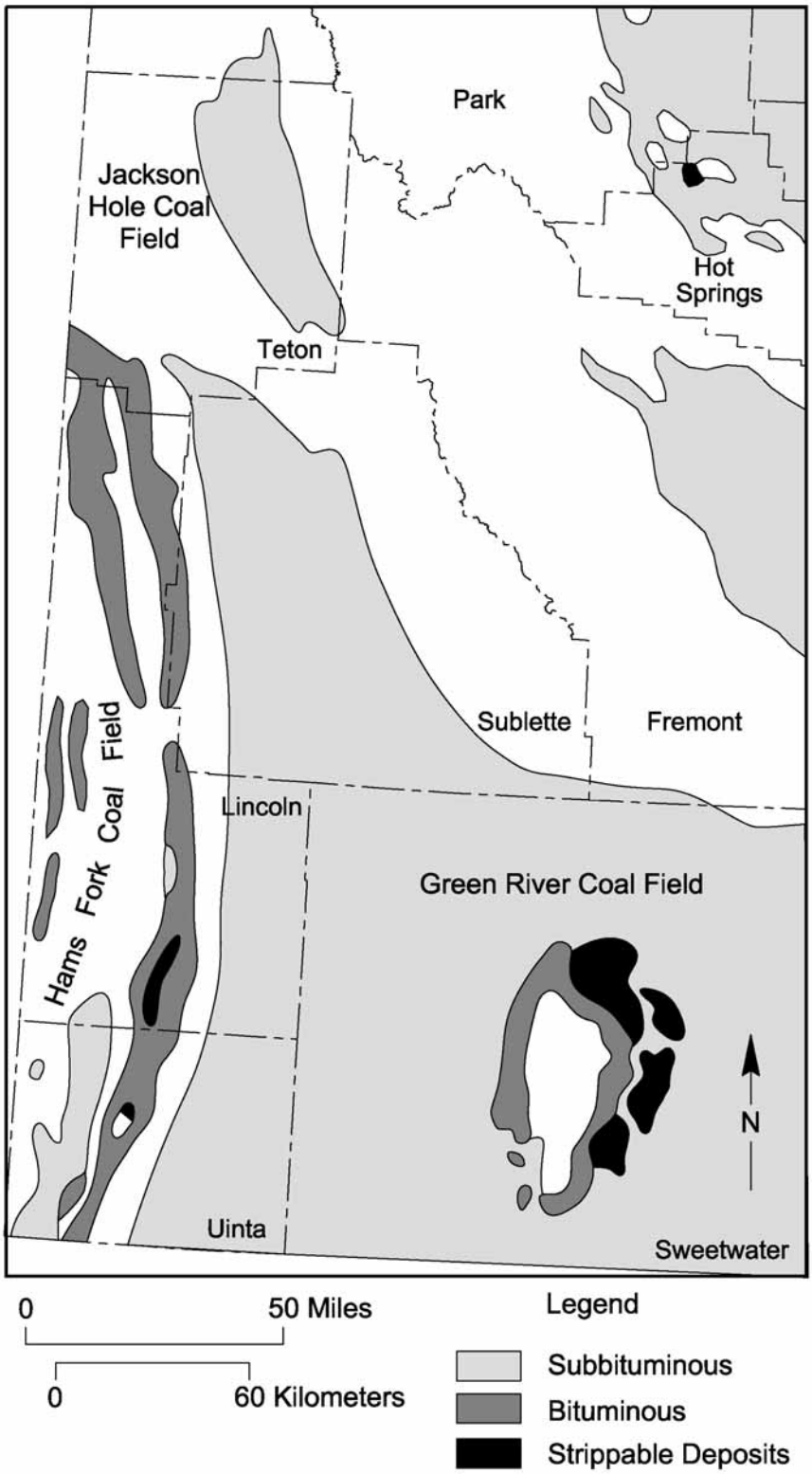
Management actions for oil and gas generally address those areas administratively available and (or) administratively unavailable for leasing. Constraints on oil and gas development typically result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.3 Leasable – Coal

Wyoming has the largest federal coal program in the BLM and is the Nation's largest producer of coal, with about 34 percent of the Nation's coal production. Most Wyoming coal is used for steam generation in the electrical utility industry. The planning area contains bituminous and sub-bituminous deposits. Coal begins as a buildup of carbonaceous plant matter associated with freshwater lowland swamps.

Primary coal reserves occur in the Adaville, Evanston, and Frontier formations of Cretaceous age. Outcrops of coal-bearing formations in the planning area are confined to the Overthrust portion of the area and occur mainly in three north-south-trending belts. The reserves in the Adaville Formation are estimated at 1-billion tons, based on 13 of the formation's coal seams. One seam in the Adaville Formation exceeds 100 feet in thickness; another 17 seams appear to be greater than 6-feet thick. Adaville Formation coal currently is being mined at Chevron Mining, Inc.'s surface mine near Kemmerer. Frontier Formation coals, not presently being mined, have a higher British Thermal Unit (BTU) value than the Adaville coals and contain beds up to 20-feet thick (Glass 1976). The Frontier Formation was extensively mined using underground methods up until the 1950s. Coal reserves in the planning area occur in two major regional coal fields: the Hams Fork Coal Field and the western portion of the Green River Coal Field. Coal production currently is occurring only in the Hams Fork Coal Field at the Kemmerer Mine. Map D shows regional coal fields that overlap the planning area.

Map D. Kemmerer Planning Area Regional Coal Fields



Source: BLM 2004a

The Green River Coal Field covers the largest area in Wyoming, with 16,800-square miles containing more than 1.46-trillion tons of coal (BLM 2004a). The far western edge of this coal region overlaps the eastern portion of the planning area; however, most coal deposits in the Green River coal region portion of the planning area are deeply buried by younger formations, and no surface or underground mining of those coalbeds has occurred. The only named coal field in the western portion of the Green River basin is the La Barge Ridge field in portions of Lincoln and Sublette counties, located outside the planning area.

The Hams Fork Coal Field is Wyoming's fifth largest coal region. The field extends from southwestern Teton County into Lincoln County, western Sublette County, and the western half of Uinta County. It is a narrow elongate field within the Overthrust Belt of western Wyoming (Salt River and Wyoming Ranges) (University of Wyoming 2003). The Hams Fork Coal Field contains sub-bituminous and bituminous coals suitable for mining using both surface and underground methods. The Hams Fork coal region includes the Salt River Range, Greys River Coal Field, Wyoming Range, the McDougal Coal Field, and the Kemmerer Coal Field.

The presence of coal in the Green River region of the planning area was the primary factor for UPRR's decision to build a rail line through southern Wyoming in the 1860s (State of Wyoming 2001). The railway created a demand for coal, as well as the means for transporting it to other regions. By the end of 1868, the railroad had reached as far west as Evanston (State of Wyoming 2001). Coal was discovered on Hams Fork, near Kemmerer, in 1868 (State of Wyoming 2001). High quality coal was known to be in the area based on federal surveys in 1874. Hams Fork Coal Company (later the Diamond Coal and Coke Company, a subsidiary of Anaconda Copper Company) was established during this time (Wyoming Tails and Trails 2003). Coal mining began near Kemmerer when UPRR opened a mine at Twin Creek in 1881 and completed a spur track to Kemmerer in 1885 (City of Kemmerer 2003). However, mining did not begin in earnest until 1897 when the Kemmerer Coal Company was founded. After trains switched to diesel engines in the 1950s, most underground coal mines shut down.

Open-pit mining in the planning area began in 1963 (University of Wyoming 2003). Current federal coal production is centered in Lincoln County west of Kemmerer. The only production from the Hams Fork Coal Region is within the planning area. The fields are characterized by coal reserves ranging from 9,000 to 11,000 BTU/pound and 0.4 percent to 0.9 percent sulfur. The reserves are characterized by steeply dipping seams that have been mined by underground methods in the past, but are currently mined using surface methods only. The relatively thin and divided nature of the seams and the steep dip results in higher mining costs for these seams. The only major surface mining company at this time is Chevron Mining, Inc., which operates a mine west of Kemmerer. Chevron Mining Inc. has 8,679 acres of federal coal leases, produced 4.6-million tons of coal in 2005, and has a planned production of 4.5- to 5-million tons per year in the near future. This coal is produced from multiple seams in the Adaville Formation. The coalbeds dip about 20 degrees [°F or °C] and the coal is extracted using truck and shovel surface-mining methods. The Kemmerer Mine is the largest and deepest open-pit coal mine in the nation.

FMC Corporation's Skull Point Mine was located next to the Kemmerer Mine. The Skull Point Mine was later acquired by Pittsburg and Midway (P&M) (UPRR 2003). Chevron Texaco acquired P&M in 2003 (City of Kemmerer 2003). In general, the coal at this mine has a heat content of BTU of 9,889 per pound, a sulfur content of 0.95 percent, a moisture content of 22 percent, a volatile material content of 34 percent, and a fixed carbon content of 39.5 percent; these values vary throughout the mine area. Table 3-8 lists coal production at the Kemmerer Mine from 2001 through 2005.

Table 3-8. Kemmerer Mine Production, 2001 - 2005

Year	2001	2002	2003	2004	2005
Coal Produced (million tons)	4.5	4.2	4.1	4.5	4.6

Source: SIM 2005

Coal leasing is considered on all federal lands in the planning area other than the Raymond Mountain WSA. Exploration on federal lands is subject to the requirements and conditions of the coal exploration license process, the result being a set of project-specific stipulations and conditions designed to limit impacts from exploration on other resources. Before the area can be considered for leasing, the amount of overburden, volume and quality of coal, and other information needed to plan a mine must be gathered. The BLM Solid Minerals Group in the Rock Springs Field Office has the primary responsibility for all coal operations within both the Rock Springs and Kemmerer planning areas (including inspection and enforcement) on federal lands.

Table 3-9 summarizes leasable coal areas by type. Lands that are nominated for coal leasing, which is done under a process called Lease By Application (LBA), are subject to a review known as the coal-screening process which is described in 43 CFR 3420.1-4 (see the *Coal Screening Summary Report* available at www.blm.gov/rmp/kemmerer/).

Table 3-9. Mined and Unmined Coal Leases and Lease By Applications as of 2003 (acres)

	Unmined	Mined
Federal Coal Leases	8,431	248
Lease By Application	3,963	0
State/Private Coal Leases	–	2,180
Total	–	2,428

Source: Clawson 2003
– Data not available

The four steps of the coal screening process are:

1. Identify areas of federal coal with development potential.
2. Apply the unsuitability criteria listed in 43 CFR 3461.
3. Identify other multiple-use conflicts.
4. Consult with qualified surface owners.

These four screens are described in 43 CFR 3420.1-4(e)(1-4). The areas of federal coal that pass through these screens are identified as acceptable for further consideration for leasing. The BLM compiled a Coal Screening Summary Report in July 2004, which describes application of the screens for the Kemmerer planning area in detail. The paragraphs and tables below briefly summarize the results.

Step 1: Identify areas of federal coal with development potential

In 2003, BLM published a Notice of Intent to revise the Kemmerer RMP in the Federal Register. This notice included a call for parties interested in coal leasing and development to submit coal resource data for their areas of interest. The only area of interest was the current Haystack federal lease application area (LBA), which covers 300 acres in Section 30, T 17 N, R 117 W, containing an estimated 16,500,000 tons of recoverable coal. The BLM identified a total of six sections (3,963 acres) of federal coal under BLM surface in the LBA and surrounding vicinity as having coal development potential based on previous coal leasing in the area, past and present mining proposals and exploration, and data contained in U.S. Geological Survey Coal Resource Occurrence-Coal Development Potential maps.

Step 2: Apply the unsuitability criteria listed in 43 CFR 3461, as follows:

- Criterion 1 – Federal Land Systems
- Criterion 2 – Rights-of-Way and Easements

- Criterion 3 – Dwellings/Roads/Cemeteries/Public Buildings
- Criterion 4 – Wilderness Study Areas
- Criterion 5 – Visual Resources
- Criterion 6 – Scientific Studies
- Criterion 7 – National Register of Historic Places
- Criterion 8 – National Natural Landmarks
- Criterion 9 – Federally-Listed Endangered Species Habitat
- Criterion 10 – State-Listed Endangered Species Habitat
- Criterion 11 – Bald and Golden Eagle Nest Sites
- Criterion 12 – Bald and Golden Eagle Roosts
- Criterion 13 – Falcon Cliff Nesting Sites
- Criterion 14 – Migratory Bird Habitat
- Criterion 15 – Habitat for State High-Interest Wildlife and Plants
- Criterion 16 – Riverine/Coastal and Special Floodplains
- Criterion 17 – Municipal Watersheds
- Criterion 18 – National Resource Waters
- Criterion 19 – Alluvial Valley Floors
- Criterion 20 – Criteria proposed by a State or Indian Tribe and adopted by U.S. Department of the Interior (USDI).

Of the 20 unsuitability criteria, only those in Table 3-10 applied to lands in the analysis area.

Table 3-10. Acres or Facilities Potentially Affected by the Unsuitability Criteria in the Kemmerer Planning Area

Criterion	Potentially Affected Acres or Facilities
No. 2 – Rights-of-way and Easements	1 gas pipeline 1 electric utility line
No. 7 – National Register of Historic Places	447.5 acres (sites potentially eligible for listing)
No. 9 – Federally Listed Endangered Species Habitat	3,318 acres (black-footed ferret habitat)
No. 11 – Bald and Golden Eagle Nest Sites	1,557 acres (nests with ½-mile buffer)
No. 15 – Habitat for State High-Interest Wildlife and Plants	3,348 acres (crucial big game winter range) 1,311 acres (greater sage-grouse leks with 0.6-mile buffer)

Source: 2004 Coal Screening Report; BLM 2008b

No areas were found to be unsuitable for leasing under any of the criteria after exemptions and exceptions under 43 CFR 3461 were applied. However, the criteria listed above may require special lease or mine permit stipulations to mitigate identified concerns. Some overlap exists between areas covered by different criteria.

Step 3: Identify other multiple-use conflicts

The third screen involved a multiple use conflict evaluation of values other than those contained in the unsuitability criteria. For example, paleontological features, BLM sensitive species, wetlands, and oil and

gas development were some of the values examined under the multiple use conflict evaluation. No areas were found to be unacceptable for coal development as a result of the analysis. The following resources may require special lease or mine permit stipulations to mitigate identified concerns (Table 3-11). Some overlap exists between areas identified for the different topics.

Table 3-11. Areas that May Require Special Lease or Mine Permit Stipulations to Mitigate the Multiple Use Conflict in the Kemmerer Planning Area

Multiple Use Conflict	Area Potentially Affected
Oil and gas development	3,963 acres
Archeological areas	447 acres
Wetlands	See Figure 12 of Coal Screening Summary Report (BLM 2004b)
Native American sensitive sites	680 acres

Step 4: Consult with qualified surface owners

This fourth screen identifies areas where a significant number of qualified surface owners over federal coal have expressed a preference against surface mining. Since none of the lands involve split-estate (private surface over federal coal), the fourth screen was not relevant to the analysis and no acres were deleted from further consideration for leasing due to this screen. The surface of all the screened lands is managed by BLM.

Acres of unleased federal coal that went through the screening process are shown in Table 3-12:

Table 3-12. Acres of Unleased Federal Coal Processed through the Coal Screening Process

Coal Planning Screen	Acres
Federal coal with development potential	3,963 (LBA)
Areas deleted by unsuitability criteria	0
Areas deleted due to multiple use conflicts	0
Areas deleted by surface owner consultation	0
Total areas of federal coal acceptable for further consideration for leasing	3,963

Although no lands were found unsuitable or unacceptable for further consideration for leasing, the analysis revealed that the lands within the review area need certain conditional requirements or mitigating measures to be considered acceptable for further consideration for leasing. Those measures are summarized below:

1. Mitigation of impacts of proposed mining to cultural sites, and consultation with Native American tribes.
2. Protection or relocation of existing utility lines.
3. Resolving possible oil and gas/coal conflicts through appropriate lease stipulations on new oil and gas and coal leases.
4. Conducting new field investigations to determine if certain methods of coal mining can occur without having a long-term adverse effect on select wildlife, and especially on threatened and endangered species. This includes, but is not limited to surveying any areas proposed to be leased to determine if they may support a BLM sensitive or state or federally listed endangered species. If any such species were found, such lands would be acceptable for further consideration for leasing only with a provision that appropriate mitigation measures will be developed that will protect the long-term interests of the species and habitats involved. Prior to leasing, surveys will

be completed for bald and golden eagle roosts and nests, falcon cliff nesting sites, and birds protected under the Migratory Bird Treaty Act and of high federal interest. Mitigation measures may include, but are not limited to, seasonal operations in some areas, buffer zones around occupied eagle or falcon nests, habitat improvement or development, special reclamation measures, or other appropriate measures for long-term habitat protection. Mitigating measures will be combined with appropriate mining methods to manage the potential adverse effects of mining in critical big game winter range. Sage grouse habitat areas will require appropriate mitigating measures for coal exploration, development, and ancillary facilities.

Future LBAs, if any, will be reviewed by the BLM on a case-by-case basis using the coal screening process.

Management challenges for the coal program include conflict resolution between mineral resource programs (e.g., oil and gas vs. coal) and complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for coal identify areas of federal coal acceptable for further lease consideration. Restrictions on coal result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.4 Leasable – Sodium (Trona)

The world's largest known trona deposit is located in southwestern Wyoming and extends into the eastern portion of the planning area (BLM 2004a). All trona in the planning area is mined underground. Trona is a hydrous sodium carbonate mineral refined into soda ash, sodium bicarbonate, sodium sulfite, sodium tripolyphosphate, and chemical caustic soda (WSGS 2002). Soda ash is the trade name for sodium carbonate, a chemical obtained from trona and sodium-carbonate-bearing brines (USGS 2003). Soda ash is used in a wide variety of applications: glass production accounts for 48 percent of the domestic use; the chemical industry accounts for 26 percent; soap and detergents, 14 percent; and other users, such as the pulp and paper, water treatment industries, and the manufacture of baking soda, make up the remaining 12 percent (WSGS 2002). Soda ash can be synthetically manufactured from salt and limestone, both of which are practically inexhaustible; however, synthetic soda ash is more costly to produce and generates environmentally harmful wastes (USGS 2003).

Trona resources found on federal lands are considered leasable minerals. The area where trona is known to exceed 4 feet in thickness is part of the Known Sodium Leasing Area (KSLA), which covers about 1,100 square miles, half of which is in the eastern portion of the planning area (see Volume 2, Map 13).

All public lands within the KSLA currently not leased are available for leasing consideration. Sodium leases are subject to renewal every 10 years after the initial 20-year term. Prospecting permits outside of the KSLA are considered and modified when necessary to ensure consistency with the objectives of protecting other resources. Prospecting permits may be denied if it is determined that exploration or development impacts are inconsistent with other resource management objectives. In addition to prospecting permits for sodium, exploration licenses may be issued within the KSLA for sodium lands that are not currently leased.

The Kemmerer Field Office is involved in developing mitigating measures for prospecting permits, trona leases, and surface-disturbing activities on those leases. In addition, the Solid Minerals group in Rock Springs is responsible for managing trona in the KSLA, including operations within the planning area (Clawson 2003). The group comprises geologists, mining engineers, and environmental specialists. Its primary responsibilities include processing new lease applications and post leasing actions. A large component of the group's activity is to conduct inspections of active mines. At a minimum, all active mines are inspected on a quarterly basis and all leases are inspected annually. The group also carries out production verification inspections to confirm that the lessee's reported extraction values are correct.

Through the preparation of environmental documents, the Kemmerer Field Office provides input to the Solid Minerals group regarding surface resources impacted by trona development.

An evaluation regarding safety issues associated with oil and gas drilling within or near active trona mining areas resulted in suspension of existing oil and gas leases in the Mechanically Mineable Trona Area (MMTA) since 1995. No new oil and gas leases are being issued in the MMTA until safety issues are resolved. The MMTA is an area generally defined by active trona mining, as well as various geologic factors, including trona bed thickness, depth below the surface, and purity.

The trona is found in the Green River Formation of Eocene age. The Wilkins Peak Member of the Green River Formation includes at least 42 trona beds, occurring from 400 to 3,500 feet below the surface. In the trona deposition area, which extends outside the planning area, there are about 36 billion tons of halite-free trona, and 25 billion tons of mixed trona and halite, that occur in beds more than 1.8 meters in thickness (USGS 2007).

Ninety percent of the Nation's trona production and 30 percent of the world's soda ash production comes from southwestern Wyoming, with four of the five underground mines in the planning area. Trona mining began in southwestern Wyoming in 1947. Wyoming production of trona in 2005 totaled more than 13-million short tons. About 1.8 tons of trona are required to produce 1 ton of soda ash. Approximately 35 percent of Wyoming soda ash production is exported to other countries. According to the American Natural Soda Ash Corporation, approximately 4.41-million short tons of soda ash were exported from Wyoming in 2000 (WSGS 2002).

Within the planning area, FMC Wyoming Corporation, General Chemical Corporation, and Solvay Minerals, Inc., produce trona from four underground mines. The FMC Granger Mine is being operated as a solution mine because the conventionally operated Granger Mine workings are flooded with water; therefore, the saturated solution is pumped to the Granger Soda Ash Plant for recovery. Solution mining represents only a small fraction of total production. Most trona production is by conventional room and pillar as well as longwall mining. FMC Westvaco and General Chemical mines have separate facilities for underground solution mining of trona (drawing water with dissolved trona from the underground workings), both of which are temporarily shut down. Three trona lessors (federal, state, and private) have issued leases within the KSLA in the Granger/Little America area. Table 3-13 shows trona production by mine in 2005.

In addition to numerous sodium leases for trona, there is a sodium lease for halite (sodium chloride) in the planning area located about 50 miles northwest of Kemmerer on a small salt spring in the Bridger-Teton National Forest. Some intermittent production of salt brine has occurred for use as a binder on roads.

Table 3-13. Trona Production by Mine, 2005

Mine Name	County	Facilities Operated	Production (estimated tons)
Granger Mine/FMC Wyoming Corporation	Sweetwater	Underground Mine Processing	130,000
Westvaco Mine/FMC Wyoming Corporation	Sweetwater	Underground Mine Processing	4.7 million
Alchem Mine/General Chemical Corporation	Sweetwater	Underground Mine Processing	4.7 million
Solvay Trona Mine/ Solvay Chemicals, Inc.	Sweetwater	Underground Mine Processing	4.0 million
Total: Underground Mines: 13.53 million tons			

Source: SIM 2005

Restrictions on trona leasing and development generally result from management actions identified in other resource programs. Management challenges involve surface tailings disposal, air quality, and multiple mineral development conflicts, primarily between oil and gas and trona. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.5 Leasable – Other Solid Leasables

Other than coal and trona, solid leasable minerals in the planning area include oil shale and phosphate. Access to BLM-administered leasable minerals is at the BLM's discretion.

The Green River basin, which covers a large area in southwest Wyoming, northwest Colorado, and northeast Utah, contains an estimated 244-billion barrels of shale oil in the Tipton Shale Member, Wilkins Peak Member, and Laney Member of the Green River Formation. This estimate is based on oil shale that yields at least 15 gallons of oil per ton of rock. Oil shale occurs throughout most of the Green River basin and in thin beds (less than 4-feet thick) in Fossil basin. The most notable oil shale resources in the Kemmerer Field Office are located toward the southeastern boundary of the area around Flaming Gorge Reservoir. The beds in the upper part of the Tipton Shale are up to 75-feet thick and yield up to 24 gallons of oil per ton. Overburden is 2,000- to 3,000-feet thick. Other important oil shale beds in the Wilkins Peak Member and the Laney Member are slightly to the east of the southeast border of the Kemmerer planning area.

There are at present no regulations in place for leasing oil shale, nor any existing oil shale leases. Lands containing oil shale resources were originally identified through an inventory that portrayed the occurrence of the Green River geologic formation in Utah, Wyoming, and Colorado. Once identified, lands containing oil shale resources were withdrawn from mineral entry through a 1930 Executive Order, which was later modified to allow for oil, gas, and sodium leasing. Since that time, the economic potential for the oil shale resource has been further defined, now comprising a smaller area in the three states.

When the Kemmerer Resource Management Plan (revision) was initiated in 2003, there was no reasonable foreseeable development expectation for oil shale over the life of the plan. The mineral report identified this resource, but did not foresee any future leasing or development due to lack of regulations as well as prevailing and anticipated economic factors.

All decisions related to oil shale leasing in this Resource Management Plan are being deferred to the ongoing Programmatic EIS and Plan Amendments for Oil Shale and Tar Sands Resources Leasing on Lands Administered by the BLM in Colorado, Utah, and Wyoming (USDI 2007c). The Record of Decision on the final Programmatic EIS will amend the existing plan by making allocation decisions on whether or not to allow leasing and future development of oil shale on public lands for those areas where the resource is present. For oil shale, the scope of the Programmatic EIS analysis will include the entire extent of the Green River, Washakie, Uinta, and Piceance Creek basins (USDI 2007c). These decisions will amend the Kemmerer RMP. Additional opportunities for public involvement and comment will occur when the Programmatic EIS becomes available in draft form (USDI 2007c). Site-specific requirements will be addressed in future National Environmental Protection Act (42 United States Code [USC] § 4321 et seq.) (NEPA) analysis for individual project applications after the Programmatic EIS is completed.

Areas containing known deposits of oil shale are available for oil shale lease consideration where it is not inconsistent with existing laws and regulations, Executive Orders (EOs), and Areas of Critical Environmental Concern (ACECs). Oil shale leasing will not be considered in areas where it would jeopardize the safe operation of existing trona mines.

Phosphate rock and associated vanadium occurs at the surface in north-south-trending outcrops of the Phosphoria Formation, located in the Overthrust portion of the planning area. Mining has occurred in the past in various surface and underground mines, beginning with an underground mine near Cokeville in 1906, which had the first production in Wyoming. The last federal phosphate leases in the Kemmerer Field Office area, relinquished in 1995, were located in the Sublette Range north of Cokeville, Wyoming. Currently, most phosphate rock production in the United States is from Florida, North Carolina, Utah, and Idaho. Currently, no production of phosphate occurs in the planning area.

Prospecting permits for phosphate will be considered in all areas. Appropriate stipulations will be added to protect other resources. Prospecting permits for phosphate may be denied if it is determined that impacts from exploration or development are inconsistent with the objectives of the RMP. If prospecting eventually leads to leasing, those leases will be conditioned to avoid adverse impacts to other resources.

Management challenges for other solid leasable minerals generally are related to program management issues, such as complying with restrictions imposed by other resource programs (e.g., wildlife stipulations).

Management actions for other solid leasables generally address areas open and (or) closed for leasing. Restrictions on development of other solid leasables result from management actions identified in other resource programs. These management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.2.6 Salable

Salable minerals, also known as mineral materials, include common variety materials, such as sand, stone, gravel, pumice, pumicite, cinders and clay, as well as petrified wood. The Kemmerer Field Office administers the permits for salable minerals. The office maintains two community pits and one common use area, which provide relatively small amounts of mineral materials to the public using nonexclusive contracts. Those contracts generally are for sand and gravel, shale, moss rock, and boulders. The Kemmerer Field Office also issues exclusive use permits when the request is to obtain mineral materials from a specific location as an exclusive permittee. This is done as a "Free Use Permit" (usually for government entities such as city, county, or state) or as a commercial sale. The sale may be noncompetitive or involve bids at a competitive sale if the volume is above 200,000 cubic yards or there is competitive interest in the deposit. Depending on the size and nature of a sale or Free Use Permit, a mining and reclamation bond may be required. Mine permit and bond requirements are coordinated with the Wyoming DEQ, Land Quality Division, under a Memorandum of Understanding (MOU). Another method to dispose of mineral materials, particularly borrow material and sand and gravel, is the Material Site Right-of-Way. The Wyoming Department of Transportation (WYDOT) uses Material Site ROW to obtain salable minerals from the BLM for road construction that involves federal funds.

Table 3-14 shows the number of active sales, quantity produced, and values of mineral materials produced in fiscal year (FY) 2003 (BLM 2003a). Table 3-15 displays the production statistics of salable minerals according to type of disposal in the planning area for FY 2003.

Table 3-14. Mineral Material Disposal Types and Commodities for Fiscal Year 2003

Type of Disposal	Number of Sites	Total Amount Authorized	Commodity	Comments
Negotiated Sales (active cases)	1	98,000 cubic yards	Borrow	None
Competitive Sales (active cases)	0	0	N/A	None
BLM Common Use Area	1	996 tons from 1998 through 2003	Mostly moss rock, some boulders	None
Material Sites ROWs	19	Unknown	Sand and gravel and limestone	Issued to Wyoming DOT
BLM Giraffe Creek Community Pit	1	1,160 cubic yards from 1998 through 2003	Limestone	Talus

Table 3-14. Mineral Material Disposal Types and Commodities for Fiscal Year 2003 *(Continued)*

Type of Disposal	Number of Sites	Total Amount Authorized	Commodity	Comments
BLM Cokeville Community Pit	1	300 cubic yards from 1998 through 2003	Limestone	Talus
BLM Willow Springs Community Pit	1	20 cubic yards from 1998 through 2003	Sand and gravel	Pit closed
Free Use Permit (active cases)	3	38,000 cubic yards from 1998 through 2003	Sand and gravel	Two permits to Lincoln County, one permit to Uinta County

Source: McNaughton 2003
BLM Bureau of Land Management
DOT Department of Transportation
N/A Not Applicable
ROW rights-of-way

Table 3-15. Salable Mineral Production in the Kemmerer Planning Area for Fiscal Year 2003

Type of Disposal	Number of Permits	Quantity Produced	Value ($)
Community Pit Sales	4	520 cubic yards	$130
Common Use Area Sales	10	291 tons	$2,910
Negotiated Sales	0	0	0
Competitive Sales	0	0	0
Free Use Permits	1	10,000 cubic yards	$7,500

Source: BLM 2003i

The following sections describe the primary salable minerals of the planning area, including sand and gravel, decorative stone, and limestone and sandstone. Most salable minerals are common construction materials; the demand for these materials is linked to the area's economy. Aggregate (sand and gravel) demand is expected to remain high. Aggregate is one of the most widely used salable resources in Wyoming and in the planning area (WSGS 2005b). The four types of sand and gravel deposits in the planning area include alluvial sand and gravel from recent stream deposits, glacial sand and gravel in the southern portion of the planning area, Quaternary terrace gravels, and older sand and gravel deposits of Late Cretaceous to Pleistocene age.

The primary sand and gravel deposits in the planning area are in the Star Valley (Salt River drainage) and along other major drainages, including the Bear River, Blacks Fork, Smiths Fork, Hams Fork, and Green River. There are three free-use permit areas for county governments and numerous Material Site ROW issued to the Wyoming DOT. Material sites can be authorized for federal aid highway projects. The Kemmerer Field Office has averaged 14 salable mineral authorizations per year over the last 4 years, including negotiated sales such as those in community pits and the common use area, free use permits, and authorizations for exploration. Numerous older gravel pits occur throughout the area, many of which were originally issued to the Wyoming DOT.

Decorative stone is defined as "any type of rock product exclusive of aggregate that is used for its color or appearance" (Harris 1993). Currently, building stone and moss rock is being produced, though other varieties of decorative stone have been produced in the past. An active market has developed for moss rock, or lichen-covered sandstone, which is mainly found on hogback ridges in the Overthrust Belt portion of the planning area, as well as flagstone of varying thickness. Current production and demand for building stone and moss rock are expected to continue at their current rates. However, this is dependent on the growth rate in the building industry as well as other economic factors.

About 1,000 tons of moss rock have been sold from public land in the planning area since 1998. This demand continues, especially from the Jackson Hole area and the Wasatch Front area in Northern Utah. In 2003, 520 tons were sold from scattered locations in the Overthrust Belt portion of the planning area.

Substantial commercial limestone or sandstone production (other than decorative stone) in the planning area is not expected. Salable limestone is an abundant resource within the planning area; however, there is currently minimal production. Other than relatively small amounts of limestone produced from the Giraffe Creek Community Pit, there are no commercial sales of limestone in the planning area. The Wyoming DOT does however, have a limestone quarry on public land under a Material Site ROW.

Mineral materials are basic natural resources used in construction; however, they generally are bulky and have low unit prices. The sheer weight of mineral materials results in high transportation costs. Adequate local supplies of these basic resources are important to the area's economy. The BLM's policy is to make these materials available to the public and local government agencies whenever possible and wherever it is environmentally acceptable. Additional information on salable minerals may be found in the *Mineral Assessment Report 2004* (BLM 2004a).

Management actions for salable minerals generally address areas closed to mineral material disposal. Restrictions on salable minerals result from actions identified in other resource programs. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.3 Fire and Fuels Management

The Kemmerer Field Office fire management program focuses on two categories of fires: unplanned and planned. Unplanned or wildland fire occurs as the result of an act of nature (e.g., lightning), human accident, or by intent to cause damage. Planned or prescribed fire is used in a controlled manner for specific purposes, such as improving habitats and plant community health and reducing hazardous fuels. Stabilization and (or) rehabilitation may occur following wildland fire. This section describes current management and conditions in the planning area for wildland fire, prescribed fire, and stabilization and rehabilitation.

The wildland fire season generally runs from July to October. Prescribed fires are usually planned for periods following the peak of wildland fire season. Prescribed fire or wildland fire use implies that fire effects are favorable to the resource managed under a specified set of environmental criteria (prescriptions). Planned ignitions imply a planned fire intended to enhance the resource targeted for treatment (e.g., vegetation). Prescribed fire has been used extensively and successfully in the planning area to improve plant communities. From 1995 to 2005, prescribed burns averaged 4,300 acres per year in the Kemmerer planning area. Lightning accounts for most wildland fires in the planning area followed by human-caused fires from fireworks, woodcutting, and campfires.

The planning area is included within the Rawlins Interagency Dispatch Center jurisdiction, the High Desert District fire suppression response zone, and the *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). An annual operating plan is developed between the Kemmerer Field Office and Lincoln, Uinta, and Sweetwater counties to establish operating procedures for coordinated responses and cooperative sharing of resources. The BLM coordinates with the Bridger Teton National Forest, NPS, Fossil Butte National Monument, U.S. Fish and Wildlife Service (USFWS), Seedskadee National Wildlife Refuge, Wyoming State Forestry Division, and the Wyoming Game and Fish Department (WGFD) to ensure compliance with interagency policy and procedure requirements. The BLM also coordinates with private landowners, as needed.

The planning area includes a variety of vegetation communities that vary in their response to fire. For example, sagebrush and grassland communities in the lower elevations and mixed conifer stands in higher elevations are susceptible to fire. In sagebrush and grassland communities, fuel sources include dead vegetation and litter. In mixed conifer stands, fuel sources include dead and downed timber or standing timber with heavy fuel loading due to historic fire suppression and drought. Aspen is not as susceptible to fire as conifers and other woodland species; however, it will burn and carry fire during the late fall and under drought conditions.

Table 3-16 shows historical wildland fire occurrence and fire size between 1980 and 2002 in the planning area. An average of five to six wildland fires per year have occurred in the planning area over the period 1980 to 2002. Acres burned have ranged in size from less than 1 acre to more than 13,000 acres.

Over the past 100 years, fire exclusion in the planning area has caused the general buildup of vegetative fuels and deadwood. In addition, drought conditions in recent years have caused vegetation to be less resistant to fire. Historic fire exclusion in the planning area has altered composition of vegetation communities, as well as natural fire regimes. For example, fire exclusion has allowed sagebrush and juniper communities to dominate some sites, causing a reduction in grass and forb production. In forested areas, suppression activities have increased fuel buildup, saplings, and small, early seral stage trees, making these areas more prone to catastrophic fires.

Table 3-16. Wildland Fire History in the Kemmerer Planning Area, Wyoming (1980 to 2002)

Year	Fire Occurrence	Total Acres	Year	Fire Occurrence	Total Acres
1980	5	422	1992	8	75
1981	18	13,573	1993	2	112
1982	3	181	1994	10	2,213
1983	3	104	1995	0	0
1984	1	0	1996	3	92
1985	18	1,371	1997	0	0
1986	2	11	1998	3	60
1987	4	1,621	1999	4	305
1988	15	8,051	2000	7	1,829
1989	4	21	2001	4	77
1990	4	706	2002	2	3,508
1991	2	100	-	-	-
			Total	122 Fires	34,432

Source: BLM 2003a

Under the existing plan, fire suppression is used to protect resource values and areas. Examples of resources or areas protected from wildland fire under the existing plan include the following:

- Communities
- Campgrounds and other developed recreational areas
- Rock art, cultural sites, and historic structures
- Commercial timber where hazardous fuels exist
- Oil and gas fields and related facilities, utilities, and road ROW
- Lands with intermingled federal, state, and private ownership where currently no agreements for using wildland fire as a resource management tool
- Other areas, as identified through continued public involvement in the fire management planning effort

Under the existing plan, general fire management objectives and strategies for BLM-administered lands in the planning area include, but are not limited to, the following:

- Wildland fire use and prescribed fire will be used to achieve resource objectives identified to reduce hazardous accumulations of fuels.
- Use of heavy equipment for fire management will be minimized and vehicle tracks, fire lines, and emergency access routes may be stabilized to prevent erosion and continued use.
- The BLM will promote public education regarding fire management, including restrictions on the use of fire on public lands.
- All trespass fires (unauthorized human-caused fires on public lands) will be suppressed and responsible parties will be required to pay compensation for all suppression costs.
- Wildland and prescribed fires will be managed in all vegetation types to maintain or improve biological diversity and health of public lands.
- Burned areas will be monitored for the control of noxious weeds. Vegetation treatments and other follow-up management actions will be used, as needed, to prevent the spread of noxious weeds.
- Burned areas will be assessed for Burned Area Emergency Stabilization and Rehabilitation needs.

Under the existing plan, specific fire management objectives and strategies or an appropriate management response are identified for BLM-administered land by nine fire management units comprising the planning area (see Volume 2, Map 20) (BLM 1998b). Fire management units are delineated using broad factors, such as fire frequency, elevation, vegetation, and values at risk, and include the following:

- KFO1 – Star Valley
- KFO2 – Raymond Mountain Wilderness Study Area
- KFO3 – Smiths Fork
- KFO4 – Rock Creek/Slate Creek
- KFO5 – North Cumberland
- KFO6 – Bear River Divide/Carter
- KFO7 – Evanston/Bridger Valley
- KFO8 – South Bridger
- KFO9 – Moxa

3.3.1 Unplanned/Wildland Fire

The BLM in Wyoming emphasizes an appropriate management response (AMR) to wildland fires based on consideration of firefighter and public safety, anticipated management costs, resource values at risk, resource benefits, threats to private property, opportunities for reducing hazardous fuels, criteria for fire management units, and political and social concerns. AMR involves a wide range of fire management options, including wildland fire use, confining or containing a wildland fire so it stays within a predetermined boundary, or aggressively and quickly suppressing the fire. On BLM-administered lands within the planning area, wildland fire is managed to improve natural resources. To reduce wildland fire management costs and increase resource benefits, fires will be allowed to burn up to natural fuel breaks, when feasible.

An essential component of the Kemmerer Field Office's fire management program is protection of the public and property from the adverse impacts of wildland fires; however, unplanned fire can sometimes serve as a management tool to benefit natural resources. For example, the BLM's Fire Management Implementation Plan (BLM 1998b) states, "A naturally-caused fire occurring during favorable conditions in an area with a prescribed burn plan could be treated as a prescribed fire."

Minimal impact suppression techniques and restrictions or prohibitions on the use of heavy equipment will be applied in WSAs and in other identified sensitive areas. All wildland fires are assessed to identify emergency stabilization and rehabilitation needs. In some parts of the planning area, disturbance of soil from fire and suppression activities has resulted in establishment of invasive nonnative species (INNS). See the INNS section of this document for additional discussion.

One objective of the BLM's fire management program in the planning area is to reduce hazardous fuel loads (i.e., the amount of easily ignited vegetation in an area, usually expressed in tons per acre) with an emphasis on the wildland-urban interface (WUI). The WUI includes any area with residential, industrial, or agricultural structures interspersed with or located adjacent to trees and other combustible vegetation. In areas of mixed ownership, modification of vegetative fuels on public land alone would not result in a substantial reduction of the threat of wildland fire to private lands and homes; cooperation among all landowners is required.

3.3.2 Planned/Prescribed Fire

Prescribed fire currently is used to improve natural resource conditions and reduce hazardous fuels where management objectives have not been met by wildland fire or other vegetation treatments. The Kemmerer Field Office uses prescribed fire in combination with other vegetation treatments, as appropriate, including manual, mechanical, biological, and chemical methods. Prescribed fire is also used to create fuel breaks and reduce hazardous fuels, especially in the spring and late fall when vegetation is dormant and soil moisture is elevated. A naturally caused fire occurring during favorable conditions in an area with a prescribed burn plan can be treated as a prescribed fire.

General objectives for fuel treatments include removal of excessive brush or woodland canopy in mosaic patterns. The percentage of brush or canopy removed depends on the resource management objectives for the area, including wildlife habitat needs and watershed improvement. Management objectives for the juniper and limber pine woodlands include promoting age class diversity and reducing woodland invasion into more productive grasslands and commercial forests.

3.3.3 Stabilization and Rehabilitation

Full suppression provides the most effective tactic to manage unplanned fire; however, use of heavy equipment can cause damage to wildlife habitats, soils and vegetation, increases potential water quality degradation, and the spread of INNS. Full suppression also encompasses the use of fire retardant or foam; however, current practice limits the use of retardant or foam within 200 feet of waterways and in the vicinity of significant cultural resources. In areas where full suppression may impact sensitive natural resources, limited suppression tactics may be utilized. Stabilization and rehabilitation may be used in the planning area to offset the adverse impacts of fire and fire suppression. Fire suppression on public lands is guided by objectives in the existing plan and clarified by the annually updated *Fire Management Plan Southwestern Zone Wyoming BLM 2004* (BLM 2004f). The Healthy Forests Initiative, Healthy Forest Restoration Act, and the National Fire Plan 2000 influence the BLM's approach to forest health and fire management in the planning area.

No specific stabilization and rehabilitation decisions exist in the present plan; therefore, stabilization and rehabilitation are conducted on a case-by-case basis and will follow the policy outlined in the Department of Interior Interagency Burned Area Emergency Response Guidebook, and the BLM *Burned Area Emergency Stabilization and Rehabilitation Handbook*. Stabilization and rehabilitation may be necessary following wildland fire to address the following:

- Emergency stabilization and rehabilitation. The BLM will identify actions to stabilize or rehabilitate burned areas, such as seeding, fencing, and temporary closures.
- INNS. Burned areas and areas subject to fire suppression usually offer an opportunity for the spread of INNS. Pre- and post-fire management is crucial and, as within WUI areas, depends on a cooperative approach by landowners and land users.

Management challenges related to fire include the ability of the BLM to control fire; use wildland fire for the benefit of resources when it does not threaten life or property; manage natural fire regimes and fire return intervals; potential unintended impacts of fire on visibility and public health; use fire as a resource management tool; manage fire in the WUI; link together fire management activities and resource management goals and objectives; consider natural fire regimes, fire return intervals, and desired future vegetative types; the impacts of fire through the spread of INNS and habitat for wildlife and special status species; post-fire livestock grazing management and rest; and continue coordination and training with local volunteer fire departments. For example, the BLM's fire management strategies must recognize the role of wildland fire as an essential ecologic process. At the same time, these strategies must also consider firefighter and public safety, suppression costs, the resource values to be protected, and be

consistent with resource program objectives. While protection of human life is the overriding priority in the BLM's fire management decisions, the BLM also considers community infrastructure, private property, natural and cultural resources, and social, economic, and political factors. For example, BLM policy is that livestock grazing is not allowed on a burned area for a minimum of two growing seasons after the fire is extinguished. This policy, land ownership patterns, and the economic impact of rest from grazing for two growing seasons limit the number of prescribed fire projects occurring on grazing allotments in the planning area. Management actions addressing these challenges are incorporated in the alternatives and described in more detail in Chapter 2.

3.4 Biological Resources

This section describes the affected environment (i.e., existing conditions) for habitat fragmentation, biological diversity, and individual biological resources (i.e., vegetation, fish, wildlife, special status species, and INNS). Habitat fragmentation and biological diversity are not considered resources or resource uses; rather, they reflect conditions within the planning area that can be impacted (beneficially or adversely) by BLM management actions and allowable uses, as expressed in the alternatives (see Chapter 2). Therefore, the existing conditions of habitat fragmentation and biological diversity are described in this section. Following these descriptions, the existing conditions of individual biological resources are described, beginning with vegetation and followed by fish and wildlife and special status species.

Due to the complexity of biological resources and the vast size of the planning area, this section does not attempt to provide an encyclopedic description of all vegetation, fish, wildlife, and special status species; rather, based on issues identified during the scoping process and BLM's MSA, this section focuses on existing biological resource conditions in the planning area, which may be further impacted (beneficially or adversely) by alternatives. Chapter 4, Environmental Consequences, describes the potential environmental consequences (i.e., impacts) of each alternative related to individual biological resources.

Habitat Fragmentation

Habitat fragmentation involves the division of large contiguous areas of habitat into smaller patches (fragments) isolated from one another (Johnson 2001). As contiguous blocks of habitat become smaller, adverse impacts, including reduction in total habitat available, increased edge effects, and isolation from other habitats or populations can occur. Actions that result in habitat loss are exacerbated when fragmentation reduces the size and (or) isolates remaining habitat patches below size thresholds necessary to support particular species. Habitat fragments may eventually become too small, too isolated, and too influenced by edge effect to maintain viable populations of some species, resulting in a loss of biological diversity (Johnson 2001). Edge effects influence habitats near the boundaries between natural and disturbed or developed land. These effects occur at various distances from disturbances in the form of changes in noise, sunlight, wind, water runoff, humidity, and often plant composition, depending on the contrast of environments created by the edge. Edges also can provide habitats for INNS, both plants and animals, which are detrimental to the native species in the adjacent parcel. Species requiring the largest home ranges are generally the first species to decline when habitat fragmentation occurs.

Historic sources of habitat fragmentation within the planning area include homestead development, agriculture, irrigation, fencing, and minerals development, starting in the late 1880s. Subsequent development of the region in the early-to-mid 1900s included establishing the railroad and a road network to connect population centers. In the late 1900s, ever-increasing rural development of homes, recreational properties (the WUI), and energy development have further fragmented planning area habitats.

Currently, the planning area is primarily fragmented by linear features including roads, railroads, trails, irrigation systems, and ROWs. I-80 and a network of state highways, county roads, local roads on private and public lands, and the UPRR dissect much of the planning area. The associated construction, maintenance, and use of these features, along with well pads, pipelines, and powerlines, has fragmented many of the larger habitat blocks in the planning area. The development of irrigation reservoirs and districts with their associated water-distribution systems also contribute to habitat fragmentation in the planning area. Irrigation water development has diverted scarce water supplies from native plant communities to hayfields, pasture, and cropland, thereby further reducing the productivity of habitats. Fences can block migration routes for some wildlife species, such as pronghorn, which prevents or changes access to some habitat. Existing pipeline and powerline corridors are also a source of habitat fragmentation, especially when they do not follow existing ROWs.

In addition to linear features, fragmentation also occurs at population centers and other developments where humans live, recreate, and work. Developing large private parcels bordering BLM-administered

lands has, in some instances, contributed to habitat fragmentation by native land conversion to subdivisions or smaller ranchettes. This type of land conversion primarily occurs near population centers and the WUI. Buildings, roads, fences, and utility corridors associated with residential and commercial developments all contribute to fragmentation of planning area habitats.

Resource development and management, including fire and fuels management, harvest of forest and woodland products, and minerals extraction, also result in fragmentation (refer to the individual sections in this chapter for additional details on these resources). Conducting prescribed burns and managing wildland fire have sometimes contributed to temporary habitat fragmentation in the planning area with the removal of aboveground vegetation by fire or for firebreaks. Intense and large-area fires temporarily can isolate individual species and communities of plants and less mobile species of animals. A frequent fire-return interval often associated with INNS can effectively fragment habitat over the long term. Similar to fire, mechanical vegetative treatments generally have been temporary in nature on public lands, usually consisting of small acreages. OHV use also contributes to habitat fragmentation through the vegetative and soils disturbance created by often-used trails and roads, trampling of native plants, displacement of wildlife, and potential transportation of INNS seeds into undisturbed areas. Management actions to address these challenges are incorporated in the alternatives for biological resources in Chapter 2. Common and scientific names of plant and wildlife species identified in this Proposed RMP and Final EIS are listed in Appendix E.

Biological Diversity

The Keystone Center (1991) defines four elements of biological diversity relating to scale:

1. Genetic diversity
2. Species diversity
3. Community or ecosystem diversity
4. Landscape or regional diversity.

Biological diversity is a complex subject that makes the measurement of existing conditions difficult. Species diversity is probably the most recognizable and easily understood element of biological diversity and, for this RMP revision, is defined as the variety of species found in the planning area. In other words, species diversity includes the numbers and distribution of all species in the planning area. This includes species (e.g., cottontail rabbits, coyotes, elk, pronghorn, etc.) that are common and plentiful, as well as other species (e.g., western bladderpod, mountain plover, bald eagle, etc.) that are less common or rare. Classifying rare species as sensitive, threatened, or endangered is one way of conserving biological diversity because these classifications heighten awareness for conservation of rare species.

Spatial and temporal scales also are important considerations for conserving biological diversity. For example, nonmigratory populations of mammals may become temporarily diminished following a harsh winter and limited food supply. In addition, migratory birds may return to breeding grounds with diminished populations due to the stress factors associated with migration. In these instances, the lower number of individuals does not necessarily equate to a reduction in biological diversity in the planning area because the number of individuals ultimately (all else being equal) return to pre-winter levels. Permanent reductions in the four elements of diversity listed above are considered adverse impacts to biological diversity for this RMP revision.

Counting the number and relative frequency of species occupying an area over time is one means of identifying reductions in species diversity; however, this approach can be overly simplistic and does not necessarily address the other three elements of diversity. Currently, there is no single, commonly accepted scientific protocol for measuring biological diversity. Nevertheless, it is generally accepted that "…reducing the number of biological entities in a system or making some of them less abundant reduces

diversity" (Langner and Flather 1994). Biological diversity in the planning area is currently addressed by strategies such as the BLM's National Sage-Grouse Habitat Conservation Strategy.

Climatic factors (e.g., drought), disease, fire regime, predation, competition, and population cycles all have contributed to the current natural variability in number and relative frequency of individuals, species, and communities of plants and animals in the planning area. Other factors contributing to natural variability include surface-disturbing activities (e.g., road and well pad construction), the physical and chemical environment (e.g., soil nutrients and water), adjacent area vegetation (e.g., croplands), historic vegetation, INNS, herbivory (e.g., native ungulates and livestock), and the planning area's existing vegetation.

The current condition for biological diversity in the planning area is a function of physical factors (e.g., soils, geology, air, water, geography, and elevation), natural factors (e.g., fire, drought, disease, evolution), and human actions. In the context of these physical and natural factors, biological diversity evolved over time to produce the diversity present in the planning area prior to Anglo settlement. Human actions during the subsequent 140 years changed the pattern, composition, structure, and function of plant and animal communities within the planning area, thus affecting the pre-Anglo biologically diverse settlement. Management challenges for biological diversity include competing resources and resource uses. Management actions to address these challenges are incorporated in alternatives for physical and biological resources and for fire and fuels management in Chapter 2.

Vegetation

Vegetation types used by the BLM are broad classifications dominated by communities of shrubs, trees, forbs, and grasses. These broad vegetation types are an expression of the wide range of climatic and soil conditions found throughout the planning area (Map 21).

Table 3-17 summarizes the extent of the vegetation types and plant communities within the planning area. Existing conditions for three categories of vegetation types (forests and forest products, grassland and shrublands, and riparian and wetland communities) that occur in the planning area are described in the following sections.

Other lands within the planning area identified in Table 3-17 include bare ground (alpine and basin-exposed rock soils) and disturbed areas altered by human use, including irrigated and dry-land crops, surface-mining operations, and human settlements.

Alpine bare rock and soil include cliffs, spires, and talus fields occurring in all mountain ranges within the State of Wyoming. Basin bare rock and soil include naturally occurring areas of bare rock and soil where total cover of vegetation is less than 15 percent, such as cliffs, spires, rock outcrops, and talus fields, as well as steep scarps of soft rock. Basin bare rock occurs in all of the Wyoming basins. The bare ground category of vegetation types occupies about 3 percent of the planning area. Disturbed areas, including agriculture, active mining, and urban areas, occupy about 7 percent of the planning area.

The following is a description of the plant communities for the planning area from "GAP" vegetation information, information provided by BLM resource specialists, and other references, as noted.

Table 3-17. Vegetation Types in the Kemmerer Planning Area

Vegetation Type	Total Acres	BLM Surface Acres	BLM Mineral Estate Acres
Forest Types			
Conifer	563,834	41,965	54,846
Aspen	163,538	36,274	54,432
Juniper Woodland	95,442	36,075	41,368
Grassland/Shrublands			
Grassland	14,536	345	1,326
Meadows	144,437	662	1,097
Sagebrush	2,095,198	1,049,350	1,162,304
Desert Shrubs	295,180	153,649	143,911
Mountain Shrubs	26,446	18,565	19,413
Greasewood Fans and Flats	14,435	10,296	10,260
Bare Ground	123,290	48,405	48,328
Riparian/Wetland	104,395	13,609	18,475
Disturbed (Altered by Humans)	276,127	11,437	20,953
Unknown*	14,326	3,373	2,649
TOTAL	**3,931,184**	**1,424,005**	**1,579,362**

Source: BLM 2006a

*Areas not specifically identified in the Geographic Information System (GIS) overlay represent less than 1 percent of the planning area.

Note: Acreages in this table were derived through GIS analysis of available GAP vegetation data. GAP vegetation data has not been ground-truthed and provides only a rough approximation of the size of each habitat type in the planning area. Acreages of forestlands and woodlands available for BLM management may be more accurately represented to include approximately 19,008 acres of forestlands and approximately 15,000 acres of woodlands; and an additional approximately 3,000 acres of combined forestland and woodland within the Raymond Mountain WSA (BLM 1985).

3.4.1 Vegetation – Forests, Woodlands, and Forest Products

Forest and Woodland Communities

The conifer forest communities, about 14 percent of the planning area, consist of lodgepole pine, Douglas-fir, spruce-fir, spruce-fir/lodgepole pine mixed aspen, and clear cut areas. Lodgepole pine dominates the canopy in the lodgepole pine forest with subalpine fir and Engelmann spruce mixed with the canopy trees on most sites. This forest community is widely distributed throughout Wyoming with the exception of the Black Hills. Douglas-fir is dominant in both intact Douglas-fir forests and Douglas-fir forests influenced by logging. Douglas-fir forests are found along the foothills of most of the major mountain ranges in Wyoming, but are most common and extensive in the northwest. Engelmann spruce and (or) subalpine fir are dominant or codominant in the canopy of the spruce-fir forest, which is an important forest type in the mountain ranges of Wyoming, with the exception of the Black Hills. At the lower end of its elevation range, this community occurs in relatively cool, mesic sites, such as north-facing slopes and along riparian corridors in canyons. It also mixes with aspen at lower elevation ranges. Subalpine fir tends to be dominant at lower elevations, with Engelmann spruce gaining importance toward the tree line. Spruce-fir/lodgepole pine mixed aspen forest communities exhibit spruce-fir/lodgepole pine as a major understory and co-dominant component which, with time and lack of fire and other natural disturbances, eventually will succeed aspen and dominate the canopy and become the major species in these stands. These forests occur throughout all the mountains ranges. Clear-cut conifer communities are areas within conifer forests substantially altered by logging. This community comprises clear-cut areas within a matrix of conifer forests and, as such, is a mosaic of standing forest and logged

areas with logged areas covering more than 40 percent of the total ground area. The logged areas may be in early succession stages, but classification as a forest requires trees to achieve a 25 percent canopy closure.

In the planning area, conifer forestlands are located in the mountains north of Kemmerer, Wyoming, in the Tunp Range, Sublette Range, and Commissary Ridge areas, and south of Mountain View, Wyoming, on the lower north slope of the Uinta Mountains. Based on GAP vegetation data the conifer forestland within the planning area comprises about 41,965 acres of BLM-administered surface and includes stringers and fringe areas bordering larger contiguous blocks of forest on adjacent USFS administered land. Because of the isolated nature of the forested areas, special management areas (e.g., WSA) and access issues, only 19,008 acres of the forested area are considered available for active forest management. The BLM-administered conifer forestlands delineated for management are approximately comprised of lodgepole pine (51%), Douglas-fir (17%), spruce-fir/lodgepole pine mixed aspen (17%), alpine fir/Engelmann spruce (15%), and less than 1 percent of limber pine. Sawtimber-sized trees are found on approximately 56 percent of the forestlands (BLM 2003a). There have been a significant increase in forest insect infestations in the last 4 years due to drought and age class of the current forests. Mountain pine beetle (*Dendroctonus ponderosae*) in lodgepole pine and the western balsam bark beetle (*Dryocetes confuses*) in subalpine fir are the primary species approaching or at epidemic levels. According to the USFS Intermountain Region Forest Health Protection Center, these epidemics are expected to continue for at least the next 5 years. These epidemics are expected to cause heavy mortality in these two tree species with mortality approaching or exceeding 90 percent in some stands. All of the BLM forested areas either have been or have the high probability of being significantly impacted by these epidemic levels of insects. Within the analysis area the Sublette Range, Commissary Ridge, and the Uinta Mountains are the most impacted. Douglas-fir beetle (*Dendroctonus pseudotsugae*) in Douglas-fir and spruce beetle (*Dendroctonus rufipennis*) in Engelmann spruce are also found at endemic levels at this time. Limber pine is also being affected by white pine blister rust (*Cronartium ribicola*), mountain pine beetle, and multiple root rot diseases.Approximately 56 percent of the BLM administered conifer forestlands are stocked with mature sawtimber-sized trees averaging around 120 years in age. Growing stock volumes per acre average 2,500 cubic feet for lodgepole pine, 1,800 cubic feet for Douglas-fir, and 1,950 cubic feet for subalpine fir/Engelmann spruce (BLM 2003a). Annual growth per acre averages around 50 cubic feet per acre per year in the sawtimber component and 72 cubic feet per acre per year in the poletimber component. Annual mortality per acre per year averages around 14 cubic feet for all species combined (BLM 2003a).

Aspen woodlands, or aspen forestlands with a major conifer component, include areas where aspen is the dominant tree species. Aspen communities occur in mountain foothills and in high valleys throughout Wyoming wherever the environment is sufficiently mesic. Aspen also occur in riparian zones in foothills. Aspen stands typically exhibit a diversity of understory vegetation, and are utilized by wildlife and livestock. They also serve as natural firebreaks, and often occur as part of an important riparian and wetland component of the forested ecosystem. Aspen stands appear to be declining throughout the interior west, due to advanced age and/or conifer invasion (Bartos and Campbell 1998; Kulakowski et al. 2004; Knight 2001; WSFD 2001). Many of these stands also have declined due to ungulate use and the lack of fire (to control competition and stimulate regeneration). According to a report on forest health published by the Wyoming State Forestry Division, the average age of aspen forests and woodlands in the State of Wyoming is 68 years (WSFD 2001).

Juniper woodlands are found in foothills and rocky outcrops in most of Wyoming in association with big sagebrush, limber pine, and mountain mahogany species. The juniper woodlands include Rocky Mountain juniper and Utah juniper. Juniper encroaches into and dominates sagebrush communities after long periods without fire. In the planning area, aspen is intermixed with the conifer forestlands, and is scattered on mid-elevation ridges and hillsides often in pure stands. The juniper woodlands are located in the hills and escarpments east of Evanston and south of Kemmerer, Wyoming. Based on GAP vegetation data,

there are approximately 72,349 acres of combined woodlands (juniper and aspen) or BLM-administered surface within the planning area.

Forest Products

Since 1984, the BLM has harvested approximately 8-million board feet of sawtimber from 500 acres of administered lodgepole pine forestlands throughout the planning area (BLM 2003a). The BLM harvested the timber using the clear-cut harvest method. All clear-cut forestlands have successfully regenerated, and of the 500 acres of commercial harvest since 1984, approximately 350 acres are ready, and it is anticipated that the remaining 150 acres will become ready in the next decade, for precommercial thinning to optimize growing conditions (BLM 2003a).

Approximately 250 cords of fuelwood, 50 Christmas trees, and 1,000 post and poles are sold annually from BLM-administered forestland within the planning area. Virtually no forest products are harvested from the aspen and juniper woodlands (BLM 2003a).

Management of Forests and Woodlands

In the mid 1980's, a stand-based inventory was conducted on BLM lands and approximately 19,008 acres of forestlands were identified as suitable for long-term commercial management (BLM 1985). These forestlands were comprised of 9,727 acres of lodgepole pine, 3,202 acres of Douglas-fir, 3,144 acres of aspen with a considerable conifer component comprised of spruce-fir and/or lodgepole pine, 2,901 acres of subalpine fir/Engelmann spruce, and 34 acres of limber pine. The forestlands determined suitable for commercial management were stratified into stands and intensively inventoried using the U.S. Forest Service Region 2, Stage II system. The data was compiled, and growth and harvest yields were calculated. Long-term sustained yield harvest schedules were generated, under various prescription alternatives, using FORPLAN, a computer-planning model. This planning model is used to estimate the long range productive capability of the forestlands under the prescription selected for an upper limit on the harvest level to ensure that the inventory of growing stock trees is not depleted. Under an "Accelerated Harvest" solution that allows harvesting high risk and salvaging beetle-killed timber sooner and reaching the long term sustained yield level earlier, the harvest levels for the first and second decades could theoretically be 2,624 thousand cubic feet (MCF), or approximately 11.8 million board feet (MMBF), from 1,782 acres, and 2,549 MCF, or 11.5 MMBF from 1,486 acres, respectively. Harvest levels in future decades could increase and average around 4,000 MCF, or 18 MMBF. The proposed timber harvest level alternatives are considerably lower due to multiple use considerations, primarily involving lynx analysis unit (LAU) management guidelines, and elk management guidelines for escape cover and calving areas. Canada lynx are listed as threatened under the Endangered Species Act (ESA), and any forest management activity must not adversely impact this species. Canada lynx and elk are discussed in more detail in the Special Status Species section and the Fish and Wildlife Resources – Wildlife section, respectively.

An additional combined acreage of around 3,000 acres of forestland and woodland is located within the Raymond Mountain WSA. Currently, no management action is prescribed for these forest and woodlands. Alternatives for "reserve management" (prescribed fire or wildland fire use with no mechanical surface-disturbing activities) to simulate natural alteration of vegetation to meet wilderness and healthy forest landscape objectives, have been developed. Another 80 acres of forestland is not available for management due to forest clearing for ski runs at the Pine Creek ski area west of Cokeville, Wyoming.

Approximately 70,000 acres of woodlands, consisting of aspen and juniper, occur on BLM-administered surface, according to a GAP vegetation data analysis. Currently, no management action for the woodlands exists. Presented in Chapter 2 alternatives, 15,000 acres of woodland are available for management and to create more historical conditions in terms of stocking, and structure/composition. Woodland products are provided as a byproduct consistent with woodland health, landscape restoration, and reduction of forest fuels objectives.

"Old-Growth" is defined in The Dictionary of Forestry (Helms 1998) as:

> The (usually) late successional stage of forest development. Old-growth forests are defined in many ways; generally, structural characteristics used to describe old-growth forests include (a) live trees: number and minimum size of both seral and climax dominants, (b) canopy conditions: commonly including multilayering, (c) snags: minimum number of specific size, and (d) down logs and coarse woody debris: minimum tonnage and number of pieces of specific size.
>
> Old-growth forests generally contain trees that are large for their species and site and sometimes decadent (overmature) with broken tops, often a variety of tree sizes, large snags and logs, and a developed and often patchy understory. Stand age, although a useful indicator of old-growth, is often considered less important than structure because (a) the rate of stand development depends more on environmental factors and stand history than age alone, and (b) dominants are often multiaged.
>
> Due to large differences in forest types, climate, site quality, and natural disturbance history (e.g., fire, wind, and disease and insect epidemics), old growth forests vary extensively in tree size, age classes, presence and abundance of structural elements, stability, and presence of understory. The minimum area needed for an old-growth forest to be a functional ecological unit depends on the nature and management of surrounding areas; small areas often do not contain all old-growth elements.

Because of the impreciseness of a definition of old-growth with its inherent subjectivity, the approach taken in the KPA was to develop old-growth descriptions of the major forest cover types found in the planning area. Measurable attributes (see Glossary under Old-Growth Forest) are provided for each of these forest cover types. These above-mentioned descriptions will be used to evaluate areas prior to vegetation treatment to determine old-growth potential in the treatment units as well as the surrounding areas. Areas determined to have old-growth potential and targeted as future old-growth stands may undergo some management activities (thinnings, prescribed fire, etc.) if those treatments enhance the old-growth objective for the forest stand.

Based on the above criteria no "old growth" forest has currently been identified within the commercial areas in the planning area. However, because of the lack of current inventory data and the fact that most of the forested lands have had no commercial entry, it is probable that "old growth" conditions do exist within the Kemmerer planning area. Currently, no management guidelines are prescribed for old growth forests. The low level of historical harvest activity in the planning area has had a negligible impact on the amount of potential old growth forest that may be identified. In Chapter 2 description of the alternatives, management actions to permit old growth management under the Healthy Forests Restoration Act (HFRA) are included. The BLM-administered forestlands currently available for harvest treatments, serve as habitats for Canada lynx. Canada lynx are listed as threatened under the ESA and any forest management activities must not adversely impact this species. In addition, elk management guidelines for escape cover and calving areas complicate management. The Special Status Species and the Fish and Wildlife Resource sections address Canada lynx and elk in more detail.

3.4.2 Vegetation – Grassland and Shrubland Communities

Surface-disturbing activities, livestock grazing, fire or fire suppression, and INNS have influenced most grassland and shrubland communities in the planning area. See also the Livestock Grazing, Fire and Fuels Management, and Vegetation – Invasive Nonnative Species sections of this document.

Grassland make up less than 1 percent of the planning area and include the Great Basin foothills grassland and mixed grass prairie cover types. Great Basin foothills grassland is a mesic grass-forb mix found in the foothills of northwestern Wyoming and includes species such as bluebunch wheatgrass, arrowleaf

balsamroot, silvery lupine, Idaho fescue, spike fescue, Richardson's geranium, and avens-old man's whiskers. Mixed grass prairie contains a mixture of short and tall grass prairie species, but does not contain buffalo grass, an indicator of short grass prairie. Grass species that occur in mixed grass prairies include western wheatgrass, needle and thread, Indian ricegrass, and prairie junegrass. Shrub/subshrub species include Douglas rabbitbrush, winterfat, horsebrush, and prickly-pear cactus. When mixed grass prairie occurs in patches intermixed with shrub species (i.e., big sagebrush), grass patches must occupy more than 50 percent of the landscape for the primary vegetation type to be classified as a mixed grass prairie community. The vegetation type may also contain or be dominated by silver sagebrush. With the exception of silver sagebrush, trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

Meadows

Meadows occupy approximately 4 percent of the planning area and include subalpine meadow and grass dominated wetland cover types. Subalpine meadows occur in mountain parks within and below the upper treeline and include species such as American bistort, dwarf lewisia, alpine timothy, hairy arnica, slender wheatgrass, spiketrisetum, tufted hairgrass, and oatgrass. Grass-dominated wetlands comprise only a small percentage of the meadow habitat within the planning area and include nonriverine wetlands, such as wet and moist meadow grassland, marsh and swamp wetlands, cattail, bullrush and sedge-dominated wetlands, and inland saltgrass/alkali sacaton-dominated wetlands. Representative species include alkali sacaton, cattail, inland saltgrass, Baltic rush, and alkali cordgrass. Within both meadow cover types, trees or shrubs cannot occupy more than 25 percent of the total vegetative cover.

Sagebrush

Sagebrush communities include areas dominated by Wyoming big sagebrush and mountain big sagebrush and occupy the majority (53 percent) of the planning area. The Wyoming big sagebrush plant community is a shrubsteppe type, with Wyoming big sagebrush being the dominant shrub and total shrub cover comprising more than 25 percent of the vegetative cover. This plant community is variable in Wyoming and includes the full range—from dense, homogeneous Wyoming big sagebrush to sparsely vegetated arid areas where Wyoming big sagebrush is the dominant shrub. Often, patches of Wyoming big sagebrush occur with patches of mixed grasses. In these cases, classification of the community as Wyoming big sagebrush steppe occurs if the sagebrush patches occupy more than 50 percent of the total landscape area, and as mixed grass if the grasses occupy more than 50 percent of the total area. Wyoming big sagebrush occurs throughout most of the state, with the exception of the extreme southeast corner. Often, rolling landscapes may feature Wyoming big sagebrush dominating broad slopes, but with sand sagebrush or various cushion plants on wind-swept ridges and knolls and with mountain big sagebrush in hollows. These landscapes are complex mixtures of several sagebrush-dominated types, but classified as Wyoming big sagebrush when dominated by this vegetation type.

The mountain big sagebrush plant community is dominated by mountain big sagebrush, often found with mixed grasses, with a total shrub cover comprising more than 25 percent of the vegetative cover. Sometimes this shrub type occurs as patches of dense sagebrush with patches of mixed grasses. Currently, the sagebrush patches comprise more than 50 percent of the total landscape area categorized as mountain big sagebrush. This community is widespread in the mountain ranges and higher valleys of Wyoming (BLM 2003a) and is found throughout the state, except east of the Laramie Range. Mountain big sagebrush occupies cooler sites than basin big sagebrush and more mesic sites than Wyoming big sagebrush, often occurs in mountain parks and is intermixed with trees, and is found at the lower margin of the treeline.

Desert shrubs

The desert shrubs community comprises a mixture of shrub species occurring in dry saline habitats. Shrub cover is often dominated by shadscale and saltbush, but can be a mixture of Gardner's saltbush,

black greasewood, and (or) desert cushion plants. When ground cover is pure Gardner's saltbush or pure greasewood, it is classified as such, but when these species are mixed and dominance is unclear, it is classified as desert shrub. This plant community also includes some cushion plant communities found in Wyoming basins. Total shrub cover comprises more than 25 percent of the total vegetative cover. Desert shrub usually is found in flats and fans in the central and western basins of Wyoming. Desert shrubs occupy approximately 8 percent of the planning area.

Mountain shrubs

Mountain shrub communities include xeric and mesic shrublands found on mountain slopes and occupy less than 1 percent of the planning area. In the xeric shrub community, the shrub cover is dominated by species of mountain mahogany, with shrub species comprising more than 25 percent of the vegetative cover. These communities usually occur on dry slopes or flats where bedrock is very close to the surface or outcropping. Xeric shrublands often are found along canyon walls around the margins of mountain ranges or on surfaces formed by tilted sedimentary strata. Xeric shrublands also are found throughout Wyoming at mid-elevations in shallow soils. Soil factors are probably the most important factors in controlling the distribution of these shrublands.

A variety of shrub-dominated communities grow in relatively mesic sites in Wyoming, often in snow catchments or downslope from catchments or in ravines over a wide range of elevation. Most often, Rocky Mountain maple, bigtooth maple, serviceberry, snowberry, wax currant, and (or) chokecherry are dominant or codominant, but other shrub species can be present. Mountain mahogany species cannot be dominant and mesic shrubs must comprise more than 25 percent of the vegetative cover. Mesic shrublands occur in foothill locations and in mesic microenvironments throughout Wyoming.

Greasewood fans and flats

Areas where greasewood comprises more than 75 percent of the total shrub cover and where shrubs comprise more than 25 percent of the vegetative cover are categorized as greasewood fans and flats. This vegetation type often is found mixed with grasses and generally found along streams at low to medium elevations, although it can occur on fine-textured saline upland areas and on basin fans and flats. Greasewood also occurs in riparian areas where the classification becomes shrub riparian, with the greasewood community entered as a secondary vegetation type within the polygon. Greasewood fans and flats occupy less than 1 percent of the planning area.

Management of Grasslands and Shrublands

Management challenges for grassland and shrubland communities include the spread of INNS; lack of a natural fire regime; overly mature stands with insufficient recruitment; integrating treatments of multiple resource programs to achieve landscape level objectives; competition for forage between native ungulates and livestock; habitat fragmentation; restoration of areas damaged by surface-disturbing activities to mitigate potential impacts regarding erosion and water quality; and maintaining a distribution and diversity of these communities sufficient to support wildlife, special status species, livestock, and other competing multiple-use demands on BLM-administered lands. As appropriate, management actions designed to address these challenges were identified during the alternative formulation planning phase and are incorporated in the alternatives described in Chapter 2 of this document.

3.4.3 Vegetation – Riparian and Wetland Communities

Riparian and wetland communities are areas that exhibit persistent water or obligate vegetation (e.g., sedges, rushes, willows) reflecting the availability of surface or groundwater. Vegetation found in these communities typically is adapted to flooding disturbances or saturated (water-logged) soils. Due to their importance in the landscape, wetlands are legally protected under the CWA and are defined and delineated by use of a USACE manual (USACE 1987) to determine the simultaneous presence of specific

criteria for soil, water, and vegetation. For the purpose of this discussion, references to wetlands are not restricted to the legal definition.

Riparian areas support more wildlife diversity than any other habitats (WGFD 1999) and are the single most productive wildlife habitat type in Wyoming. Many wildlife species depend on these habitats for all or part of their life-cycle (WGFD 1999). Healthy riparian areas provide vertical structural complexity, canopy, and subcanopy layers, as well as a ground layer that supports species diversity. In addition to being an integral part of watershed health, riparian areas are desired for their recreation, fish and wildlife, water supply, cultural, and historical values, as well as their economic values, which stem from their use for livestock production and mineral extraction (Prichard 1998).

About half the bird species found in riparian habitats are obligate species (Howe et al. 2004). In general, the greater the diversity of habitats along a river or stream, the greater the species diversity of aquatic and riparian biota (Wohl 2004). Riparian habitats support extended forb production and diversity in vegetation and structural complexity, which provides for biological communities rich in insect composition (Connelly et al. 2004). Most birds are insectivores during their breeding season (Howe et al. 2004). Emerging aquatic insects are a large part of the diet of birds using riparian areas (Moline 2004). These factors make riparian areas the most important habitats to avian biodiversity across the West (Howe et al. 2004). Greater sage-grouse depend on riparian areas in the summer for late brood-rearing habitats. After upland forbs expire, greater sage-grouse move into mesic riparian habitats because forbs generally are still available in these areas for several more months (Connelly et al. 2004).

Riparian and wetland communities are more structurally diverse and produce more plant and animal biomass than adjacent uplands in the planning area. Compared to uplands, healthy riparian areas generally are lusher and stay greener for a longer portion of the year (WGFD 1999). Riparian areas, adjacent to flowing (lotic) and standing (lentic) water, form transition zones between aquatic and upland areas and may or may not be jurisdictional wetlands. Jurisdictional wetlands are determined to be present at a location if the following criteria are met: simultaneous occurrence of at least 50-percent hydrophytic (water-loving) vegetation, wetland hydrology, and hydric soils (USACE 1987). Riparian and wetland communities in the planning area include forest-dominated riparian, grass-dominated wetland, shrub-dominated riparian, and open water.

Forest-dominated communities include riparian zones in which tree species dominate the vegetation of the riparian corridor. In Wyoming, these are usually cottonwood species, but can also be aspen, boxelder, or a variety of conifer species. Trees must occupy more than 25 percent of the vegetative cover within the riparian zone. Forest-dominated riparian communities are found throughout Wyoming, from basins to treeline. In basins, larger drainages often support trees, while smaller drainages generally support shrubs and grasses.

Shrub-dominated riparian communities include riparian zones in which shrubs comprise more than 25 percent of the vegetative cover and in which trees occupy less than 25 percent of the vegetative cover. Shrubs often include willow species, hawthorn, wild plum, birch, alder, tamarisk, and shrubby cinquefoil, but other shrubs (e.g., sagebrush species, and (or) greasewood) may be present. Shrub-dominated communities also include alpine riparian zones dominated by willow species or other shrubs. Shrub-dominated riparian communities occur throughout Wyoming.

Grass-dominated wetlands include nonriverine wetlands with vegetation dominated by grasses or forbs. Trees or shrubs cannot occupy more than 25 percent of the vegetative cover. Grass-dominated wetlands are found throughout Wyoming and include communities such as wet and moist meadow grassland, marsh and swamp wetlands, cattail, bullrush- and sedge-dominated wetlands, and inland saltgrass and alkali sacaton-dominated wetlands. Grass-dominated wetlands also include both low and high salinity wetlands. Cattails, rushes, sedges, and prairie cordgrass characterize low-salinity wetlands. High-salinity wetlands include species such as alkali sacaton, alkali cordgrass, saltgrass, seablite, wildrye, and wheatgrass.

In addition to native plant species, several INNS are prevalent in riparian areas found in the planning area. INNS have been shown to decrease biological diversity, affect stream functions, degrade the quality of wildlife habitats, and decrease forage production for livestock and wildlife. For more detailed information, see the INNS section of this document.

Although riparian areas generally account for less than 1 percent of the total land area in the western United States (Slater and Anderson 2004), the benefits of these vital oases in semiarid environments far exceed the relatively small area they occupy. Despite the relatively small area occupied in the planning area, riparian and wetland communities provide important functions, such as influencing water quality, sustaining base flows, lessening the impact of floods, providing wildlife habitats, and providing forage, shade, and water for livestock (BLM 1991).

Moreover, vegetation found in riparian and wetland areas influences stream communities by shading the stream (reducing water temperature), controlling dissolved nutrient inputs, stabilizing stream banks, and contributing organic matter (Moline 2004). Streamside vegetation provides cover for fish by creating quiet, shaded resting areas beneath overhanging vegetation and contributes material to organic debris jams (Wohl 2004). The roots of riparian vegetation are imperative to the development and maintenance of undercut banks that also provide cover for trout (Wohl 2004). The roots help to stabilize the stream banks, thus reducing siltation in pools and on spawning bars (Wohl 2004). Root stabilization of stream banks also allows soils to absorb extra water during spring runoff that is later released during drier months, thereby improving late summer streamflows (WGFD 1999).

The ability of riparian and wetland areas to provide the functions described in this section depends, in part, on the interactions of water, soil, and vegetation. Streams, wetlands, and their associated riparian areas are shaped by processes through natural adjustments to handle the water and sediment load delivered by the watershed. A healthy riparian-wetland area exhibits resilience to normal variations in water and sediment loads. In other words, these areas can handle increases in stormflows/snowmelt runoff with minimal disturbance of the channel and associated riparian-wetland plant communities. Riparian areas adapt to changes through the interaction of soil/landform, vegetation, and water. With the exception of sites that lack the vegetative potential, healthy riparian-wetland areas are typically characterized by vigorous and diverse plant communities that have the root structure and mass necessary to resist the erosive forces of water and sediments, or that provide for the recruitment of large wood to the stream channel to accomplish the same thing. If a riparian-wetland area is lacking in these critical attributes it will not be resilient to normal variations in water and sediment loads. Similarly, if larger watershed processes are substantially altered through either human activities or stochastic (unpredictable) events, riparian-wetland areas will experience degradation.

Riparian areas and wetlands that are in proper functioning condition have adequate vegetation, landform, or large woody debris present to dissipate energies associated with high water flows, wind action, wave action, and overland flow from adjacent sites. These areas serve to reduce erosion; filter sediment; improve water quality; aid in floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize stream banks, islands, and shoreline features against cutting action; restrict water percolation; develop diverse ponding characteristics to provide the habitat, water depth, duration, and temperature necessary for fish production, water-bird breeding, and other uses; and support greater biodiversity.

In recognition of the importance of riparian-wetland areas, as well as that of proper functioning condition as a base for supporting the health of these areas, the Director of the BLM in 1991 established a goal "to achieve proper functioning conditions" on all riparian-wetland areas on lands administered by the BLM (BLM 1991). Additional guidance is found in the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a), considered to be the most current primary guidance for ecosystem management that serves to meet the intent of the Federal Land Policy and Management Act (43 USC §

1701 et seq.) and other relevant BLM policy concerning the management of vegetation, wildlife habitats, special status species, watersheds, and water quality. The BLM promotes healthy sustainable rangeland, woodland, and forest ecosystems in addition to accelerated restoration and improvement of public lands, as directed by the rangeland health standards (43 CFR 4180).

Assessments of proper functioning condition for riparian-wetland areas include Prichard (1998) categorizing a site into the following functional categories: proper functioning condition, functional at-risk, or nonfunctional (refer to Section 3.1.3, Water). A site is considered to be in proper functioning condition when adequate vegetation, landform, and large woody debris are present to dissipate stream energy, filter sediment, improve water retention and groundwater recharge, develop root masses to stabilize stream banks, develop diverse habitat characteristics for fish and wildlife, and support greater biodiversity (Prichard 1998). Functional at-risk sites are susceptible to degradation, and nonfunctional sites do not provide adequate vegetation, landform, or large woody debris to dissipate stream energy; therefore, they do not provide functions such as improving water quality and groundwater recharge (Prichard 1998).

It is important to understand that managing toward proper functioning condition as a minimum goal is not intended as a sole replacement for inventory or monitoring protocols designed to yield detailed information on the "biology" of the plants or animals dependent on the riparian-wetland ecosystem. Proper functioning condition is intended to provide information on whether a riparian-wetland area is functioning in a manner that will allow the maintenance or recovery of desired values (e.g., fish habitats, neotropical birds, forage, etc.). Thus, riparian areas and wetlands must, at a minimum, be properly functioning before the system has the dynamic stability to support the development of features necessary to produce the values desired by society. Depending on the blend of resource values and associated conditions established by a collaborative planning process such as proper functioning condition, other assessments will be required to ensure that these “higher” values are achieved once proper functioning condition has been attained.

Within the planning area, proper functioning condition assessments were completed between 1994 to 2003 on 404 miles of riparian areas associated with flowing water (e.g., streams and rivers) and 339 acres of riparian areas associated with standing water (e.g., lakes, reservoirs, and ponds) (see Table 3-18). Of the stream miles categorized as functional at-risk, 18 percent show an upward trend, no trend was apparent for 37 percent, and 7 percent show a downward trend. The monitoring of these areas is an ongoing process; therefore, the classification in Table 3-18 may not fully represent current conditions.

Table 3-18. Riparian and Wetland Area Assessment of Proper Functioning Condition on Public Surface within the Kemmerer Planning Area

Riparian/Wetland Type	Total Area Evaluated	Proper Functioning Condition		Functional At-Risk		Non-Functional	
		Area	Percent	Area	Percent	Area	Percent
Streams/Rivers[1]	404 miles	129 miles	32	250 miles	62	25 miles	6
Lakes, Reservoirs, Ponds	339 acres	289 acres	85	40 acres	12	10 acres	3

Source: BLM 2003a

[1]Perennial streams and rivers are measured in valley length rather than channel length.

The proper functioning condition of riparian areas and wetlands is important to other programs and uses within the planning area, including mineral extraction; fire and fuels management; fish, wildlife, and special status species habitats; heritage resources; livestock grazing; recreation; special designations; and socioeconomic resources. For example, specific management guidelines pertaining to other resource programs include habitat-improvement projects, restrictions on or prohibitions of certain activities near riparian and wetland areas, monitoring range conditions, stream improvement and use of areas by wildlife, control of INNS, and recreation guidelines. Standard 20012 of the *Standards for Healthy Rangeland and Guidelines for Livestock Grazing Management for Public Lands Administered by the*

Bureau of Land Management in the State of Wyoming (BLM 1998a) provides a goal for all riparian and wetland areas: "Riparian and wetland vegetation has structural, age, and species diversity characteristics of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance in order to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge."

Kovalchik and Elmore (1992) state that improper livestock grazing adversely impacts the stability of some riparian areas dominated by willow. Clary and Kinney (2000) indicate that the damage to riparian habitats as a result of bank alterations is greater than or equal to the damage caused by changes in vegetation biomass. See the Fish and Wildlife Resources – Fish section of this document for additional discussion regarding riparian vegetation, aquatic habitats, and existing conditions.

The Kemmerer Field Office focuses management on the entire watershed to improve water quality within riparian zones to benefit all users. The BLM's goal for riparian and wetland areas is to maintain, rehabilitate, and improve riparian ecosystems to achieve maximum long-term benefits. Management challenges for riparian communities include balancing the sometimes-conflicting land uses while managing for proper functioning condition and water quality and controlling the spread of INNS. For example, some riparian or wetland areas are located on public lands in most of the larger grazing allotments in the planning area; however, these areas usually make up only a small percentage of the total riparian acreage and are almost always intermingled with private and (or) state lands. Riparian and wetland areas are often the primary, and sometimes the only, watering place for livestock. Consequently, grazing animals, including livestock and wildlife, tend to congregate in these areas, especially during the hot summer season. As a result, the condition of riparian areas is one reason some allotments have not met Standard 20012 of the rangeland health standards. This and other management challenges for riparian and wetland communities are addressed through management actions incorporated in the alternatives for biological resources and other resource programs, discussed in more detail in Chapter 2. As management plans for grazing allotments are developed, desired future conditions for each individual riparian and wetland area are included.

3.4.4 Fish and Wildlife Resources – Fish

Public lands within the planning area provide habitats for 30 species of fish. These species have adapted to a variety of stream habitats, from the cold rapid waters of mountainous areas to the slow turbid waters of the high desert. The planning area supports seven BLM sensitive fish species, and four federally endangered fish species that occur downstream of the planning area and may be impacted by activities within the planning area (see the Special Status Species – Fish section of this document).

The Kemmerer Field Office is responsible for managing fisheries habitats, while management of fish species is overseen by state and federal wildlife management agencies. The WGFD manages resident fish populations. Fisheries habitats include perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Three regional watersheds (3rd -order) providing fisheries habitats within the planning area are described under surface water quality in the Water section of this document and include the Green, Bear, and Snake rivers (Map 7). Within these drainages and their tributaries, aquatic habitats vary by vegetation types, water quality and quantity, land use, and landscape setting.

Using valley length as the measure, approximately 403 miles of streams exist in the planning area. Using stream meander as the measure, approximately 509 miles of streams exist in the planning area. Base flows of the perennial streams vary from less than 1 cubic feet per second (cfs) to more than 800 cfs in the Green River. Of the 509 miles of streams in the planning area, approximately 139 miles are suitable for maintaining a fishery with the rest unsuitable at this time due to things such as very small intermittent flows, high water temperatures, and generally lacking habitat.

Fisheries habitats conditions are closely allied with the ecological conditions of riparian plant communities. Riparian vegetation occurs along drainages and serves to moderate water temperatures, control erosion by adding structure and stability to stream banks, provide in-stream habitats for fish, and provide organic material and nutrients to aquatic macroinvertebrates. Vegetation within the floodplain of drainages also serves to dissipate stream energy, store water for later release and provide areas for groundwater infiltration and rearing areas for juvenile fish. In addition to physical habitat features such as vegetation, water quality also influences aquatic habitats. Specifically, water temperature, turbidity, and dissolved oxygen determine the quantity and quality of aquatic habitats usable by various fish species. Other factors influencing aquatic habitats in the planning area include adjacent land use and the location of such habitats relative to natural landscape features. Approximately 30 percent of streams in the planning area are in proper functioning condition (BLM 2003a). Of the 139 miles containing a fishery, approximately 38 miles of streams are in proper functioning condition (BLM 2003a). The Vegetation – Riparian and Wetland Communities section in this chapter describes the existing riparian and habitat conditions within the planning area. Information on surface water bodies, water quality, and water quantity is provided in the Water section of this document.

The BLM uses several types of management plans to focus management of site-specific fisheries and aquatic habitats in the planning area, including the Thomas Fork Aquatic Habitat Management Plan (HMP), three Conservation Agreements and Strategies (for Colorado River cutthroat trout, Bonneville cutthroat trout, and '3-species'), WGFD basin management plans, and three Cooperative Resource Management Plans (CRMP): Willow Creek CRMP, Smithsfork CRMP, and Cumberland CRMP. The Thomas Fork Aquatic HMP focuses on the Bear River (Bonneville) cutthroat trout, while the Willow Creek and Cumberland CRMPs focus on the Colorado River cutthroat trout, the Bonneville cutthroat trout, and the recovery of riparian areas in the Cumberland-Uinta allotment, respectively.

Agriculture, vegetation management, fire management, development, OHV use, and recreation have historically influenced fisheries habitats in the planning area and continue to have effects. Another factor impacting fisheries habitats and conditions is water quality, which is regulated by the Wyoming DEQ. Historic and current water withdrawals for irrigation and other beneficial uses seasonally restrict the amount and distribution of aquatic habitats available for fisheries; however, water use in the planning area is regulated by the Wyoming State Engineer's Office. Although irrigation and other types of reservoirs can contribute to water depletion, they also trap sediment, which can degrade aquatic habitats, thereby reducing the sediment load downstream.

In addition to water depletion from historic activities (e.g., irrigation diversions), activities that result in soil compaction or erosion; increased sedimentation of streams; removal and degradation of riparian vegetation; changes in water temperature, velocity, volume, or timing of flows; and spread of INNS in riparian corridors have altered aquatic habitats in the planning area; some continue to do so. For example, in some riparian areas, historic improper livestock grazing contributed to aquatic habitat degradation through accelerated loss of streamside vegetation, compaction of soil, and increased stream bank erosion and silt deposition. To address these historic issues and the health, productivity, and sustainability of BLM-administered land in Wyoming, the BLM currently employs standards and guidelines for managing public rangelands toward the following fundamentals (BLM 1998a):

- Watersheds are functioning properly
- Water, nutrients, and energy are cycling properly
- Water quality meets state standards
- Habitats for special status species are protected.

Historic vegetation removal that impacted aquatic habitats primarily occurred through vegetation treatment, fire, improper livestock grazing, and development, and involved erosion and sedimentation. The development of private lands within the planning area also contributed to effluent discharge, stream

channelization, stream diversions and dams for reservoirs and power plants, and changes in water temperature and water quality.

In addition to the historic activities described above, sport fish stocking occurs in designated multiple-use reservoirs in the planning area suitable for fisheries. Introductions of nonnative game fish to Wyoming have occurred as early as 1880. The common carp, introduced in the 1880s as a food source, can be a nuisance in some situations, but has not infiltrated the waters in the planning area to any great degree. Common carp occur in the lower Hams Fork River, Green River, and possibly the Blacks Fork River. Introducing game fish has had positive economic impacts for the state through recreational fishing; however, in some instances, there have been adverse impacts to native cutthroat populations through competition (space and forage), predation, and hybridization.

Management challenges identified for fish in the planning area are based, in part, on historic activities and current habitat conditions and trends. Management challenges include flow management and sediment entrainment; activities contributing to reductions in streamside vegetation; management of produced water disposal; stream road crossings; maintaining proper functioning condition as a minimum condition for lotic and lentic riparian habitats; improving floodplain connectivity; developing water sources and acquisition of water rights to benefit fisheries; public access to fisheries; herbivory and physical trampling of riparian vegetation and soil compaction by herbivores; vegetation management, including INNS; fragmented land ownership; and water quality. Future activity plans may be identified to address these habitat challenges. Management actions for fish generally address surface-disturbing activities, barriers to fish passage, and habitat restoration, improvement, and conservation.

3.4.5 Fish and Wildlife Resources – Wildlife

This document groups wildlife according to Wyoming Statutory Wildlife Categories to facilitate the discussion regarding these species. The remainder of this section includes a description of the existing conditions and management challenges of habitat types and statutory wildlife groups found in the planning area. Management actions are described in more detail by alternative in Chapter 2. For the purpose of this discussion, the terms *habitat* and *vegetative types* are interchangeably used.

Wildlife and Habitats in the Kemmerer Planning Area

The planning area is within the ecoregions of the Southern Rocky Mountain and the Intermountain Semidesert provinces (Bailey 1995). The convergence of these zones results in a diversity of vegetative types, as listed in Table 3-17 and described in more detail in the Vegetation sections in this chapter. Following is a brief description of wildlife associated with the vegetative types as identified in Table 3-17.

The diversity of habitats and landscapes within the planning area cumulatively provide important areas for meeting all life requirements including breeding, foraging, migration, and winter range. The habitats and wildlife within the planning area are representative of northern Great Basin flora and fauna. Vegetation zones in the planning area are mostly the foothills scrub zone dominated by sagebrush, with timbered mountain slopes, some desert and basin zone, river bottoms, and limited alpine zones. These provide a broad range of diverse habitat types supporting the assemblages of species that live within the planning area.

Sagebrush, conifer forest, and desert shrubs vegetative types dominate the planning area (see Table 3-17). Sagebrush covers 2,095,198 acres of the planning area, of which 1,049,350 acres is BLM-administered surface land. The open grassland, sagebrush, and shrubland vegetative types are home to many raptor species, such as the Swainson's hawk, northern harrier, and prairie falcon. Raptors are attracted to the abundant prey, including upland game birds, small game, and numerous rodent species. More than 350 species of flora and fauna depend on the sagebrush vegetative type for all or part of their existence (Connelly et al. 2004). Sagebrush provides crucial winter range for big game and is essential for greater

sage-grouse and other sagebrush obligates, such as the Brewer's sparrow, sage sparrow, and sage thrasher (Cerovski et al. 2001). Many other species utilize the sagebrush vegetative type, including a number of reptiles and invertebrates.

Although only representing approximately 3 percent of the planning area, riparian and wetland habitats provide important areas for wildlife use and avifauna nesting. Riparian vegetation often provides a corridor for wildlife migration and travel. Riparian habitats occur primarily in association with the major tributaries and main stems of Thomas Fork, Smiths Fork, Hams Fork, and Blacks Fork; Fontenelle, Raymond, Coal, and Rock creeks; and the Green and Bear rivers. Usually, a high degree of plant diversity occurs along the riparian corridors, exhibiting variable density and composition of plants that leads to diversity of openness and ground cover. In later stages of development, riparian communities can support cottonwood-willow communities that provide important habitats for furbearers, raptors, and game species.

Water sources are important to the location and survival of plants and animals within the planning area. Seeps and springs provide water and meadow habitats important during birthing and rearing for big game. Small, shallow lakes, reservoirs, ponds, and wetlands provide seasonal habitats for resident and migrant waterfowl and shorebirds, including American avocet, killdeer, long-billed curlew, Canada geese, mallard, and cinnamon teal. The small streams and spring outlets provide wet meadow and streamside riparian habitats used by a great variety of species.

The Bear River Divide, Rock Creek Ridge, and Sublette Range form a major ridgeline that runs north and south along the west side of the planning area. Commissary Ridge, Oyster Ridge, and the Hogsback form a ridgeline running north and south through the central portion of the planning area. These two major ridgelines are very important migratory pathways for migratory raptors and neotropical migrant birds.

Compared to sagebrush and grassland, forests and woodlands are less abundant in the planning area. Based on GAP vegetation data, approximately 21 percent of the planning area (822,814 acres) is forested, of which 114,314 acres are on lands administered by the BLM. Vegetative types included in the forest category include lodgepole pine with Douglas-fir and spruce-fir at higher elevations and moister sites. Woodlands include aspen and juniper. Forests and woodlands provide summer cover for big game and are prime habitats for American marten, blue grouse, and northern goshawks. Aspen represents an important component of biodiversity in the planning area. Aspen stands typically have a diverse understory component and, thus, provide abundant forage and cover for big game, particularly females with young. Aspen also supports an abundance and diversity of animal species, including birds such as the blue grouse, red-naped sapsucker, and warbling vireo. Fire management, land development, climate, and ungulate grazing continue to affect the quantity and distribution of aspen in the planning area.

Large and small rim rock complexes in canyons and along ridge lines provide cliff and rock slope habitats that are primary nesting sites for swallows, rock doves, golden eagles, falcons, turkey vultures, and ferruginous and other species of hawks in the planning area. Rocks and canyons also provide denning sites for mountain lions and bobcats, and yearlong homes for many small mammals, including ground squirrels, woodrats, and rabbits. Abandoned cabins, mineshafts, and adits in the planning area provide potential and occupied habitat for numerous species of bats. Inventories of bats and other small mammals have not been completed within the planning area.

Historic activities from agriculture, development, fire and fuels management, OHV use, recreation, and transportation, have, in some areas, contributed to the degradation of wildlife habitats in the planning area. In other instances, historic activities have improved habitats or the ability to manage wildlife habitats.

Examples of historic activities that have contributed to the degradation of wildlife habitats include:

- Livestock concentration in areas such as water sources, which has contributed to trampling and removal of vegetation, and compacting soil

- Utility and pipeline corridor installation, which has disturbed soil and provided opportunities for the spread of INNS
- Fire suppression, which has depleted or completely removed the natural fire regime with which habitats evolved
- Mineral development, which has disturbed soils for the construction of associated well pads, access roads, facilities, and pipelines, thereby contributing to soil erosion and habitat fragmentation
- Improper OHV use, which has spread INNS, along with snowmobile use, which both can disturb wildlife
- Recreation activities, which have disturbed wildlife; and road placements, which have contributed to habitat fragmentation in the planning area.

The historic activities mentioned above have occurred to various degrees and primarily in isolated areas within the planning area. Consequently, current wildlife habitats in the planning area exhibit a range of existing conditions from habitats in proper functioning condition to habitats in something less than proper functioning condition, and large, contiguous blocks of habitats to small, fragmented patches of habitats. Examples of historic activities that have improved wildlife habitats or improved the management of habitats in the planning area include prescribed fire to maintain or restore desirable vegetative types and restore a natural fire regime; livestock water developments as sediment traps and as water sources for native ungulates and other wildlife; mining reclamation; and granting public access for hunting as a tool for big game management.

The BLM coordinates activities in the planning area with the WGFD and other federal agencies in managing fish, wildlife, upland game birds, and waterfowl to achieve and maintain sustainable population, including population dynamics and distributions. The WGFD and federal wildlife agencies are responsible for managing the populations, while the BLM, in cooperation with state and other federal agencies, is responsible for managing the habitats for the species. Through habitat management and restoration, the BLM intends to maintain and reestablish populations of native species that have historically used the range located within the planning area boundaries. Hunting occurs throughout the planning area in accordance with the State of Wyoming regulations. In addition, the planning area currently is a "Bighorn Sheep Non-management Area" (Wyoming State-wide Bighorn/Domestic Sheep Interaction Working Group 2004).

BLM and WGFD guidance documents are available regarding BMPs and management of wildlife habitats (WGFD 2004a; BLM 2005d). The existing plan guides the BLM's overall management of wildlife habitats within the planning area. Due to the relationship between wildlife habitats managed by BLM and wildlife species managed by the WGFD, a statewide agreement was established to facilitate cooperation between these agencies relative to wildlife (WGFD and BLM 1990). In accordance with the cooperative relationship between these agencies, the following description of priority wildlife species in the planning area is organized by Wyoming statutory categories: big game, trophy game, furbearers, predatory animals, small game, game birds, migratory game birds, and nongame (raptors, neotropical migrants, mammals, and reptiles and amphibians).

Big Game

BLM-administered lands in the planning area provide habitat for a variety of big game species, including moose, mule deer, pronghorn, and Rocky Mountain elk. In addition, BLM-administered lands in the planning area provide the majority of crucial winter range for pronghorn, mule deer, and elk populations that occur between the Wyoming and Uinta mountain ranges. Winter is a stressful time for wild ungulates and designated crucial winter ranges provide habitat during difficult conditions (e.g., deep

snow, low temperatures) of the most severe years. Therefore, crucial winter range for the most abundant big game species (pronghorn, mule deer, and elk) is often the focus of management and a criterion for analyzing the impacts of resources management on big game.

The planning area encompasses all or part of 18 big game populations or herd units (4 moose, 4 mule deer, 3 pronghorn, and 7 elk). Of these, 4 moose, 2 mule deer, 3 pronghorn, and 3 elk herd units include lands administered by the BLM. Established population objectives guide management strategies for each big game herd unit. WGFD establishes objectives through a public interagency review and input process, and are set at biologically sustainable and socially acceptable levels. Much of the information presented below on big game herd units was taken from the WGFD job completion reports (WGFD 2006a, 2006b).

Management challenges for big game species include poor habitat conditions, fire and fuels management, drought, increased development and urbanization, habitat fragmentation, OHV use, disease, and the impacts of livestock grazing on the frequency, quality, and composition of key forage species. The BLM and WGFD continually coordinate and evaluate actions affecting herd units and habitat conditions to determine appropriate management direction. Currently, chronic wasting disease occurs in western Colorado and eastern Utah, increasing concerns of the potential spread of this fatal brain disease into southwest Wyoming deer and elk herds. The impacts of these issues at the population level are not well understood.

Moose

Moose occupy a narrow range of habitats in the planning area. In the summer, moose utilize perennial streams, wetlands, and shrublands interspersed with forest cover. In the winter, moose browse willow, cottonwood, and aspen habitats. Winter populations of moose are larger than summer populations in the planning area. Moose generally summer in the Bridger-Teton and Wasatch National Forests and migrate to the lower elevations (e.g., stream bottoms) in the planning area in the winter to escape extreme snow depths. A limiting factor to all moose herds is the condition and trend of riparian communities (moose winter ranges), in the planning area, particularly willows and other palatable riparian shrubs.

Four moose herd units occur in the planning area and include the Lincoln, Sublette, Bear River Divide, and Uinta moose herd units. Moose herd units occupy approximately 3,930,927 acres in the planning area, of which approximately 1,423,960 acres are BLM-administered lands. The Lincoln Herd Unit post-season population has averaged approximately 1,514 moose between 2000 and 2004. The 2005 population estimate was 1,500, slightly below the herd population objective of 1,620 moose. The Sublette Herd Unit post-season population averaged approximately 3,997 moose between 2000 and 2004. The 2005 population estimate was 3,926, well below the herd unit objective of 5,500 moose. The Bear River Divide Herd Unit contains a small moose herd (an estimated 120 moose) that is scattered over a large expanse of nontypical open habitat. This area acts as an “over flow” area for adjacent larger populations of moose in the Uinta and Lincoln herd units. The Uinta Herd Unit post-season moose population averaged approximately 950 between 2000 and 2004. The 2005 population estimate was 925, and the Herd Unit objective was 900. The Uinta moose herd is an interstate herd occupying the north slope of the Uinta Mountains of Wyoming and Utah. A majority of the moose winter in Wyoming and summer in Utah. No working models address the interstate nature of this herd and population estimates are unreliable. Some of the greatest threats to the moose in the Bear River Divide Herd Unit may be the loss of aspen due to plant succession and the lack of fire, and potential increases in energy development and winter recreation on winter ranges resulting in direct loss of habitats and disturbance, reducing the availability of the remaining habitats.

Approximately 283,358 acres of moose crucial winter range occur in the planning area, of which 89,472 acres are BLM-administered surface and 219,224 acres are federal mineral estate. In general, crucial winter range for moose is separate from deer or elk winter range in the planning area; however, two areas of overlap do occur. One area of overlap is located in the Rock Creek and Raymond Canyon areas north

of Sage Junction and Cokeville; the second area of overlap occurs in the Chapman Butte and Blacks Fork area north of Cap White Ridge in the southern portion of the planning area.

Mule Deer

Mule deer occupy a wide range of habitats and almost all of the BLM-administered surface lands in the planning area constitute summer range for mule deer. Limited use occurs in the area bounded by State Highway 412, U.S. highways 189 and 30, and I-80. Population sustainability of mule deer at their objective level depends, in part, on habitat quality, quantity, and availability on public lands.

Two mule deer herd units (Wyoming Range and Uinta) occupy approximately 3,930,903 acres in the planning area, of which approximately 1,423,952 acres (36%) are BLM-administered surface lands. The Wyoming Range Herd Unit has shown a downward population trend from an estimated 37,639 mule deer post-season 2000, to an estimated 27,169 mule deer post-season 2005. The population is currently 46-percent below the population objective of 50,000. High mule deer mortality during the winters of 2001-02, 2003-04, and 2004-05, combined with drought conditions on summer and winter ranges resulting in poor fawn production, have kept this population depressed.

In the Uinta Herd Unit, mule deer populations generally are stable. The average post-season population estimate between 2000 and 2004 was 19,580 animals. The 2005 population estimate was 18,536, slightly below the herd unit objective of 20,000 mule deer. Because of herd mixing across the Utah-Wyoming state line and differing data collection methods between states, confidence in the accuracy of population estimates is low. Drought conditions and over-winter morality have been somewhat less severe in the Uinta Herd Unit than in the Wyoming Range Herd Unit. Fawn production data from 2003-2005, as well as fairly high buck ratios, point to good recruitment and an increasing population.

Mule deer generally move to winter range during November and remain there until April or May. There are approximately 467,348 acres of mule deer crucial winter range in the planning area, of which approximately 244,345 acres (52%) are BLM-administered surface lands. The largest winter range is more than 60-miles long and is associated with the western and southern portions of the Bear River Divide, Rock Creek Ridge, and the Sublette Range. Fontenelle and Slate creeks provide winter range in the northeastern portion of the planning area. Other areas of winter range include Muddy Creek and Blacks Fork near Piedmont and other smaller scattered areas in the planning area. Winter range is considered a limiting factor for mule deer in the region. Issues of concern within mule deer winter ranges include increased fencing, livestock grazing, competition for browse, declines in shrub community vigor, and unsound vegetation treatments, primarily on private lands. No winter feeding program occurs for mule deer in the planning area.

Livestock grazing occurs on the majority of mule deer summer and winter range. Cattle and mule deer have some dietary overlap, but generally cattle grazing is compatible within mule deer habitats. However, heavy cattle stocking may convert shrub-grassland habitats into less palatable shrublands, making them less useful for mule deer. The diets of domestic sheep, however, have considerable overlap with the mule deer diet, which can affect mule deer forage.

Pronghorn

Pronghorn are associated with low, rolling terrain supporting open grassland and sagebrush communities. Population sustainability of pronghorn at their objective level depends, in part, on habitat quality, quantity, and availability on public lands.

Three pronghorn herd units occur in the planning area: the Sublette, Carter Lease, and Uinta Cedar Mountain herd units. Pronghorn herd units occupy approximately 3,313,346 acres in the planning area, of which approximately 1,419,938 acres (43%) are BLM-administered surface lands. Pronghorn post-season population estimates for the Sublette Herd Unit averaged 43,340 between 2000 and 2004. The 2005

estimate was 47,900 pronghorn, nearing the population objective of 48,000 pronghorn. Hunt area 93 is the only hunt area within the herd unit that extends onto BLM-administered lands. The population-objective level for hunt area 93 is 8,000 pronghorn. The post-season population estimate for this hunt area was 7,177 in 2005. Pronghorn population estimates for the Carter Lease Herd Unit averaged 9,023 between 2000 and 2004. The 2005 estimate was 9,207, far greater than the herd unit population objective of 6,000 pronghorn. Pronghorn population estimates for the Uinta Cedar Mountain Herd Unit averaged 7,860 between 2000 and 2004. The population appears to be increasing, with the 2005 estimate of 9,177 pronghorn, approaching the herd unit objective of 10,000.

Fence construction specifications place the bottom wire high enough to allow pronghorn to pass without affecting the containment of livestock because pronghorn tend to crawl under fences rather than jump over them. The BLM constructs new fences to these specifications. Snow may occasionally build up in the area between the bottom wire and the ground, where it may impede herd movement. Some fences, especially along highways, do not meet these specifications for pronghorn. When problems with herd mobility are identified, the fences are modified or gates on these fences are opened.

Livestock grazing occurs on the majority of the pronghorn summer range. Cattle and pronghorn generally have very little dietary overlap and, therefore, some cattle grazing is compatible with pronghorn habitats. Cattle can directly compete with pronghorn for the same vegetative resources when their ranges overlap in shrub communities (e.g., Gardner's saltbush, winterfat, and bitterbrush are all palatable to both), and when cattle grazing affects forb species availability and composition on overlapping summer ranges. Also, Bleich et al. (2005) outlined some indirect adverse impacts from cattle grazing, including (1) reduction in the vigor of plants and their quantity and quality, (2) elimination or reduction in a plant's reproductive capacity, (3) reduction or elimination of locally important cover types and replacement with less favorable types or communities, and (4) alteration of composition of plant communities due to season of use, which can consume favorable plants and increase the growth of undesirable plants or weeds. The diets of domestic sheep, however, have considerable overlap with the pronghorn diet and, therefore, sheep can out-compete pronghorn for forage (BLM 2003a).

Approximately 466,368 acres of pronghorn crucial winter range occur in the planning area, of which approximately 224,472 acres are BLM-administered surface and 294,302 acres are federal mineral estate. Major winter range areas are associated with lower Fontenelle and Slate creeks and the Green River. The largest winter range area is associated with lower Hams Fork, Blacks Fork, and Muddy Creek. Smaller winter range areas are south of Interstate 80, west of Sage Junction and in the Abbot Creek along State Highway 189. The availability of browse, especially sagebrush, appears to be the limiting factor for pronghorn winter range.

Rocky Mountain Elk

Elk diets consist mostly of grasses and forbs, with grasses being the dominant forage in spring and forbs being the dominant forage in summer months (Clark and Stromberg 1987). Elk consume shrubs year round, but are especially important on the winter range when forbs and grasses are less accessible. BLM-administered lands provide less cover for elk and have a higher degree of road access than the adjacent USFS lands. Almost all the BLM-administered lands in the planning area could be considered summer range for elk. However, the elk are migratory, and most migrate to the Bridger-Teton or Wasatch National Forests in the summer. Some elk remain on higher elevation BLM-administered lands throughout the summer in areas where cover is adequate and disturbing activities are minimal. Only those areas north of Kemmerer, south of Mountain View, and along the northern portion of the Bear River Divide are considered occupied summer range. Nonetheless, they are important because the long stringers (continuous strands) of cover along ridges allow elk access to forage and winter range. High country areas along the forest boundary (aspen-conifer associations) support considerable spring and fall and some summer elk use. These areas also are used for calving. Winter range appears to be the main

limiting factor for elk in the planning area; however, poor forage conditions from drought conditions are contributing factors to low calf production and survival.

There are approximately 461,061 acres of elk crucial winter range in the planning area, of which approximately 272,480 acres (59%) are BLM-administered surface lands. Elk crucial winter range is concentrated in five major locations, mostly in the northern portion of the resource area. These areas strongly overlap with mule deer wintering areas, but also include areas with deeper snow. The two largest winter range areas are to the northeast and northwest of Kemmerer in the north-central portion of the planning area, associated with the western side and southern aspects of Rock Creek Ridge, and an area associated with Fontenelle and Slate creeks. There are many smaller areas scattered from Lake Viva Naughton and the Sublette Range north. Two moderate-sized winter ranges are located south of I-80, one in the vicinity of Hickey Mountain and the other southwest of Fort Bridger. Weather conditions influence the use of these two southern winter ranges. In mild winters, many of the animals never completely move out of summer range areas in Utah.

Seven elk herd units occur in the planning area, of which three—the Afton, West Green River, and Uinta herd units—occupy BLM-administered surface lands. The Afton Herd Unit elk population has generally been stable for the last few years. The post-season population estimate averaged 2,451 elk between 2000 and 2004. The 2005 population estimate was 2,330, slightly above the population objective of 2,200. Some elk from Idaho herd units winter in Wyoming. Mixing of elk between Wyoming and Idaho and variability in the timing of movement complicates an accurate determination of population numbers. The principle issues concerning elk management in the Afton Herd Unit are related to damage to private landowner forage and numbers of animals on the two-winter feed grounds in this unit. These two feed grounds, the Alpine feed ground and the Forest Park feed ground occur in the planning area. The purpose of the Alpine feed ground is to alleviate private property damage and motor vehicle collisions, while the purpose of the Forest Park feed ground is to prevent starvation of animals. Neither feed ground is on BLM-administered lands, but there have been instances of emergency feeding, such as during the severe winter of 1996 and 1997.

The West Green River Herd Unit population estimate averaged 4,423 between 2000 and 2004. The 2005 estimate was 4,439 elk, substantially greater than the population objective of 3,100 elk. Drought conditions affect elk through reduced forage production and poor body conditions, which could lower calf production and survival. Elk numbers observed on trend counts have remained stable on these winter ranges.

The Uinta Herd Unit management objective is for 600 wintering elk. The population is thought to have been at or near objective since 2000. However, confidence in the population estimate is low because of herd mixing across the Utah-Wyoming state line and differing data collection methods between states. Wintering numbers and harvest levels highly depend on weather conditions affecting timing and extent of elk seasonal movements. Drought conditions do not seem to have affected elk populations as much as mule deer or pronghorn.

Livestock grazing occurs on the majority of the elk summer and winter range. Cattle and elk have considerable dietary overlap; therefore, cattle grazing can be incompatible with elk habitats, especially on winter range areas. The diets of domestic sheep, however, have less overlap with the elk diet, so sheep are less likely to compete with elk for forage.

Trophy Game

Trophy game found on BLM-administered land in the planning area includes black bear and mountain lion. Limited black bear populations occur in aspen-conifer areas in higher elevations of the northern portion of the planning area. The goal within the planning area is to maintain a healthy bear population capable of providing a broad range of recreational opportunities (including hunting and viewing in existing occupied habitats) while considering public safety, economic concerns, and other wildlife

species. Due to a bear's secretive nature, population estimates are difficult to obtain and population objectives are not established. The BLM and WGFD utilize management guidelines established by the WGFD's *Black Bear Management Plan* (WGFD 1994) to help direct management activities on BLM-administered land.

Mountain lion populations generally occur in the northern, northwestern, and southern edges of the planning area at higher elevations. The seasonal range of mountain lions generally follows that of their main prey, mule deer. The planning area encompasses portions of two WGFD lion management units (southwest and west) and three lion hunt units. Management goals generally focus on sustaining mountain lion populations, maintaining prey (mule deer) populations, and providing recreation and hunting opportunities, while considering human safety, economic concerns, and the needs of other wildlife species. The BLM and WGFD utilize management guidelines established by the WGFD's *Mountain Lion Management Plan* (WGFD 2006c) to help direct management activities on BLM-administered land.

Furbearing Animals

Furbearing animals in the planning area include badger, beaver, bobcat, mink, weasel, muskrat, and marten. Badger and bobcat are habitat generalists and can be found throughout the planning area, although bobcat do not occupy high mountain areas. Beaver, mink, and muskrat are common in the waters and riparian areas throughout the planning area. Marten occur in the forested regions of the mountains along the north and south portions of the planning area. Short-tailed weasels are found in coniferous forest, riparian shrub and meadow habitats, while long-tailed weasel are typically found in rock outcrops near water in desert shrub, grassland, and riparian shrub habitats (Cerovski et al. 2004). No management challenges have been identified for these species in the planning area.

Predatory Animals

According to Wyoming statute, predatory animals include coyote, jackrabbit, porcupine, stray cat, gray wolf, red fox, raccoon, and skunk (striped and spotted). From the standpoint of BLM management, most of the efforts and attention are focused on coyote, red fox, and skunk animal damage-control activities. The BLM does not conduct any habitat-management activities for predatory animals.

The U.S. Department of Agriculture (USDA) and Animal and Plant Health Inspection Service (APHIS)-Wildlife Services conduct predatory animal damage control activities on public lands in accordance with the national MOU and local action plans (BLM 1997b; BLM 1995b; BLM 2000a). Agencies conduct damage control activities in response to requests from individuals, organizations, and agencies experiencing damage caused by wildlife. Animal damage control activities primarily include mechanical (trapping, shooting, and denning), chemical (poison), and nonlethal methods (noise devices, aversive conditioning, etc.). Through the Animal Damage Management Board, the State of Wyoming also conducts animal damage-control activities, particularly those actions involving rabies and other diseases. The management challenges of animal damage-control activities are to conduct a program that responds to predation problems and remains socially acceptable and safe in accordance with applicable laws and regulations.

Small Game

Three mammal species can be harvested as small game in the planning area: cottontail rabbit, snowshoe hare, and red squirrel. Cottontail rabbits are habitat generalists, occupying brushy, rocky areas, dense sagebrush, streamside thickets, and brushy forest edges throughout the planning area. Snowshoe hare primarily utilize conifer forest and aspen communities in higher elevation areas. Red squirrels occur mainly in coniferous and mixed forests, but could also occupy deciduous woodlots, hedgerows, and second-growth areas. Populations of all small game species tend to be cyclic in nature. No assessments of habitat condition, estimates of population size, mortality or natality rates, or hunter effort are known for any of these species. Due to the wide distribution of small game species throughout Wyoming, no

management challenges are identified in the planning area. No specific management objectives exist for these species in the planning area.

Game Birds

Game bird management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Upland Game Bird Habitat Management Plan* (BLM 1992a). All game bird species in Wyoming are managed for recreational use (e.g., hunting, bird watching, etc.).

Game birds include greater sage-grouse, ruffed grouse, blue grouse, chuckar, and Hungarian partridge. Greater sage-grouse are discussed in the Special Status Species - Wildlife section of this chapter. Ruffed grouse generally are associated with brushy riparian habitats within the conifer zone and blue grouse generally are associated with upland conifer habitats. These habitat types occur in the northern and southern sections of the planning area. No specific management areas are designated for these species. In general, increased water availability and improvement to riparian habitats in the conifer zone are current management objectives for these species.

Migratory Game Birds

Migratory game birds in the planning area include waterfowl and the mourning dove. At least 24 species of waterfowl are known to occur in the planning area. Most species are migratory, but some nest in the planning area. Most water bodies in the planning area provide staging and migration stopover habitat for waterfowl. Aquatic resources are scattered throughout the planning area. The main areas used by waterfowl include the Bear River and Green River and their tributaries and adjacent wetlands. The Wheat Creek Meadows Wildlife Habitat Area north of Kemmerer is managed to enhance waterfowl and other wetland species breeding, nesting, and rearing habitats. In Wyoming, mourning doves are typically associated with river-bottom lands and agricultural areas that provide necessary food, water, roosting, and breeding areas. Mourning doves are common throughout the planning area and are associated with weedy forb species. Livestock and wildlife water developments increase the potential suitable habitats in the planning area for mourning doves.

Nongame

Existing conditions for four categories of nongame wildlife (raptors, neotropical migrants, mammals, and reptiles and amphibians) are described briefly below. Raptors and neotropical migrants are afforded protection under the Migratory Bird Treaty Act. Additional detail about nongame wildlife occurring within the planning area can be found in the WGFD's *Atlas of Birds, Mammals, Amphibians and Reptiles in Wyoming* (Cerovski et al. 2004) and the *Comprehensive Wildlife Conservation Strategy* (WGFD 2005). In addition, the *Wyoming Partners in Flight's Wyoming Bird Conservation Plan* identifies priority bird species and habitats, as well as population and habitat objectives for birds (Nicholoff 2003).

Raptors

Raptors include eagles, hawks, owls, falcons, and vultures. The planning area provides seasonal and yearlong habitat for a multitude of raptor species. Raptor utilization for specific and region wide areas varies greatly year-to-year and season-to-season depending on prey availability, habitat quality, level of raptor populations, and other factors. Common breeding raptors in the planning area include Swainson's hawk, ferruginous hawk, red-tailed hawk, northern harrier, golden eagle, prairie falcon, American kestrel, and great-horned owl. Of these raptors, golden eagle and great-horned owl are yearlong residents, and smaller winter populations of red-tailed hawk and northern harrier occur within the planning area. The Special Status Species-Wildlife section of this chapter addresses ferruginous hawk and burrowing owl. Other raptor species adapted for open areas found during various times of the year include rough-legged hawk, a winter resident; snowy owl, a rare winter visitor; long-eared owl, a denizen of open and forested areas; and short-eared owl. Ospreys are common summer residents in the planning area along the major

river and stream systems. Forest raptors occurring in the planning area include sharp-shinned hawk, Cooper's hawk, northern goshawk, and northern saw-whet owl.

Management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Raptor Habitat Management Plan* (BLM 1992b). Management procedures and activities for raptors have been identified by the USFWS management guidelines (USFWS 2002) and Avian Protection Plan guidelines (APLIC and USFWS 2005). Golden eagles also are protected under the Bald and Golden Eagle Protection Act. The *Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0* identifies habitat requirements and threats for raptor species (Nicholoff 2003). Currently, approximately 210 raptor nests are documented in the planning area, of which 110 raptor nests are on BLM-administered surface land; however, not all of these nests are occupied.

Management challenges for raptors generally are directed at activities around nesting habitats, concentration sites (e.g., winter roosts), and foraging areas. Management of powerlines and contaminants for raptor conservation are ongoing issues in the planning area.

Neotropical Migrants

For the purposes of this RMP, neotropical migrants include birds that breed in the United States and Canada and winter in Latin America (Nicholoff 2003). The terms "neotropical migrants" and "nongame birds" are used interchangeably for this discussion. Neotropical migrant management direction for the BLM is identified in the *BLM Fish and Wildlife 2000 Nongame Migratory Bird Conservation Plan* (BLM 1992c). The *Wyoming Partners in Flight Wyoming Bird Conservation Plan Version 2.0* provides habitat requirements for neotropical migrant species and identifies their threats (Nicholoff 2003).

Numerous nongame bird species are known or suspected to occur within the planning area, including waterbirds, shorebirds, marshbirds, and a range of songbirds, both residents and neotropical migrants. Many of these species breed in Wyoming, others rely on habitats within the state during migration, and a few species breed to the north and winter in Wyoming. Most songbirds in the planning area are those adapted for open areas. The vast sagebrush component of the planning area provides important habitats for major indicators of that type—sage thrasher, Brewer's sparrow, and sage sparrow. Forests, riparian areas, and water resources within the planning area also provide habitats for multitudes of other species. These species collectively utilize all of the vegetative types in the planning area.

Management challenges focus around maintaining or enhancing the presence of these species and the habitats upon which they depend. Management actions for neotropical migrants generally are directed at activities around nesting habitat and migration corridors. Ongoing conservation issues for neotropical migrants include managing hazards such as powerlines, communication towers, contaminants, and wind turbines.

Mammals

At least 43 species of nongame mammals are known or suspected to occur in the planning area, including 5 shrew species, 12 bat species, 9 squirrel family species, 2 gopher species, 14 mouse or rat species, and the porcupine. For a complete habitat description and distribution of nongame mammals, refer to the *Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming* (Cerovski et al. 2004). Most nongame mammals are widely distributed in the state, although population trend data and specific habitat requirement information are lacking for many of these species.

Management challenges currently focus on increasing the understanding of habitat requirements for these species and maintaining the presence of these species in occupied habitats. Ongoing conservation efforts for nongame mammals include reducing the spread of INNS into native habitats and managing hazards, such as contaminants and developments.

Reptiles and Amphibians

The climate and habitat types in the planning area restrict the diversity and abundance of reptiles and amphibians. In general, reptiles occurring in the planning area occupy a variety of habitats, including rock outcrops (lizards) and a variety of terrestrial vegetative types (snakes and lizards). Amphibians occurring in the planning area occupy aquatic habitats, including springs, wetlands, riparian corridors, or open water for the first phase of their life cycles. Ten species of reptiles and amphibians are expected to occur in the planning area: tiger salamander, boreal toad, Great Basin spadefoot, boreal chorus frog, northern leopard frog, spotted frog, eastern short-horned lizard, northern sagebrush lizard, rubber boa, and wandering garter snake. No estimates of population size are known for any of these species. The Special Status Species – Wildlife section of this chapter addresses boreal toad, Great Basin spadefoot, northern leopard frog, and spotted frog. Management challenges for reptiles and amphibians primarily include maintaining a variety of habitat types and components (e.g., rock outcrops, riparian, and wetland) in proximity to provide for the requirements of these species.

3.4.6 Special Status Species – Plants

Management of special status species on public lands administered by the BLM occurs under a variety of laws, policies, and other requirements, as summarized in Chapter 1.

The USFWS provides regulatory oversight for all plant, fish, and wildlife species listed as threatened or endangered, proposed for listing, or are candidates for listing under the ESA. Management of federally listed species and the designation of critical habitats are overseen by the USFWS in accordance with the ESA. Formal consultation is required on any action a federal agency proposes that may adversely affect a federally listed species or critical habitat. A conference is initiated when any action will result in jeopardy or adverse modification of critical habitats for proposed species. Informal consultation is required on any action a federal agency proposes that (1) may affect – not likely to adversely affect listed species or critical habitat or (2) may affect – may have beneficial, discountable or insignificant effects. Consultation is not required when it is determined that an action will have no effect on listed species or designated critical habitat. Special status species considered in this analysis include those species listed as threatened or endangered, are proposed for listing, are candidates for listing, or those designated by the BLM State Director as sensitive.

Currently, four species of plants within Wyoming are listed as either endangered or threatened by the ESA, none of which is known to occur in the planning area, although potential habitats for one of these species does occur within the planning area. No plants are proposed or candidates for listing within Wyoming. No designated critical habitat exists in the planning area. Eight sensitive plant species, as designated by the BLM State Director, occur in the planning area.

The Wyoming Natural Diversity Database (WYNDD) maintains a list of Wyoming plant species of concern and plant species of potential concern and provides information on global and state abundance, legal status, and state distribution (Keinath et al. 2003). Species in Wyoming are considered to be of special concern if (1) the species is vulnerable to extinction at the global or state level due to inherent rarity, (2) the species has experienced a significant loss of habitat, or (3) the species is sensitive to human-caused mortality or habitat disturbances. The WYNDD tracks, studies, and documents these special status species and other species considered to be rare within the State of Wyoming. The species on this list are watched to determine their abundance and whether they need to be added to the BLM-sensitive species list. By continuing to identify and avoid actions that could result in adverse impacts to these species and their habitats, their populations can be maintained so they will not need to be listed by the BLM as sensitive in the future. The BLM Wyoming State Office conducts an annual review of its sensitive species list to make additions or deletions based on the most current information on species status. Currently, the Wyoming State Government does not list any plant species as sensitive.

The Kemmerer Field Office determines presence of special status plant species on a case-by-case basis. Restrictions in areas with known populations of special status plants are also determined on a case-by-case basis. The Kemmerer Field Office has the specific goals of contributing to the recovery of species currently listed under the ESA and to promoting the recovery and conservation of all special status plant species within the planning area (BLM 2003a).

Special status plant species that occur or have habitats available in the planning area are listed in Table 3-19 and described in this section. There are no known occurrences of federally listed plant species, although habitat for one of these species occurs within the planning area (Ute ladies'-tresses). Eight BLM sensitive plant species and 17 plant species of concern tracked as rare by WYNDD are documented as occurring within the planning area. Much of the information in the following species descriptions was taken from the *Summary of the Management Situation Analysis* (BLM 2003a) for the planning area.

Table 3-19. Special Status Plant Species Known to or Potentially Occurring in the Kemmerer Planning Area

Scientific Name	Common Name	Rank[1]
Federally Listed Plant Species		
Spiranthes diluvialis	Ute ladies'-tresses	federally threatened
BLM Sensitive Plant Species		
Astragalus racemosus var. *treleasei*	Trelease's racemose milkvetch	G5T2/S1
Lepidium integrifolium var. *integrifolium*	Entire-leaved peppergrass	G2T1/S1
Lesquerella macrocarpa	Large-fruited bladderpod	G2/S2
Lesquerella multiceps	Western bladderpod	G3/S1
Lesquerella prostrata	Prostrate bladderpod	G3/S1
Phlox pungens	Beaver-rim phlox	G2/S2
Physaria condensata	Tufted twinpod	G2/S2
Physaria dornii	Dorn's twinpod	G1/S1
WYNDD Plant Species of Concern		
Achnatherum swallenii	Swallen mountain ricegrass	G5/S2
Astragalus bisulcatus var. *haydenianus*	Hayden's milkvetch	G5T5/S2
Astragalus coltonii var. *moabensis*	Moab milkvetch	G5T3/S2
Astragalus lentiginosus var. *salinus*	Sodaville milkvetch	G5T5/S2
Atriplex falcata	Sickle saltbush	G5/S1
Chamaechaenactis scaposa	Fullstem	G5/S1-2
Downingia laeta	Great Basin downingia	G5/S1
Eriogonum divaricatum	Divergent wild buckwheat	G5/S1

Table 3-19. Special Status Plant Species Known to or Potentially Occurring in the Kemmerer Planning Area *(Continued)*

Scientific Name	Common Name	Rank[1]
Lathyrus lanszwertii var. *lanszwertii*	Nevada sweetpea	G5T5/S1
Lesquerella parvula	Narrow-leaved bladderpod	G5T3/S1
Opuntia polyacantha var. *juniperina*	Juniper prickly pear	G5T3/S1
Opuntia polyacantha var. *rufispina*	Rufous-spine prickly pear	G5T5/S2
Penstemon scariosus var. *garrettii*	Garrett's beardtongue	G5T3/S1
Phacelia glandulosa var. *deserta*	Desert glandular phacelia	G5T1-2/S1
Phlox albomarginata	White-margined phlox	G5/S1
Potentilla multisecta	Deep creek cinquefoil	G3-4/S1
Silene douglasii	Douglas' campion	G5/S1

Sources: BLM 2003a; Keinath et al. 2003

[1] The WYNDD utilizes a standardized ranking system developed by The Nature Conservancy's Natural Heritage Network to assess the global and statewide conservation status of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. Codes are as follows:

G Global rank: Rank refers to the rangewide status of a species.
T Trinomial rank: Rank refers to the rangewide status of a subspecies or variety.
S State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
1 Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.
2 Imperiled because of rarity (often known from 6 to 20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
3 Rare or local throughout its range or found locally in a restricted range (usually known from 21 to 100 occurrences).
4 Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5 Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
6 Ute ladies'-tresses are not known to occur in the planning area; however, potential habitat does occur in the planning area.
BLM Bureau of Land Management
WYNDD Wyoming Natural Diversity Database

Federally Listed Plant Species

Ute Ladies'-tresses. Ute ladies'-tresses, a federally listed threatened species, has not yet been identified in western Wyoming, although potential habitat for the species does exist. The Ute ladies'-tresses grows on moist sub-irrigated or seasonally flooded soils in valley bottoms, gravel bars, old oxbows, or floodplains bordering springs, lakes, rivers, or perennial streams at elevations between 1,780 and 6,800 feet. Populations have been documented from alkaline sedge meadows, riverine floodplains, flooded alkaline meadows adjacent to ponderosa pine-Douglas-fir woodlands, sagebrush steppe, and streamside floodplains. The Ute ladies'-tresses is well adapted to disturbances from stream movement and is tolerant of other disturbances, such as light grazing, that are common to grassland riparian habitats and reduce competition between the orchid and other plants (USFWS 1995). Populations are known from along the base of the eastern side of the Rocky Mountains in portions of Wyoming, Montana, and Colorado. Populations are also known from the upper Colorado River basin, especially in the Uinta basin; areas along the Wasatch Front and westward in the eastern Great basin; in north-central and western Utah; extreme eastern Nevada; and in Nebraska and Washington. The populations closest to the planning area are found in the Brown's Park area along the Green River in northeast Utah and along the Snake River in eastern Idaho. The riparian and wetland habitats for Ute ladies'-tresses have been heavily impacted by urban development, heavy grazing, stream channelization, water diversions, and watershed and stream alterations that reduce the natural dynamics of stream systems, recreation, and invasion of habitats by exotic plant species (USFWS 1995). The potential habitats within the planning area include riparian and wetland communities at elevations below 7,000 feet.

To gather as much information about this species as possible, and to comply with the provisions of the ESA and BLM national policy, the Kemmerer Field Office requires surveys of all suitable areas that

could provide habitat for this species prior to engaging in surface-disturbing activities. Should Ute ladies'-tresses be found, all surface-disturbing activities would be halted until protective measures developed in coordination with the USFWS could be implemented. Mandatory surveys and avoidance would help to prevent adverse impacts to this species within the planning area.

BLM Sensitive Plant Species

Trelease's Racemose Milkvetch. Trelease's racemose milkvetch is a regionally endemic Wyoming BLM sensitive species, as well as a Natural Heritage Network globally secure and Wyoming State and trinomially (taxonomic ranking identified below that of species) imperiled species. It grows on barren hills and washes, although little else is known about this species. The Wyoming Rare Plant Technical Committee is currently compiling information on the Trelease's racemose milkvetch. Populations of Trelease's racemose milkvetch are known to occur in Sublette and Uinta counties. Two occurrences are known from the southern portion of the planning area. At present, threats to the species are unknown.

Entire-leaved Peppergrass. Entire-leaved peppergrass is a sensitive species in Wyoming, as well as a Natural Heritage Network global, state, and trinomially imperiled species. It is a perennial forb found on desert hills, sparsely vegetated and seasonally wet clay flats, and moist alkaline meadows at elevations between 6,200 to 6,770 feet in Lincoln and Uinta counties. Entire-leaved peppergrass is a regionally endemic species of northeastern Utah and southwestern Wyoming found within Fossil Butte National Monument and in one location within the planning area. Threats to the species include human development, which has caused the loss of many of Utah's entire-leaved peppergrass populations.

Large-fruited Bladderpod. Large-fruited bladderpod is a Wyoming BLM sensitive species, as well as a Natural Heritage Network global and state-imperiled perennial species. It grows in open Gardner's saltbush and squirreltail communities on barren clay hills and flats. Usually, populations are found on slopes of less than 15 percent on low hills, knolls, or colluvial fans at elevations of 6,800 to 7,700 feet. Soils are usually fine to textured barren clays and shales. The large-fruited bladderpod is endemic to an area less than 25 square miles in size on the western rim of the Great Divide basin and in the Green River basin near Opal and Ross Butte, Wyoming. Disturbance from oil and gas mining and exploration is a threat to the species. OHV use and wild horse activity are also possible threats. Management entities with known populations of large-fruited bladderpod include the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, one occurrence of the large-fruited bladderpod is known south of Opal.

Western Bladderpod. Western bladderpod is a Wyoming BLM sensitive species, as well as a Natural Heritage Network globally rare and state-imperiled perennial forb. It grows on dry, gravelly limestone ridges and slopes at elevations of 8,300 to 8,600 feet. It is a regional endemic of northeastern Utah, southeastern Idaho, and western Wyoming. In Wyoming, it occurs only from the Snake River Range and Overthrust Belt in Lincoln County. Current trends and threats are unknown for this species. One population occurs on lands in the Targhee National Forest on land managed by the Bridger-Teton National Forest, and the other population is managed by the BLM in southwestern Lincoln County within the planning area.

Prostrate Bladderpod. Prostrate bladderpod is a Wyoming BLM sensitive species, as well as a Natural Heritage Network globally rare and state-imperiled perennial forb. It is a regional endemic found in central Idaho and southeastern Idaho and in southwestern Wyoming and northeastern Utah. In Wyoming, it occurs in the Overthrust Belt in Lincoln and Uinta counties. Prostrate bladderpod grows on slopes and rims of limey clays and soft sandstones with a fine gravel surface layer at elevations of 7,200 to 7,700 feet. Current threats to this species are low because the plants grow on steep slopes; however, future oil and gas development and pipeline construction may pose a threat. Prostrate bladderpod has five populations growing in the south and central portions of the planning area.

Beaver Rim Phlox. Beaver Rim phlox is a slightly prickly matted plant with large white flowers determined in 1988 to be endemic to Wyoming. Beaver rim phlox is classified as Wyoming BLM sensitive with a high conservation priority and is ranked by the Natural Heritage Network as a global and state-imperiled species. This species grows on dry desert hills on sparsely vegetated slopes with sandstone, siltstone, or limestone substrates at elevations of 6,000 to 7,400 feet. Populations of Beaver Rim phlox occur in the Green River basin in Sublette and Lincoln counties and in southern Fremont County. The Green River basin populations differ morphologically from those in Fremont County by having short-stalked glandular hairs on the leaves, as well as narrower leaves. Beaver Rim phlox is known to occur in the eastern edge of the planning area. General threats to the Beaver Rim phlox include disturbance from oil and gas development, pipeline construction, and highway construction.

Tufted Twinpod. Tufted twinpod is a Wyoming BLM sensitive perennial forb, as well as a with Natural Heritage Network global and state-imperiled species. Tufted twinpod occurs on dry, rocky calcareous knolls and ridges, shaly hills, and clay banks. This species occurs in openings within sagebrush grassland at elevations of 6,700 to 7,400 feet in sparsely vegetated cushion plant communities. Tufted twinpod is an endemic to the southern Overthrust Belt and lower Green River basin in Lincoln, Sublette, and Uinta counties in southwest Wyoming. Tufted twinpod may be adaptable to disturbed sites and threats appear minimal. The species occurs on lands managed by Fossil Butte National Monument and the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, 12 locations of this species are known.

Dorn's Twinpod. Dorn's twinpod is a BLM sensitive species and a Natural Heritage Network global and state critically imperiled species. This species is a locally endemic perennial herb restricted to the southern Overthrust Belt in Lincoln and Uinta counties. Dorn's twinpod grows on clay-gravel or sandy-shale slopes with little plant cover at elevations of 6,500 to 7,600 feet. Threats include OHV use, road construction, and mineral exploration. Dorn's twinpod grows on BLM-administered land and on adjacent state and private land. Within the planning area, there are four main populations with 97 percent of the population occurring in a contiguous area comprising three of the populations within southwestern Lincoln County and one population within Uinta County.

WYNDD Plant Species of Concern

Swallen Mountain-ricegrass. Swallen mountain-ricegrass is a perennial bunchgrass with BLM sensitive status in the BLM Rock Springs planning area, as well as a Species of Concern to WYNDD. The Natural Heritage Network ranks the species as globally secure, but is state-imperiled and possibly rare in parts of its range. It occurs on sandy to gravely limey-clay soils covered with gravel. Swallen mountain-ricegrass occupies rocky slopes, rims, and mesa summits, often associated with sagebrush grasslands at elevations of 6,500 to 7,900 feet. Swallen mountain-ricegrass is an endemic of east-central Idaho and western Wyoming. Wyoming populations occur only in the western Green River basin in Lincoln and Sublette counties. Threats to populations include oil and gas development. Known populations occur on lands managed by the BLM Kemmerer, Pinedale, and Rock Springs field offices, including one occurrence in the planning area.

Hayden's Milkvetch. Hayden's milkvetch is a perennial herb with globally and trinomially secure rankings, but is a Species of Concern to WYNDD, and has state-imperiled Natural Heritage Network ranking. In Wyoming, Hayden's milkvetch occurs from the Washakie and Great Divide basins in Carbon, Fremont, and Sweetwater counties and the Overthrust Belt in Lincoln and Uinta counties. Hayden's milkvetch grows on clay or sandy soils on rims, upper slopes, and draws associated with sandstone outcrops or springs at elevations of 6,600 to 7,660 feet. Threats and trends are unknown for this species. The populations occur on lands managed by the BLM Kemmerer, Lander, Rawlins, and Rock Springs field offices. One known location occurs within the planning area, in southern Lincoln County.

Moab Milkvetch. Moab milkvetch is a perennial herb with Natural Heritage Network rankings of globally secure, trinomially rare, but is state-imperiled as well as being a Species of Concern for

WYNDD. Moab milkvetch grows on desert hills in Sweetwater and Uinta counties. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer and Rock Springs field offices. One known location of Moab milkvetch occurs within the planning area, in southeastern Uinta County.

Sodaville Milkvetch. Sodaville milkvetch is a perennial forb with Natural Heritage Network rankings of globally and trinomially secure, but is state-imperiled and a Species of Concern to WYNDD. In Wyoming, sodaville milkvetch is restricted to the Overthrust Belt in Lincoln and Uinta counties. Sodaville milkvetch grows in big sagebrush communities on rocky clay slopes and ridges below rimrock at elevations of 6,540 to 6,800 feet. Threats to the species include OHV use and invasive species. Within the planning area, the plant is known in two locations in western Lincoln County.

Sickle Saltbush. Sickle saltbush is a shrub Species of Concern to WYNDD and ranked by the Natural Heritage Network as critically imperiled in the State of Wyoming, even though globally secure. Sickle saltbush grows in sagebrush-dominated communities on desert hills, mesas, draws, and gravel benches with sandy to clayey soil. The known range of sickle saltbush includes southeastern Washington to northeastern California, east to Montana, Utah, and Nevada. In addition to Uinta County, Sublette and Sweetwater counties also contain known populations. Disturbance from mining exploration may impact some populations of sickle saltbush. Management entities with known populations include the BLM Kemmerer, Pinedale, and Rock Springs field offices. Within the planning area, the plant is known in one location in central Uinta County, which may have been eliminated during the construction of I-80.

Fullstem. Fullstem is a perennial forb Species of Concern to WYNDD with a Natural Heritage Network ranking of globally secure, but a state ranking of imperiled to critically imperiled. Fullstem is a regional endemic of southeastern Wyoming and northeast Utah. In Wyoming, fullstem is known only from the southern Green River and Washakie basins in Sweetwater County. Fullstem occurs in cushion plant communities on sparsely vegetated calcareous clay barrens rims and benches or in dry washes on extremely fine clay shales at elevations of 6,350 to 7,400 feet. This species may be threatened by oil and gas development and associated construction. Within the planning area, it is found in one location in western Sweetwater County.

Great Basin Downingia. Great Basin downingia is a annual herb Species of Concern to WYNDD with a Natural Heritage Network rank of globally secure, but a state rank of critically imperiled. This species is wide ranging, with occurrences in Wyoming known from the Laramie basin, Sweetwater River Plateau, and Overthrust Belt in Albany, Carbon, and Uinta counties. Great Basin downingia occurs in moist clay or sandy openings along ditch banks and reservoirs at elevations of 6,160 to 7,600 feet. Little is known about the trend status or threats to the species, but it may be impacted by recreational activities and other disturbances along the margins of its habitat. Within the planning area, it is known in one population on BLM-administered land in western Uinta County.

Divergent Wild Buckwheat. Divergent wild buckwheat is an annual herb Species of Concern to WYNDD, and ranked by the Natural Heritage Network as state critically imperiled, even though globally secure. Divergent wild buckwheat is a low-spreading annual that grows in cushion plant and bunchgrass communities or on the edges of sagebrush grasslands. This species prefers barren or semibarren clay, shale, or sandstone hills and washes at elevations of 6,250 to 7,500 feet. The distribution of divergent wild buckwheat in Wyoming includes the Great Divide and Green River basins in Sublette, Sweetwater, Lincoln, and Uinta counties. Impacts and threats from oil and gas development in or around divergent wild buckwheat populations are unknown. Within the planning area, it is known in five locations in Lincoln, Uinta, and Sweetwater counties.

Nevada Sweetpea. Nevada sweetpea is a perennial herb Species of Concern to WYNDD that has Natural Heritage Network rankings of globally and trinomially secure, but critically imperiled within the state. In Wyoming, Nevada sweetpea is known from the north slope of the Uinta Range in Uinta County and a location in Hot Springs County. Nevada sweetpea is found in mesic meadows and willow communities

on clay soils at elevations of 8,680 to 8,800 feet. Trend status and threats are unknown for this species. Nevada sweetpea occurs on land managed by the Wasatch-Cache National Forest and the BLM Kemmerer Field Office. In the planning area, it occurs in one location in southern Uinta County.

Narrow-leaved Bladderpod. Narrow-leaved bladderpod is a perennial forb with Natural Heritage Network rankings of globally secure, trinomially rare, and state critically imperiled, as well as being a Species of Concern to WYNDD. In Wyoming, narrow-leaved bladderpod is found from the Sierra Madre and Uinta Mountains and the Green River basin in Carbon, Sweetwater, and Uinta counties. It grows in cushion plant or sagebrush and juniper grassland communities on windswept ridges, gravelly hills, rocky knolls, or clay hillsides at elevations of 6,500 to 8,700 feet. Trend status is not known, but abundance is usually low at known sites. Threats to the narrow-leaved bladderpod include surface disturbances along rim areas. Narrow-leaved bladderpod occurs on land managed by the Medicine Bow National Forest and the BLM Kemmerer Field Office. In the planning area, it occurs in one site in southeastern Uinta County.

Juniper Prickly-pear. Juniper prickly-pear is a clump-forming perennial succulent cactus ranked as critically imperiled in Wyoming and trinomially rare, yet globally secure throughout its range by the Natural Heritage Network. It is also a Species of Concern to WYNDD. Juniper prickly-pear is found from eastern Utah and southwestern Wyoming to western Colorado, northern Arizona, and New Mexico. Habitat includes sandy soils of flats, washes, and hillsides in desert shrub, grassland, and open grassy flats in southern pinyon-juniper woodlands. The Wyoming populations are peripheral and occur in sandy or gravelly substrates with desert shrubs at elevations of 6,120 to 6,950 feet. Abundance, trend, and threats to juniper prickly-pear are unknown. Juniper prickly-pear occurs on lands within the Flaming Gorge National Recreation Area, the BLM Kemmerer and Pinedale field offices, and the Seedskadee National Wildlife Refuge. Within the planning area, juniper prickly-pear is located in the Green River basin in Sublette and Sweetwater counties, including one occurrence on the east-central boundary in western Sweetwater County.

Rufous-spine Prickly-pear. Rufous-spine prickly-pear is a perennial succulent cactus ranked by the Natural Heritage Network as globally and trinomially secure, but with a state ranking of imperiled as well as being a Species of Concern to WYNDD. In Wyoming, rufous-spine prickly-pear is a peripheral species known from the Green River and Washakie basins in Sweetwater and Lincoln counties. Rufous-spine prickly-pear grows in sagebrush grassland, salt desert shrublands, and vegetated sand dunes on slopes and buttes at elevations of 6,500 to 7,100 feet. Abundance, trend, or threats are not known for the species. Rufous-spine prickly-pear occurs on land managed by the Flaming Gorge National Recreation area and the BLM Kemmerer, Rawlins, and Rock Springs field offices. Within the planning area, rufous-spine prickly-pear is known in one location in southeastern Lincoln County.

Garrett's Beardtongue. Garrett's beardtongue is a perennial forb with Natural Heritage Network rankings of globally secure, trinomially rare, and state critically imperiled as well as being a Species of Concern to WYNDD. Garrett's beardtongue is a regional endemic of northeastern Utah and southwestern Wyoming, known in Wyoming from the Green River basin and northern foothills of the Uinta Range in Sweetwater and Uinta counties. In Wyoming, Garrett's beardtongue is found in rolling semibarren badlands on clay soils, openings within vegetative communities on gentle clay slopes covered with small slate fragments, or on steep clay or talus slopes covered with slate chips below steep cliffs at elevations of 7,600 to 8,400 feet. Threats include impacts from surface disturbances, road construction, and vehicle trampling. Within the planning area, it is found in eastern Uinta County.

Desert Glandular Phacelia. Desert glandular phacelia is an annual or biennial herb ranked by the Natural Heritage Network as globally secure, trinomially imperiled to critically imperiled, with state ranking of critically imperiled, as well as being a Species of Concern to WYNDD. Desert glandular phacelia usually grows on outcrops of the Green River Formation, but may also occur on Bridger Formation deposits. Desert glandular phacelia grows on semibarren south- or west-facing upper slopes in gray clay shale covered by fragmented slate. Less often, desert glandular phacelia may occur on chalky,

limey-slate outcrops dominated by cushion plants, or in openings within shadscale, green rabbitbrush, and greasewood mixed shrubland. Desert glandular phacelia is endemic to the Great Divide basin and the desert foothills of the Overthrust Belt in southwestern Wyoming in Lincoln, Sweetwater, and Sublette counties. One occurrence is known in the planning area in southeastern Lincoln County. General threats to desert glandular phacelia include OHV use and mineral exploration. The BLM Kemmerer, Pinedale, Rawlins, and Rock Springs field offices and the Flaming Gorge National Recreation Area have known populations of desert glandular phacelia within their jurisdictional boundaries.

White-margined Phlox. White-margined phlox is a perennial herb with Natural Heritage Network rankings of globally secure and Wyoming State critically imperiled as well as being a Species of Concern to WYNDD. White-margined phlox is a regional endemic on the edge of its range found on rocky slopes and flats in Lincoln County. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer Field Office. There is one known population within the planning area in southwestern Lincoln County.

Deep Creek Cinquefoil. Deep Creek cinquefoil is a perennial herb and ranked by the Natural Heritage Network as globally rare to secure, but state critically imperiled as well as being a Species of Concern to WYNDD. Deep Creek cinquefoil is on the edge of its range and occurs on rocky desert hills and ridges in Sweetwater and Uinta counties. Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer and Rock Springs field offices. Only one population is located in the planning area and it is in southeastern Uinta County.

Douglas' Campion. Douglas' campion is a perennial forb ranked by the Natural Heritage Network as globally secure and state critically imperiled as well as being a Species of Concern to WYNDD. Douglas' campion is on the edge of its range and occurs on hills and slopes in western Lincoln County (BLM 2003a). Threats and trend status are unknown at this time. The populations are found on land managed by the BLM Kemmerer Field Office. One population within the planning area is in western Lincoln County.

Description of Existing Management

Consultation is required on any action that a federal agency proposes that (1) may adversely impact a federally listed species or (2) will result in jeopardy or adverse modification of critical habitats. Determining adverse impacts or lack of adverse impacts to species or their habitats is made in consultation with the USFWS or the National Marine Fisheries Service. A recovery plan for Ute ladies'-tresses (USFWS 1995), the only federally listed plant species potentially occurring in the planning area, is available to aid in management of the species and its habitats.

No management actions are permitted on BLM lands that would jeopardize the continued existence of species federally listed, proposed for listing, or candidates for listing. The Kemmerer Field Office requires surveys of all areas of suitable habitats for Ute ladies'-tresses prior to engaging in surface-disturbing activities. Appropriate measures to protect all special status species are applied to agency actions and use authorizations. These measures could include avoidance or use restrictions (e.g., no surface occupancy [NSO] restriction, no surface disturbance, and seasonal restrictions).

Currently, an NSO restriction for fluid minerals applies to four populations of Dorn's twinpod, *Physaria dornii*, and a cushion plant community containing five endemic plant species (BLM 1986a). The cushion plant community is a unique plant community with associated endemic plants that occurs within the planning area. At present, five separate known population occurrences of Dorn's twinpod make up smaller scattered populations totaling approximately 475 acres. The current NSO restriction for fluid minerals protects four populations of Dorn's twinpod, approximately 131 acres. The cushion plant community NSO restriction comprises approximately 62 acres out of 13,000 acres delineated by the WYNDD as containing scattered cushion plant areas. The existing cushion plant NSO restriction for fluid minerals does not include a known population of the endemic tufted twinpod, which is on the Wyoming

BLM sensitive species list. This population is located in a cushion plant area within the area delineated by the WYNDD. Seven other species on the Wyoming BLM sensitive species list have no formal NSO restrictions for fluid minerals.

When use restrictions are not implemented, mitigation measures can be used to lessen adverse impacts to special status species. However, mitigation options to avoid or reduce impacts to rare plants may be limited due to specific habitat requirements or lack of necessary biological information to make such an assessment. Most of the common techniques, such as offsite compensation or habitat restoration, have proven largely unsuccessful, although seedbanking is commonly performed to attempt offsite propagation. Mitigation plans for areas where impacts to these species cannot be avoided are designed to provide special management actions that minimize the overall impact to the species. However, due to the difficulties of providing successful mitigation options, impacts to candidate plants are considered less than substantial only if no net loss of population size or habitat quality results. "No net loss" is intended to mean that the BLM must "ensure that [actions authorized, funded, or carried out by BLM]. affecting the habitat of candidate species are carried out in a manner that is consistent with the objectives for managing those species. BLM shall not carry out any actions that would cause any irreversible or irretrievable commitment of resources or reduce the future management options for the species involved" (BLM 2001d).

Management of special status plant species in the planning area has a number of challenges including historical and current activities, habitat conditions and trends, and identified threats to plant populations and habitats. While threats to some plant species may remain low due to the inaccessibility of the habitats they occupy, threats to other species will remain or increase. Management challenges for special status plant species include spreading of INNS in native habitats, herbivory and physical trampling by livestock, reduced functional condition for riparian and wetland habitats, impaired floodplain connectivity, water depletions, vegetation treatments with prescribed fire or herbicides, impacts by OHV use and other forms of recreation, loss of wetland habitat due to altered hydrology, and habitat modification by development or other sources of disturbance.

BLM addresses these management challenges according to BLM Manual 6840 - Special Status Species Management (BLM 2001d) with the objectives to: (1) conserve listed species and the ecosystems on which they depend and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species either under the provisions of the ESA or BLM Manual 6840.

Management actions to address the challenges for federally listed plant species often come from the consultation process (i.e., Section 7 of the ESA). Management actions for special status plant species focus on the following goals of the BLM Wyoming Sensitive Species Policy and List (BLM 2002c). Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

- Maintain vulnerable species and habitat components in functional BLM ecosystems
- Ensure special status species are considered in land management decisions
- Prevent a need for species listing under the ESA
- Prioritize needed conservation work with an emphasis on habitats

3.4.7 Special Status Species – Fish

The Kemmerer Field Office is responsible for managing fisheries habitat, while management of fish species is overseen by state and federal wildlife management agencies. The WGFD manages resident fish populations. The USFWS provides regulatory oversight for all fish species that are listed, proposed for listing, or are candidates for listing under the ESA.

Special status fish species are those listed as threatened or endangered, are proposed for listing, or are candidates for listing under provisions of the ESA; those listed by a state implying potential endangerment or extinction (i.e., species of greatest conservation need [SGCN] and native species status [NSS]); or those designated by each BLM state director as sensitive. Lists of special status species are maintained under federal and state authority, including a March 1990 MOU between the WGFD and Wyoming BLM (WGFD and BLM 1990). BLM Wyoming Sensitive Species Policy and its species list are provided in an Instruction Memorandum (BLM 2002c; USFWS 2004). The BLM Wyoming State Office conducts an annual review of its sensitive species list to make additions or deletions based on the most current information on species status. In order to meet the requirements of the Congressionally-authorized State Wildlife Grants Program, the WGFD produced a long-range conservation plan to conserve Wyoming's SGCN entitled *The Wyoming State Comprehensive Wildlife Conservation Strategy* (CWCS). In the CWCS, species identified as NSS1-NSS4 are defined as SGCN. While the WGFD acknowledges that many other systems for identifying priority species exist, WGFD chose this system because it was broadly familiar to scientists and wildlife managers in Wyoming and provides a common foundation for identifying SGCN (WGFD 2005). Table 3-20 identifies endangered and sensitive fish species that may be impacted by BLM activities in the planning area.

Fisheries habitat includes perennial and intermittent streams, lakes, and reservoirs that support fish through at least a portion of the year. Fisheries habitats in the planning area encompass portions of three (3rd-order) regional watersheds: the Green River, Bear River, and Snake River. Of these, only the Green River watershed contributes flows to the Colorado River. See the Water section of this chapter for more detail regarding these watersheds.

Federal actions resulting in water depletions to the Colorado River system may impact the following endangered species: bonytail, Colorado pikeminnow, humpback chub, and razorback sucker downstream in the Green and Colorado river systems. Three of these species (bonytail, Colorado pikeminnow, and razorback sucker) have not occurred in Wyoming since the impoundment of the Flaming Gorge Dam in 1963. The humpback chub has inhabited only the downstream tributaries of the Colorado and Green rivers. In general, depletions include evaporative losses and (or) consumptive use of surface or groundwater within the impacted basin, often characterized as diversions less return flows. Project elements potentially associated with depletions include, but are not limited to, ponds, lakes, pipelines, water wells, diversion structures, oil and gas drilling, dust abatement, and water treatment facilities.

Water depletions upstream can change the velocity, volume, and timing of downstream river water flows. Historically, water development projects (e.g., dams, reservoirs, water and sediment control basins, irrigation diversions, sand and gravel mining, and wetland creation) have altered surface water hydrographs (e.g., water flow timing, volume, and velocity) in the Colorado River ecosystem through consumption, evaporation, or by altering the timing of water flows.

Table 3-20. Endangered and Sensitive Fish Species Potentially Impacted by BLM Activities in the Kemmerer Planning Area

Common Name	Status[1]	Habitats
Bonytail	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Colorado pikeminnow	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Humpback chub	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Razorback sucker	Endangered	Downstream riverine habitats of Yampa, Green, and Colorado river systems
Roundtail chub	Sensitive, NSS1	Colorado river drainage, mostly large rivers, also streams and lakes
Leatherside chub[2]	Sensitive, NSS1	Clear, cool streams and pools of the Bearand Snake river drainages

Table 3-20. Endangered and Sensitive Fish Species Potentially Impacted by BLM Activities in the Kemmerer Planning Area *(Continued)*

Common Name	Status[1]	Habitats
Bluehead sucker	Sensitive, NSS1	Bear, Snake, and Green river drainages, all waters
Flannelmouth sucker	Sensitive, NSS1	Colorado River drainage, large rivers, streams and lakes
Colorado River cutthroat trout	Sensitive, NSS2	Colorado River drainage, clear mountain streams
Bonneville cutthroat trout	Sensitive, NSS2	Bear River drainage, clear mountain streams
Fine-spotted Snake River[2] cutthroat trout	Sensitive, NSS4	Snake River drainage, clear, fast water

Sources: BLM 2002c; USFWS 2004

[1] Status: Sensitive = BLM Sensitive Species; Threatened, Endangered, Proposed, Candidate = in accordance with the ESA.

State-listed definitions (NSS1 through NSS4 are now identified by WGFD as species of greatest conservation need (SGCN):

NSS1 - Native Species Status 1	Populations are greatly restricted or declining, extirpation appears possible OR on-going significant loss of habitat.
NSS2 - Native Species Status 2	Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; ongoing significant loss of habitat.
NSS3 - Native Species Status 3	Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.
NSS4 - Native Species Status 4	Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are stable or increasing and not restricted in numbers and (or) distribution; ongoing significant loss of habitat.

[2] Species is not a Green River endemic

Seven BLM-sensitive fish species occur in the planning area: roundtail chub, leatherside chub, bluehead sucker, flannelmouth sucker, Colorado River cutthroat trout, Bonneville cutthroat trout, and the fine-spotted Snake River cutthroat trout. Table 3-21 identifies the streams in which each sensitive fish species occurs in the planning area. BLM has limited information on the population sizes or trends of roundtail chub, leatherside chub, bluehead sucker, and flannelmouth sucker. Population sizes vary from year to year and stream to stream. For example, Bonneville cutthroat trout numbers in the main stem of Raymond Creek doubled between 1976 and 1977, but dropped by one-third by 1987 to 380 fish per mile (BLM 2003a). Salt Creek populations have remained steady, whereas the Thomas Fork River and Coal Creek dropped to zero fish in 1992 and 1989, respectively (BLM 2003a). Snake River cutthroat trout populations in the Star Valley appear to be abundant and fairly stable (BLM 2003a). For detailed life histories and habitat requirements, refer to *Fishes of Wyoming* (Baxter and Stone 1995).

The three subspecies of cutthroat trout present in the planning area are native to Wyoming and listed as sensitive due to low population numbers of pure strain stock and declining habitats. Declines are due to extended drought conditions and past land management activities. For Colorado River cutthroat trout, declines also are due to hybridization. Human activities have disconnected headwater streams through irrigation diversions, canals, and other dewatering practices. These activities can benefit native species by making habitats less hospitable for nonnative fish thereby preventing hybridization, but they also can harm native species by preventing genetic mixing of the various populations.

Table 3-21. Streams in Which Sensitive Fish Species Occur in the Kemmerer Planning Area

Species	Stream Occurrence in the Kemmerer Planning Area
Roundtail chub[1] (nongame)	Muddy Creek (Blacks Fork)
Leatherside chub[1, 2] (nongame)	Yellow Creek (Bear River)
	Mill Creek (Bear River)
	La Chapelle Creek (Bear River)
	Bear River
	Upper Hams Fork
	West Fork Hams Fork
	North Fork Slate Creek
Bluehead sucker[1] (nongame)	Kemmerer City Reservoir
Flannelmouth sucker[1] (nongame)	Blacks Fork
Snake River cutthroat trout[2] (game)	Salt River (Star Valley)
	Willow Creek (main and east fork of Star Valley)
	Smiths Fork River
	Hobble Creek
	Green River
Colorado River cutthroat trout[1] (game)	Van Tassel Creek
	Beaverdam Hollow Creek
Bonneville cutthroat trout (game)	Raymond Creek
	Huff Creek
	Muddy Creek (Smiths Fork)
	Coal Creek (Thomas Fork)
	Coal Creek, Howland (Smiths Fork)
	Little Muddy Creek (Thomas Fork)
	Smiths Fork River (Bear)
Bonneville cutthroat trout (game) *(Continued)*	Hobble Creek
	Grade Creek
	Watercress Creek
	Salt Creek (Thomas Fork)
	Porcupine Creek

Source: BLM 2003a; WGFD 2007b

[1] Confirmed by WGFD Green River Management crew surveys

[2] Not a Green River endemic species. Some of these populations are introduced.

Approximately 30 percent of stream riparian areas where these sensitive fish species occur are in proper functioning condition (BLM 2003a). The other 70 percent are either functional at-risk or nonfunctional, indicating some components are lacking and the stream is susceptible to degradation.

BLM-sensitive species are in need of special management attention due to reduced or declining populations and (or) habitat. BLM management activities that have historically contributed to altering aquatic habitats in the planning area include agriculture, livestock grazing, fire and fuels management, vegetation management, development, OHV use, recreation, and land development. Some of these activities continue to have effects. In addition to water depletion from historic activities (e.g., irrigation

diversions), aquatic habitats in the planning area have been altered through activities that result in soil compaction or erosion; increased sedimentation of streams; removal and degradation of riparian vegetation; changes in water temperature, velocity, volume, or timing; and the spread of INNS in riparian corridors.

While fisheries habitat conditions in the planning area are a result of historic activities, their current conditionis actively managed by BLM to (1) conserve listed species and the ecosystems on which they depend, and (2) ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list special status species, either under the provisions of the ESA, BLM Manual 6840 (BLM 2001d), or BLM Wyoming Sensitive Species Policy and List (BLM 2002c). BLM is part of a conservation agreement and strategy for Colorado River cutthroat trout (CRCT Task Force 2001).

Management challenges for special status fish species in the planning area include balancing the needs of special status fish with competing needs of other resource programs, resource uses, and potential impacts to local economies; encroachment of INNS in riparian corridors; management of public access; land-tenure adjustments; water rights and produced water from wells; floodplain connectivity and stream channel degradation; and water quality degradation and potential toxicity associated with contaminants and sedimentation in the watershed. Recognizing that management actions for federally listed species are often derived from the consultation process (i.e., Section 7 of the ESA), the BLM has identified management actions in the alternatives described in Chapter 2 to address the challenges identified.

3.4.8 Special Status Species – Wildlife

Special status species are those listed as threatened or endangered, are proposed for listing, or are candidates for listing under the provisions of the ESA; those listed by a state implying potential endangerment or extinction (i.e., NSS and SGCN); or those designated by the BLM State Director as sensitive. The BLM defines sensitive species as those that could easily become endangered or extinct in a state unless protection is granted. Designated sensitive species are provided the same level of protection by the BLM as federal candidate species.

Within the planning area two wildlife species are listed under the ESA; the black-footed ferret is listed as endangered and the Canada lynx is listed as threatened. In addition, one candidate species for federal listing, the yellow-billed cuckoo, may occur in the planning area. Two species, the grizzly bear and bald eagle, were delisted from threatened status in 2007; however, they are both considered BLM sensitive species. The Wyoming population of gray wolves was delisted from its nonessential/experimental population status in 2008; this species is also BLM sensitive. Twenty-four species that may occur or have suitable habitat in the planning area are considered sensitive by the BLM (BLM 2002c). No critical habitat for ESA-listed species occurs in the planning area. Known distributions of special status wildlife species within the planning area appear on Map 24.

Special status wildlife species in the planning area inhabit a variety of habitat types, including sagebrush shrublands (e.g., sage sparrow, sage thrasher, greater sage-grouse, loggerhead shrike, ferruginous hawk), grassland (e.g., long-billed curlew, burrowing owl, white-tailed prairie dog), and riparian and wetland habitats (e.g., northern leopard frog, long-eared myotis, yellow-billed cuckoo, white-faced ibis). For most special status species, comprehensive data on population numbers and distribution within the planning area are not available. As described for federally listed plants, no management actions are permitted on BLM lands that would jeopardize the continued existence of species federally listed, proposed for listing, or that is a candidate for listing. The Kemmerer Field Office requires surveys of all areas of suitable habitats for species with potential habitats prior to engaging in surface-disturbing activities. Appropriate measures to protect all special status species are applied to agency actions and use authorizations. These

measures could include avoidance or use restrictions (e.g., NSO restriction, no surface disturbance, and seasonal restrictions).

Table 3-22 identifies all special status wildlife species that (1) occur in, (2) have potential habitats in, or (3) could be influenced by activities in the planning area. Table 3-22 also summarizes the status and general habitat for each special status wildlife species.

This section provides a brief summary of the habitats and existing conditions of each species identified in Table 3-22. It is important to note that some special status species use a variety of habitat types to complete their life cycle and it is not the intention of this document to provide an exhaustive description of each species' habitat requirements, natural history, or biology. The management challenges facing each species and management actions considered by the BLM for addressing these challenges are described. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

Table 3-22. Special Status Wildlife Species Occurring or Potentially Occurring in the Kemmerer Planning Area

Common Name	Status[1]	Habitat
Trophy Game		
Grizzly bear	Sensitive, NSS3	Montane forests
Furbearing Animals		
Canada lynx	Threatened, NSS1	Montane forests
Predatory Animals		
Gray wolf	Sensitive	Greater Yellowstone ecosystem
Game Birds		
Greater sage-grouse	Sensitive, NSS2	Basin-prairie shrub, mountain-foothill shrub
Nongame (Raptors)		
Bald Eagle	Sensitive, NSS2	Cottonwood riparian, mixed coniferous forests near large lakes and rivers
Northern goshawk	Sensitive, NSS4	Conifer and deciduous forests
Ferruginous hawk	Sensitive, NSS3	Basin-prairie shrub, grassland, rock outcrops
Peregrine falcon	Sensitive, NSS3	Tall cliffs
Burrowing owl	Sensitive, NSS4	Grassland, basin-prairie shrub
Nongame (Neotropical Migrants)		
White-faced ibis	Sensitive, NSS3	Marshes, wet meadows
Trumpeter swan	Sensitive, NSS2	Lakes, ponds, rivers
Long-billed curlew	Sensitive, NSS3	Grassland, plains, foothills, wet meadows
Yellow-billed cuckoo	Candidate, NSS2	Riparian areas west of the Continental Divide; open woodlands, streamside willow, and alder groves
Mountain plover	Sensitive	Shortgrass prairies and shrubsteppe; prefers areas with little vegetative cover, such as prairie dog towns (USFWS 2003)
Loggerhead shrike	Sensitive	Basin-prairie shrub, mountain-foothill shrub
Sage thrasher	Sensitive, NSS4	Basin-prairie shrub, mountain-foothill shrub
Brewer's sparrow	Sensitive, NSS4	Basin-prairie shrub
Sage sparrow	Sensitive, NSS4	Basin-prairie shrub, mountain-foothill shrub
Nongame (Mammals)		
Long-eared myotis	Sensitive, NSS2	Conifer and deciduous forests, caves and mines
Pygmy rabbit	Sensitive, NSS3	Basin-prairie and riparian shrub
White-tailed prairie dog	Sensitive, NSS3	Basin-prairie shrub, grasslands
Idaho pocket gopher	Sensitive, NSS3	Shallow stony soils
Black-footed ferret	Endangered, NSS1	Prairie dog towns

Table 3-22. Special Status Wildlife Species Occurring or Potentially Occurring in the Kemmerer Planning Area *(Continued)*

Common Name	Status[1]	Habitat
Nongame (Amphibians)		
Northern leopard frog	Sensitive, NSS4	Beaver ponds, permanent water in plains and foothills
Great Basin spadefoot	Sensitive, NSS4	Sagebrush communities, spring seeps, permanent and temporary waters
Boreal toad	Sensitive, NSS2	Pond margins, wet meadows, riparian areas
Spotted frog	Sensitive, NSS4	Ponds, sloughs, small streams
Tiger salamander	NSS4	Slow moving streams, pools, ponds, wet meadows, and lakes.

Sources: USFWS 2004; BLM 2002c

[1] Status: Sensitive = BLM Sensitive Species; Threatened, Endangered, Proposed, Candidate = in accordance with the ESA; State-listed definitions (NSS1 through NSS4 are now identified by WGFD as species of greatest conservation need (SGCN):

NSS1 - Native Species Status 1	Populations are greatly restricted or declining, extirpation appears possible OR on-going significant loss of habitat.
NSS2 - Native Species Status 2	Populations are declining, extirpation appears possible; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; ongoing significant loss of habitat.
NSS3 - Native Species Status 3	Populations are greatly restricted or declining, extirpation appears possible; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Species is widely distributed; population status or trends are unknown, but are suspected to be stable; ongoing significant loss of habitat.
NSS4 - Native Species Status 4	Populations are greatly restricted or declining, extirpation appears possible; habitat is stable and not restricted. *~OR~* Populations are declining or restricted in numbers and (or) distribution, extirpation is not imminent; habitat is not restricted, vulnerable, but no loss; species is not sensitive to human disturbance. *~OR~* Species is widely distributed, population status or trends are unknown but are suspected to be stable; habitat is restricted or vulnerable, but no recent or ongoing significant loss; species may be sensitive to human disturbance. *~OR~* Populations are stable or increasing and not restricted in numbers and (or) distribution; ongoing significant loss of habitat.

Trophy Game

Grizzly bear. The grizzly bear is a sensitive species. The Yellowstone Distinct Population Segment (DPS) was delisted from threatened status under the ESA on March 29, 2007 (USDI 2007b). In Wyoming, grizzly bears may be found in coniferous forests, mountain-foothills shrublands, riparian shrub, and mountain-foothills grassland (Cerovski et al. 2004). No grizzly bears are known to exist within the planning area. However, the WGFD grizzly bear analysis unit does encompass the northern portion of the planning area, extending down to the town of Kemmerer (BLM 2005e). Although grizzly bears do not currently occur in the planning area, it is possible for them to disperse to the planning area. In 2002, a grizzly bear was killed in the Blind Bull drainage near Deadman Mountain on the Bridger-Teton National Forest approximately 50 miles north of the planning area boundary. A *Wyoming Grizzly Bear Management Plan* was completed by WGFD in 2002 and amended in 2005 (Moody et al. 2005). The BLM will adhere to the five-year monitoring process for this species and apply conservation measures where necessary.

Furbearing Animals

Canada lynx. The Canada lynx is a federally threatened species. Canada lynx are secretive cats of coniferous or mixed forests of northern latitudes and high mountains. Snowshoe hares are the primary prey of Canada lynx, and snowshoe hare abundance is a limiting factor for Canada lynx. Forested landscapes containing a variety of seral stages provide foraging, denning, and travel or dispersal habitats for Canada lynx. The patchiness and distribution of Canada lynx habitats are factors in the vulnerability of the species. The habitat within good patches and the travel corridors between patches is essential for the Canada lynx (BLM 2005f). Alteration of natural disturbance regimes, various forest management practices, road building, and some recreational activities may affect Canada lynx habitats suitability. Several occurrences of Canada lynx are documented for the northern edge of the planning area.

There are 24 LAUs designated for the planning area, including two stand-alone LAUs at the south end of the Bridger-Teton National Forest, Commissary Ridge and Dempsey Ridge (BLM 2005f). Habitat has

been delineated for the planning area in the north, in the two stand-alone LAUs, and in the south as an extension of the Wasatch National Forest LAUs. Some of this habitat is located within LAUs, and some is not. The delineated habitat separate from LAUs, as that which occurs in the northern part of the planning area, reflects the fact that the habitat was not of sufficient size to delineate an LAU, but can be recognized and protected as potential habitat on its own.

Predatory Animals

Gray wolf. The Northern Rocky Mountain gray wolf DPS was officially removed from listing under the ESA on March 28, 2008. This DPS includes all of Wyoming.

Gray wolf populations have greatly increased resulting from the reintroduction of wolves into Yellowstone National Park beginning in 1995. Once a species is delisted, the affected states and tribes have sole management responsibility, and each has developed a gray wolf management plan (USFWS 2008). Gray wolves are considered predatory animals in Wyoming and may be taken any time of year without limit. The ESA includes many safeguards for delisted species that will ensure that the wolf population will remain at a recovered level for the forseeable future, including mandates for the USFWS to monitor the wolf population for at least 5 years after delisting. This, along with commitments from individual states, helps to ensure the population remains above recovery levels and emerging threats do not jeopardize the wolf population (USFWS 2008).

Gray wolves are habitat generalists and may inhabit a wide variety of habitat types. The main habitat requirements for gray wolves include the presence of abundant prey (i.e., elk) and relatively low levels of human activity (BLM 2004h). Dispersing gray wolves are capable of traveling very long distances. Human activities associated with roads and other linear corridors cause fragmentation of gray wolf habitats. The major causes of mortality among gray wolves are legal and illegal harvest, depredation control, and vehicle collisions (BLM 2004h).

The planning area provides suitable habitats for gray wolves because it is mostly undeveloped and an abundance of prey such as deer, elk, and moose are present. One gray wolf pack extends onto the planning area from the Pinedale planning area, but is located on USFS land (BLM 2004h). Lone gray wolves and small groups of gray wolves have been observed around Cokeville and as far south as Kemmerer (BLM 2004h).

Game Birds (Greater sage-grouse)

The greater sage-grouse is a BLM sensitive species and, because it can be considered a keystone species for sagebrush habitats, habitat descriptions and effects are similar for other sagebrush-dependent species. Populations of greater sage-grouse have declined throughout their native range in western North America. Several petitions to list greater sage-grouse population that occupies Wyoming as threatened or endangered were submitted to USFWS in 2002 and 2003. In January 2005, the USFWS determined that listing under the ESA was not warranted for all petitions. Greater sage-grouse habitat components and terminology referenced in the following discussion are defined in BLM's Instruction Memorandum (IM) Number (No.) WY-2004-057, Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval (BLM 2004i). Additional information regarding greater sage-grouse habitat needs as well as habitat and population trends is provided by Braun (2002) and Connelly et al. (2000).

The greater sage-grouse is the largest species of grouse in North America. It is appropriately named due to its year-round dependence on sagebrush ecosystems for both food and cover. This close relationship with sagebrush species is reflected in the greater sage-grouse's North American distribution, particularly for big sagebrush and silver sagebrush.

The association with sagebrush is perhaps most evident in the late autumn, winter, and early spring when greater sage-grouse are completely dependent on sagebrush for both food and cover. In winter, greater

sage-grouse inhabit areas with large expanses of moderate to dense sagebrush on gentle topography (Doherty et al. 2008). No less important is the reliance of greater sage-grouse on sagebrush for protective nest cover during the breeding season. Greater sage-grouse have been shown to nest at a variety of distances from active leks and use many different micro sites for nest placement, making identification and mapping of this habitat difficult (Braun 2002). Upon hatching, greater sage-grouse hens with chicks use areas close to locations of successful nests and gradually move towards moist areas as upland vegetation dries out (Braun 2002). In general, the greater sage-grouse is a mobile species, capable of movements greater than approximately 31 miles (50 kilometers) between seasonal ranges. Despite this mobility, greater sage-grouse appear to display substantial fidelity to seasonal ranges. For more detailed discussions regarding greater sage-grouse habitats, see Connelly et al. 2004.

Up until the middle of the twentieth century, greater sage-grouse flourished in Wyoming and throughout most of the West. By the mid 1950s, biologists in the western United States began to express concern about populations of sage-grouse and sagebrush-steppe habitats that ultimately led to establishing the Western States Sage-Grouse Technical Committee in 1956. By most accounts, including the range-wide *Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats* (Connelly et al. 2004), the numbers of greater sage-grouse have declined across their range during the past 50 years, as have the quality and distribution of the bird's requisite sagebrush-steppe habitats.

Population declines of greater sage-grouse are largely attributed to the loss and degradation of sagebrush habitats (Martin 1970; Braun et al. 1977; Swenson et al. 1987; Braun 2002). Changes in land use and land development and increased habitat fragmentation are the primary causes of habitat loss and reduction, while habitat degradation is a complicated interaction among many factors, including drought, livestock grazing, changes in natural fire regimes, and the invasion of INNS (Fischer et al. 1996; Pyle and Crawford 1996; Beck and Mitchell 2000; Nelle et al. 2000). Emerging issues affecting greater sage-grouse populations include impacts of pesticides, diseases, wind turbines, and raptor perch sites on powerlines.

Numerous primary and satellite leks have been documented within the central and southern portion of the planning area (See Map 24). The BLM assists the WGFD in conducting annual lek attendance counts to monitor local population trends.

In 2004, Wyoming formed eight greater sage-grouse local working groups across the state to develop and implement local greater sage-grouse conservation plans. A description of seasonal and spatial stipulations for greater sage-grouse are identified as management actions for existing management and alternatives in Chapter 2. *The Wyoming Greater Sage-Grouse Conservation Plan* (Wyoming Sage-Grouse Working Group 2003) sets out multiagency guidelines for managing of greater sage-grouse populations and habitats in Wyoming, focusing on implementation by local working groups. The local working group for the planning area developed the *Southwest Wyoming Sage-grouse Conservation Assessment and Plan*, which identifies strategies and commitments for the purpose of improving sage-grouse numbers (Southwest Wyoming Local Sage-grouse Working Group 2007).

Conservation efforts have primarily occurred through the project review process conducted by state and federal agencies, with an emphasis on minimizing disturbance during the breeding season within and around the lek sites and protections for greater sage-grouse nesting and early brood rearing habitats, and winter concentration areas.

Nongame (Raptors)

Bald eagle. The bald eagle is currently a BLM sensitive species. Since the federal delisting of the bald eagle on July 9, 2007 (USFWS 2007), the species continues to be protected under the Bald and Golden Eagle Protection Act. Bald eagles are large, primarily fish-eating raptors, although they also consume waterfowl and carrion. Bald eagles nest near large bodies of water, including lakes, reservoirs, and large rivers. Nest sites typically are located in large trees adjacent to water.

Two documented winter roost sites occur in the planning area: the Woodruff Narrows roost and the Morgan Canyon roost. The Woodruff Narrows roost supports one of the largest wintering populations of bald eagles in Wyoming. From November through February, approximately 25 to 75 birds roost in cottonwood trees and forage on carrion and various other prey species. The Morgan Canyon roost historically supports approximately 5 to 15 birds that roost in a patch of subalpine fir trees approximately 10 acres in size. Eagles utilizing this roost commonly feed on carrion associated with a nearby big game winter range. An additional roost site, identified as the Rock Creek Roost, is located in Nugget Canyon in six mature conifer trees. This roost is located along Twin Creek adjacent to State Highway 30 and an active railroad. It is currently unknown as to whether this is a satellite of the Morgan Canyon Roost or a separate roosting area. Eagles are commonly attracted to this area due to the high incidence of road-killed animals from wildlife collisions with vehicles in the canyon area providing ample carrion on which to forage. Seven bald eagle nest sites have been documented within the planning area, although none is located on lands administered by the BLM (BLM 2003g).

Northern goshawk. The northern goshawk is a large accipiter associated with coniferous forests and aspen stands and is a seasonal migrant in the planning area. Nesting habitats are generally in coniferous forests, and northern goshawks often forage throughout the forest, including aspen stands, meadows, and forest openings. The limited amount of suitable forested areas in the planning area indicates that few nesting northern goshawks are present. No known active nests occur within the planning area.

Ferruginous hawk. The ferruginous hawk occurs in grassland and shrublands during the spring, summer, and fall seasons throughout the planning area. Ferruginous hawks often nest on the ground, lone trees, topographic high points, or cliffs. Ferruginous hawks occur in areas with abundant prey, typically grassland rodents and lagomorphs (Johnsgard 1990). There are numerous ferruginous hawk nest sites in the planning area. This species is considered sensitive to disturbance during the nesting period.

Peregrine falcon. The peregrine falcon is a mid- to large-sized falcon associated with a variety of habitats during the spring, summer, and fall seasons. Nesting habitats for this species include cliffs, canyons, or other secure topographic features typically near larger water bodies. Nesting sites occur near an abundant prey base. This species is considered uncommon within the planning area; however, it has been observed migrating through the area. This species was delisted from the federal endangered species list in 1999.

Burrowing owl. The burrowing owl is a mid-sized owl closely associated with prairie dog colonies that occurs within the planning area. The burrowing owl nests within or adjacent to prairie dog towns (Canadian Wildlife Service 2003; Apple 2002). This species is relatively tolerant of human activity (Johnson and Anderson 2002; Dechant et al. 2003).

Nongame (Neotropical Migrants)

White-faced ibis. The white-faced ibis occurs in marshes, wet-moist meadows, lakes, and irrigated meadows (Cerovski et al. 2004). In the planning area, white-faced ibis have been documented north of Fontenelle Reservoir, near the Hams Fork, Cokeville Meadows National Wildlife Refuge (NWR), and have been observed near Big Piney during the spring migration (Lara Oles, Personal Communication).

Trumpeter swan. The trumpeter swan is an occasional migrant that nests on muskrat houses or small islands in open water; however, no breeding populations are known to occur in the planning area. The trumpeter swan feeds mainly on aquatic vegetation and macroinvertebrates. Trumpeter swans are found in the extreme eastern and western regions of Wyoming. There is a breeding pair of trumpeter swans on the Green River near Seedskadee NWR (Lara Oles, Personal Communication).

Long-billed curlew. The long-billed curlew is an upland shorebird occupying grassland and wet meadows in the planning area. Long-billed curlews typically nest in prairie and grassy meadows near water, but occasionally choose dry upland sites. Typical nest sites are on the ground near water and a

supply of insects and aquatic macroinvertebrates. This species has been observed foraging in areas adjacent to the Bear River and Hams Fork River drainages.

Yellow-billed cuckoo. The western U.S. DPS of the yellow-billed cuckoo is a federal candidate species under the ESA. In Wyoming, only yellow-billed cuckoos found west of the Continental Divide are considered part of the western DPS. Yellow-billed cuckoos are secretive, robin-sized birds that breed in willow and cottonwood communities along rivers and streams. The bird primarily eats large insects, including caterpillars and cicadas, as well as the occasional small frog or lizard. Breeding habitats include open woodland (especially where undergrowth is thick), parks, and deciduous riparian woodland. In the West, the yellow-billed cuckoo nests in tall cottonwood and willow riparian woodland.

Yellow-billed cuckoo are considered rare in Wyoming and their breeding range in the state is unclear. The western DPS of yellow-billed cuckoos may be found along the Lower Green River basin, from Seedskadee National Wildlife Refuge to Flaming Gorge reservoir and west to the Bear River drainage, including a portion of the planning area (Bennett & Keinath 2001). One historic breeding observation and three additional nonbreeding observations are documented within the planning area (Bennett & Keinath 2001).

Mountain plover. The mountain plover inhabits shortgrass prairies and shrubsteppe habitats, both for breeding and wintering. This species prefers areas with little vegetative cover for nesting, particularly prairie dog towns. In 2003, the USFWS withdrew its proposal to list the mountain plover as threatened because information indicated that threats to this species were not significant and that the population was stable (USFWS 2003). Numerous sightings of mountain plover have been documented in the planning area.

Loggerhead shrike. Shrublands are the preferred habitats for the loggerhead shrike and are found throughout the planning area. This species typically nests in deciduous trees or tall shrubs and feeds on insects, small vertebrates, and carrion. Loggerhead shrikes generally inhabit open country with shrubs and low trees for nesting, and spiny shrubs so they can impale their prey (Porter et al. 1975).

Sage thrasher. The sage thrasher nests in large, open tracts of dry shrub and grassland with dense stands of sagebrush, bitterbrush, or rabbitbrush. Sage thrashers are common in suitable habitats within the planning area.

Brewer's sparrow. The Brewer's sparrow breeds in high-elevation shrubs and thickets, as well as in sagebrush deserts. Brewer's sparrow is common in suitable habitats throughout the planning area.

Sage sparrow. The sage sparrow nests in large tracts of arid shrub and sagebrush communities. Sage sparrow is common in suitable habitats within the planning area.

Nongame (Mammals)

Long-eared myotis (bat). The long-eared myotis utilizes coniferous forests, especially ponderosa pine and juniper, cottonwood-riparian, basin-prairie shrublands, and sagebrush-grassland habitat types (Cerovski et al. 2004). Roost sites for long-eared myotis include snags, loose bark, rock crevices, caves, and mines. Long-eared myotis are thought to hibernate in caves and mines. Like many bat species, the long-eared myotis is sensitive to human disturbance during hibernation (Cerovski et al. 2004). The long-eared myotis is thought to occur in suitable habitats throughout Wyoming, although the majority of records are from the western half of the state, including the planning area. The status of long-eared myotis in the planning area is unknown.

Pygmy rabbit. Pygmy rabbits depend on stands of medium-to-tall, dense sagebrush in conjunction with deep, friable soils to provide yearlong food, cover, and burrow sites (Keinath and McGee 2004). These habitats are often found in swales and drainages in a patchy distribution across the landscape. Pygmy rabbits in the Cumberland Gap area of the planning were found in tall, dense homogenous stands of basin

big sage and mountain big sage; pygmy rabbits in the Moxa Arch area were located in desert mixed-shrub communities and burrows scattered along hillsides of sand (Purcell 2006).

In Wyoming, pygmy rabbits occur in the southwestern portion of the state, including the planning area. Recent surveys documented their range extending further east and northeast then previously known (Purcell 2006). Pygmy rabbits occur in suitable habitats throughout the planning area.

In May 2005, a petition to list the pygmy rabbit as threatened or endangered was found not to be warranted at this time. The USFWS concluded that the petition does not contain substantial scientific information to move ahead with a more detailed study of the species.

White-tailed prairie dog. White-tailed prairie dogs generally are found in desert grassland and shrub grassland habitats with moderate slopes at altitudes ranging between 5,000 and 10,000 feet. White-tailed prairie dogs are susceptible to rapid population declines resulting from flea-borne sylvatic plague. In addition, historic and current activities, including shooting, poisoning, and habitat conversion, have affected white-tailed prairie dog populations. White-tailed prairie dog colonies primarily occur in the central and eastern portions of the planning area. Efforts are currently under way to document and map all colonies within the planning area.

The USFWS reviewed a petition to list the white-tailed prairie dog under the ESA and concluded the petition did not contain substantial scientific data to support the petitioned action as warranted (Federal Register, November 9, 2004). Since then, the BLM developed the Wyoming BLM Statewide Programmatic White-tailed Prairie Dog (*Cynomys leucurus*) Biological Evaluation (approved by USFWS in July 2007) that included conservation measures and strategies for protecting the species.

Idaho pocket gopher. The Idaho pocket gopher occurs in shallow, stoney soils in sagebrush, sagebrush-grassland, and mountain meadows (Cerovski et al. 2004) and feeds on roots and plant parts of forbs, grasses, and herbs. The strongly fossorial Idaho pocket gopher is endemic to southwestern Wyoming and southeastern Idaho, extending slightly into southwestern Montana and northern Utah. It has been documented in Uinta, Lincoln and Sublette counties, including the planning area (Beauvais & Dark-Smiley 2005).

Black-footed ferret. The black-footed ferret is a federally endangered species. Black-footed ferrets are limited to open habitats, the same habitats used by prairie dogs, grassland, steppe, and shrubsteppe. Historically, black-footed ferrets ranged throughout the nonmountainous portion of Wyoming in areas that supported prairie dogs, their primary prey. The black-footed ferret was thought to be extirpated from virtually its entire range by the 1970s due to habitat loss, prairie dog eradication, disease, and shooting. Known ferrets in the wild currently are limited to reintroduced populations in South Dakota, Montana, Arizona, Utah, Colorado, Wyoming, and Chihuahua, Mexico (USFWS 2006b). The closest reintroduced population to the planning area is in the northwest corner of Colorado.

Two historic occurrences of black-footed ferrets were in the planning area. One observation was made in 1972 in Lincoln County, and one cranium and one mandible were collected in 1979 from Uinta County (BLM 2005g). Currently, there are no known populations of black-footed ferrets occurring within the planning area. From 2002 to 2004, approximately 58 black-footed ferret surveys were conducted for projects in the planning area. Several prairie dog complexes were identified as potentially suitable for black-footed ferret reintroduction (BLM 2005g).

Nongame (Amphibians)

Northern leopard frog. The northern leopard frog occupies riparian and wetland habitats and typically is found in cattail marshes and beaver ponds in the plains, foothills, and montane zones up to 9,000 feet above msl in the planning area. Adults feed on tadpoles, insects, and other invertebrates. Northern leopard frogs have been observed in the planning area.

Great Basin spadefoot. This species occupies sagebrush communities below 6,000 feet in elevation, west of the Continental Divide. The Great Basin spadefoot has been documented within the planning area (Crews 2005).

Boreal toad. Boreal western toads can be found breeding in wet meadows, ponds, marshes, and other shallow waters in spring. In the summer, this species uses upland montane sites, usually within 300 to 1,500 feet of the breeding ponds. During hibernation, boreal western toads seek shelter under rocks, logs, or within rodent burrows (Keinath and Bennett 2000). Historic records for the species exist within the planning area (McGee & Keinath 2004).

Spotted frog. This species occurs in ponds, sloughs, and small streams in the foothills and montane zones, although spotted frogs may avoid warm, stagnant ponds with cattails (Cerovski et al. 2004). Limited information exists on the extent of this species in the planning area.

Management challenges for special status raptor species include habitat degradation, habitat loss, lack of cottonwood and aspen regeneration, and incompatible land use practices (e.g., land conversion, clear-cutting, snag removal, industrial activities, intensive recreational activities, and removal of burrowing mammals). Other challenges include impacts from contaminants and human disturbance during sensitive periods.

General management actions should focus on maintaining the presence of special status raptor species and the habitats on which they depend in the planning area. Seasonal and spatial protective stipulations are currently applied around identified nest sites and communal roost areas from human disturbance and industrial activities.

Management challenges for neotropical migrants include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, contaminants, agricultural practices), water level fluctuations, water quality, lack of cottonwood regeneration, snag removal in preferred habitats, collision with wind turbines and powerlines, and interspecific competition for nest sites.

General management actions should maintain the presence of neotropical migrants and their preferred nesting and foraging habitats. Management actions should focus on maintaining or increasing the viability and biological integrity of special status species habitats within the planning area.

Management challenges for special status mammals include habitat fragmentation and degradation, land conversion, incompatible land uses (e.g., industrial activities, human disturbance, use of contaminants, cave closures, animal damage control practices), lack of cottonwood and willow regeneration, collision with wind turbines (for bats), and snag removal in preferred habitats. General management actions are intended to maintain and enhance the presence of nongame mammals and the habitats on which they depend.

Management challenges for amphibians include habitat degradation, land conversion, incompatible land uses (e.g., contaminants, conversion or degradation of aquatic habitats) and degradation of water quantity and quality. General management actions developed to protect riparian areas will also benefit amphibians.

3.4.9 Invasive Nonnative Species

The proliferation of INNS, including invasive nonnative plant species, as well as other organisms, such as insects, mammals, and pathogens, contributes to loss of rangeland productivity, reduced water availability, reduced structural and species diversity, loss of wildlife habitats, and, in some instances, is hazardous to human health and welfare. Federal and state laws regulate INNS control on federal lands. In accordance with these policies, the BLM works cooperatively with the State of Wyoming and the Lincoln and Uinta County Weed Control districts through a cooperative weed and pest management program to preserve and enhance all resources within the planning area.

INNS include plant species that are invasive and not indigenous to the planning area. Invasive plant species listed by the State of Wyoming and weed control districts are termed "noxious." Noxious weeds are undesirable plants that infest either land or water resources and may cause economic damage or have other adverse impacts on humans. Noxious weeds are designated and regulated by state and federal laws, including the Federal Noxious Weed Act, because they are detrimental to agriculture, commerce, and (or) public health (BLM 2005h). In addition to plants, other pests classified as INNS include any biological life form that poses a threat to human or ecological health and welfare.

INNS within the Planning Area

There are 25 designated and prohibited noxious weeds on the State of Wyoming Weed and Pest Control Act Designated List (Wyoming Weed and Pest Council 2007) (see Table 3-23). Six other INNS are included on the Wyoming Weed and Pest Control Act Designated Pests List (Table 3-24). The INNS in Table 3-25 represent the Declared List of Weeds and Pests in accordance with the Wyoming Weed and Pest Control Act of 1973 for Lincoln and Uinta counties. As new weed species or pests are discovered within the planning area, they will be added to the appropriate list and control measures will be taken.

Many INNS likely originated from Europe and Eurasia as ornamental plants for gardens and, thus, have established themselves with no natural enemies to control them. When surface disturbance occurs in areas where INNS already exist and the disturbed area is not properly managed to allow native vegetation to establish, INNS species will fill the void. Historical INNS infestations likely began as small patches in disturbed areas resulting from development, fire, roadway and utility corridors, grazing animal concentration areas, recreation, or OHV trails. The USGS (2003b) identifies fire and grazing as important disturbance factors that promote INNS spreading. Although data are not available, the spread of initial infestations have occurred through the transport of seeds or other propagates by wildlife, livestock, vehicles, people, water, or wind to disturbed areas. Actions resulting in removal of vegetation or damage to soils, such as those associated with transportation, oilfield operation, mining, recreation, OHV use, fire, utility corridors, crop production, range improvements, and concentrated livestock and wildlife grazing have exposed or altered the soil to create habitats conducive to the spread of INNS. These disturbances, combined with periodic extremes in the climate regime, resulted in changes in plant composition, decreased native diversity, and increased fragmentation (Noss 1987).

An area of concern in the management of natural resources is the departure from historical fire regimes. In recent years, the severity and intensity of wildfires in the west have increased dramatically from levels in the 1970s and 1980s. Activities contributing to this change in fire regime include fire exclusion, forest management, livestock grazing, establishment of INNS (including invasive plant species and introduced insects or disease), or other management activities. The result is a change in key ecosystem components, such as species composition, structural state, stand age, canopy closure, and fuel loading (BLM 2005h).

Nonnative annual grasses (particularly cheatgrass and Japanese brome) are invading grassland, sagebrush grassland, mixed grass prairie, desert-shrub, and mountain-shrub communities (Mac et al. 1998). While not currently listed by the State of Wyoming as noxious weeds, nonnative annual grasses can spread into undisturbed natural areas and reduce the fire-return interval sufficiently to eliminate shrubs and change species composition of sagebrush communities. Annual grasses spread by producing large amounts of seeds that can be carried by many vectors including wildlife, livestock, human foot traffic and pets, OHVs, wind, and water. Even though these INNS are spreading rapidly into grassland and shrubland communities in Wyoming; the distribution and rate of spread of nonnative grasses in the planning area are not currently being documented.

Table 3-23. Wyoming Weed and Pest Control Act Designated Noxious and Prohibited Weeds

Common Name
Field bindweed
Canada thistle
Leafy spurge
Perennial sowthistle
Quackgrass
Hoary cress (whitetop)
Perennial pepperweed (giant whitetop)
Ox-eye daisy
Skeletonleaf bursage
Russian knapweed
Yellow toadflax
Dalmatian toadflax
Scotch thistle
Musk thistle
Common burdock
Plumeless thistle
Dyers wode
Houndstongue
Spotted knapweed
Diffuse knapweed
Purple loosestrife
Saltcedar
Common St. Johnswort
Common tansy
Russian olive

Source: Wyoming Weed and Pest Council 2007. Designated Noxious Weeds W.S. 11-5-102 (a)(xi) and Prohibited Noxious Weeds W.S. 11-12-104.

Table 3-24. Wyoming Weed and Pest Control Act Designated Pests

Common Name
Grasshoppers
Mormon crickets
Prairie dogs[1]
Ground squirrels
Mountain pine beetle
Beet leafhopper

Source: Wyoming Weed and Pest Council 2005b. Designated Pests W.S. 11-5-102 (a)(xii).
[1]Prairie dogs are currently addressed as a special status species; refer to the Special Status Species section of this document for more information on prairie dogs.

Table 3-25. Declared List of Weeds and Pests by Counties in the Kemmerer Planning Area for 2006

County	Common Name
Lincoln County	Wild oats
	Cattle Grub
	Alfalfa weevil
	Mosquito
	Plains pocket gopher
Uinta County	Black henbane
	Yellow star thistle
	Mosquito

Source: Wyoming Weed and Pest Council 2006

Saltcedar (tamarisk) is another example of a plant INNS that alters the natural ecosystem. Saltcedar is a nonnative tree or shrub invading riparian and wetland areas and out-competes native vegetation by utilizing its much deeper root system (up to 100-feet deep) to inhabit a larger area further from streams and open water bodies than native riparian vegetation (TC 2003). Once established, saltcedar changes soil chemistry, depletes soil nutrients and water, and increases salinity, thereby reducing the potential for and recovery of native plant species. Mapping the distribution of saltcedar in the planning area is ongoing.

Although applying pest-control measures has been limited until this time, it is reasonable to conjecture that issues such as the West Nile virus, bird flu, other invasive and noxious weeds, nonnative animals, tree pathogens, may need to be addressed in the foreseeable future. APHIS is currently the BLM's agent for controlling animal pests.

INNS Management in the Planning Area

INNS are not restricted by legal and administrative boundaries. To be effective, federal, state, county, and private interests must work collaboratively. The Kemmerer Field Office manages INNS species in the planning area by implementing management actions consistent with the goals included in the Partners Against Weeds (BLM 1996). The Kemmerer Field Office is currently involved in three Noxious Weed Coordinated Resource Management working groups within Lincoln and Uinta counties. The Bear River Divide Weed Management Area includes both Lincoln and Uinta counties and covers most of the Cumberland and Uinta allotments (approximately 400,000 acres). The Highlands Cooperative Weed Management Area includes the portion west of Lincoln County not included in the Bear River Divide Weed Management Area. The Four Rivers Cooperative Weed Management Area covers the remaining portion of Uinta County not covered in the Bear River Divide Cooperative Weed Management Area. All the area with the planning area is covered under a Weed Management Plan. Numerous educational programs have been implemented to make the public aware of weeds, such as education days at schools, essay contests for students, and scheduled weed workdays with federal and state agencies and the public. In addition, in November 2005 the BLM issued the *Draft Programmatic Environmental Impact Statement for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States* (BLM 2005i) to analyze the use of herbicides on the human and natural environment.

Infestations of INNS spread sporadically throughout the planning area. Plant INNS (weeds) are a high priority for control and management because they contribute to the loss of rangeland productivity, increased soil erosion, reduced water quantity and quality, reduced species diversity, and loss of wildlife habitats. The Kemmerer Field Office treats an average of 1,000 acres of various weed species each year. The BLM uses an integrated weed management program that involves grazing, fire management, chemical, mechanical, and biological controls (BLM 1990a; BLM 1992d).

Current biocontrol agents in Lincoln and Uinta counties include insects that target musk thistle and Dalmatian toadflax. Other biocontrol agents that may be introduced in the future include two species that target salt cedar and one species that targets Canada thistle; however, these are in an experimental stage and have not been approved for general release.

The weed program is continually growing as a result of changing priorities, new INNS introductions, discovery of new infestations, and the rapid growth of known infestations. Geographic Information System (GIS) mapping of weed locations is ongoing to determine locations of known weeds, as well as to locate new infestations.

Management challenges for INNS include managing BLM-authorized activities in the planning area that disturb the soil or otherwise create an opportunity for the establishment of INNS; educating resource users regarding the spread, early detection, rapid response, and control of INNS; and determining effectiveness of INNS control without a current INNS inventory and comprehensive INNS management program. These challenges require coordination across all BLM's resource programs to develop, integrate, and implement aggressive management techniques and strategies for controlling the adverse impacts and spread of INNS throughout BLM lands, including the planning area. Management actions identified in the alternatives described in Chapter 2 are designed to address INNS challenges in the planning area.

3.5 Heritage Resources

Heritage Resources include the individual resources of cultural, paleontological, and tribal treaty rights. Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions.

3.5.1 Cultural Resources

3.5.1.1 Archeology and Historic Resources

Cultural resources are any prehistoric or historic district, site, or building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes. Cultural resources include archeological resources, historic architectural and engineering resources, and traditional resources. Archeological resources are areas where prehistoric or historic activity measurably altered the earth or where deposits of physical remains (e.g., arrowheads, pottery, bottles) are discovered. Architectural and engineering resources include standing buildings, districts, bridges, dams, and other structures of historic or aesthetic significance. Traditional resources can include archeological resources, structures, topographic features, habitats, plants, wildlife, and minerals that Native Americans or other groups consider essential for the preservation of traditional culture.

The majority of cultural resources in the Kemmerer planning area are identified, evaluated, and managed as a result of compliance with Section 106 of the National Historic Preservation Act (NHPA). The purpose of the process required by Section 106 of NHPA is to identify historic properties potentially affected by undertakings, assess effects, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties through consultation among the agencies and other parties that may have interests in the affected properties. Potential adverse effects on historic properties require consultation with the State Historic Preservation Officer, Native Americans for tribally sensitive sites, and affected interests such as the Oregon-California Trails Association for National Historic Trails. Historic properties are sites, districts, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and are significant because they meet one or more of the following National Register of Historic Places (NRHP) criteria: (a) they are associated with events that made important contributions to broad patterns of history; (b) they are associated with the lives of persons important in our past; (c) they embody distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components lack individual distinction; or (d) they have yielded, or may be likely to yield, information important in prehistory or history. Historic properties such as NHTs and other sites from the historic period, and some tribally sensitive sites, are often evaluated eligible for nomination to the NRHP because they meet criteria a, b, or c. The setting is commonly a defining characteristic that make these properties types eligible for inclusion in the NRHP, in combination with other aspects of integrity, when present. Setting is the physical environment of a historic property that refers to the character of the place in which the property played its historical role. Because the BLM must manage landscapes around properties for which settings are important aspects of integrity, some management obligations extend beyond the physical boundaries of historic properties.

When management requires consideration of settings, Appendix C of the State Protocol, tiered to the National Programmatic Agreement, provides guidance on the methods required to assess the effects of undertakings on historic properties for which settings are defining characteristics of their significance. When an undertaking is determined to be visible in the setting of such a property and the setting retains sufficient historic character to contribute to the property's NRHP eligibility, the Visual Contrast Rating (VCR) system is used to analyze the potential visual impacts on the setting. The BLM uses the VCR system and principles and methods of the Visual Resource Management (VRM) program for this purpose because they are existing procedures that are ideal for evaluating effects on settings of historic properties.

The use of the VRM program as a tool for assessing effects on historic properties complies with the purpose of Section 106, without creating a new requirement in that process. The VCR system meets BLM's management goals for historic properties with settings that contribute to their eligibility because assessments of impacts to settings are necessary to preserve the defining characteristics that contribute to the significance of the properties.

Identified Cultural Resources

Cultural resources investigations began in the Kemmerer Planning Area in 1967. Most investigations have been accomplished pursuant to compliance with Section 106 of the NHPA and provisions of NEPA, both of which require federal agencies to consider potential effects of federally assisted or permitted undertakings on cultural resources eligible for or listed on the NRHP. Cultural resources investigations in the Kemmerer Planning Area have also been conducted by the BLM pursuant to the BLM's stewardship responsibilities under Section 110 of the NHPA, which requires federal land-managing agencies to identify and manage significant cultural resources on lands administered by those agencies. From 1967 to 2003, approximately 4,400 cultural resources investigations were conducted within the Kemmerer Planning Area (BLM 2004c). Surveys have been conducted on more than 192,000 acres, about 4.8 percent of the planning area. These investigations have included inventory, project monitoring, site testing, evaluation of eligibility for nomination to the NRHP, and mitigation of potential adverse effects through data recovery and other documentation. Most recently, the BLM completed a Class I Regional Overview of the planning area that reviewed and summarized past cultural resources investigations, the numbers and kinds of recorded resources, and cultural resources management directions (BLM 2004c). The information in this section was prepared primarily using the Class I Overview.

The planning area defines four categories of cultural resources: (1) prehistoric sites, which include prehistoric landscapes; (2) historic sites, which include archeological sites, standing structures, roads, and historic landscapes; (3) historic trails, which include pioneer burials, emigrant campsites, pioneer inscription sites, river crossings, forts, Pony Express and stage stations, natural landmarks, and historic landscapes; and (4) Native American culturally sensitive sites (e.g., Traditional Cultural Properties [TCPs]) (BLM 2003a).

Investigations to date have recorded more than 8,400 cultural resources within the planning area (BLM 2004c). More than 95 percent of the 6,766-recorded Native American sites are campsites or habitations, lithic scatters, or secondary lithic procurement sites. Other site types include burials, ceremonial stone alignments, rock art, rock shelters, ceramic-bearing sites, quarries/primary lithic procurement sites, hunting blinds, house pit features, and bison kill and butchering sites (BLM 2004c). A total of 1,656 historic-era sites have been recorded in the planning area. Euro American or other historic sites include emigrant trails, freight wagon and stagecoach trails, military camp and fort sites, an early highway, early ranches and farms, stock-herding camps, irrigation systems, coal mines, early oil fields, railroads, bridges, historic landscapes, and urban buildings (BLM 2004c). This section summarizes the numbers and kinds of identified cultural resources in the planning area by subregion (see Map 27).

Bear River Divide Subregion. This subregion includes approximately 48,000 acres, 12.4 percent of which has been surveyed for cultural resources. Investigations have generally identified low cultural resource densities. Thirty-nine cultural resources have been documented (24 Native American and 15 Euro American or other historic). The majority of the Native American sites are classified as lithic scatters and campsites. One site with stone circles has been identified. The Hams Fork Conglomerate Archeological Landscape is located in this subregion. Among the Euro American or other historic sites, stock herding is the dominant theme. Several variants of the Oregon-California NHT cross this subregion (BLM 2004c).

Bear River Valley Subregion. This subregion includes approximately 276,480 acres, 4.15 percent of which has been surveyed for cultural resources. A total of 230 cultural resources have been documented (95 being Native American and 135 Euro American or other historic). The majority of the Native

American sites are classified as lithic scatters, along with campsites, quarries, and one rock shelter. Notable archeological sites include the Weston and Bessie Bottom sites. Among the Euro American or other historic sites, transportation sites dominate, including the original routes of the Union Pacific Transcontinental Railroad and the Union Pacific Oregon Short Line Railroad. Other site types include irrigation features and reservoirs, homesteads/ranches, urban buildings, and stock-herding sites. The Oregon-California NHT and the Mormon Pioneer-California NHT cross this subregion (BLM 2004c).

Bridger Valley Subregion. This subregion includes approximately 311,000 acres, 2.4 percent of which has been surveyed for cultural resources. A total of 681 cultural resources have been documented (536 Native American and 145 Euro American or other historic), and the subregion is considered to be relatively rich in cultural resources. The majority of Native American sites are campsites and lithic scatters. The Eakin site is a notable archeological property. This subregion also contains a concentration of historic sites that are significant in national and regional history, including the Oregon, California, Mormon Pioneer, and Pony Express NHTs; the Fort Bridger State Historic Site; the Fort Supply; features of Mormon agrarian development, such as homesteads, ranches and irrigation districts; and the Union Pacific Transcontinental Railroad (BLM 2004c) and the Lincoln Highway.

Green River Basin Subregion. This subregion covers approximately 934,400 acres, 5 percent of which has been surveyed for cultural resources. A total of 5,339 cultural resources have been documented (4,837 Native American and 502 Euro American or other historic), the highest numbers of sites among the subregions. The high densities of Native American camps, lithic scatters, and archeological landscapes reflect concentrated land use, in which occupants utilized a variety of critical resources throughout the basin for thousands of years (BLM 2004c). Notable sites include Austin Wash, Church Butte Four, Cow Hollow Creek, Dixie Cup, Disney, Fontenelle Twelve, Gateway Petroglyphs, Gemma, Hams Fork, MAK, Moxa Twenty-eight, Moxa Housepit, Old-and-in-the-way, Pescadero, Porter Hollow, Sevenmile Wash, Shute Creek Plant, Taliaferro, and the Vegan sites. Significant historic roads and trails passing through this area include the Oregon, California, Mormon Pioneer, and Pony Express NHTs, the Union Pacific Transcontinental Railroad, the Oregon Short Line Railroad, the Lincoln Highway, the Opal Wagon Road, and the Bryan to South Pass City Road (BLM 2004c).

Overthrust Belt Subregion. This subregion covers approximately 869,000 acres, 6 percent of which has been surveyed for cultural resources. A total of 749 cultural resources have been documented (459 Native American and 290 Euro American or other historic). Overall site densities are generally low throughout the area due to the steep terrain with limited habitable contexts (BLM 2004c). Among the Euro American or other historic sites, stock herding is the dominant theme. The majority of the Native American sites are classified as lithic scatters and campsites. The Sublette and Dempsey-Hockaday Cutoffs of the Oregon-California NHT cross this subregion, as do the major variants of the Oregon, California, Mormon Pioneer, and Pony Express NHTs. The Union Pacific Transcontinental and Oregon Short Line railroads, and the Lincoln Highway also cross the subregion (BLM 2004c).

Overthrust Foothills Subregion. This subregion includes approximately 514,560 acres, 8.6 percent of which has been surveyed for cultural resources. A total of 1,165 cultural resources have been documented (705 Native American and 460 Euro American or other historic). This subregion contains the greatest diversity of site types and periods of occupation. Notable archeological sites include Broken Home, Deep Hearth, Meadow Draw Ten, Meadow Draw Thirteen, Oyster Ridge, Skull Point, South Slate Creek, and Wishful sites. The Bridger Antelope Trap, an NRHP-listed game drive and trap, is also located in this subregion. All but one of the NHTs pass through this subregion, as do the Union Pacific Transcontinental and Oregon Short Line railroads, and the Lincoln Highway. Most of the many historic coal mines in the planning area are also located in this subregion, as are the historic Piedmont charcoal kilns and town (BLM 2004c).

Star Valley Subregion. This subregion includes approximately 105,600 acres, less than 1 percent of which has been surveyed for cultural resources. A total of 22 cultural resources have been documented,

all Euro American historic. One significant cultural property is known in the subregion: Lander's Cutoff of the Oregon Trail crosses private land in Star Valley (BLM 2004j).

Uinta Foothills Subregion. This subregion covers approximately 134,400 acres, 4.2 percent of which has been surveyed for cultural resources. Most of the inventories were conducted in the eastern one-third of this subregion as a result of gas development in the last two decades of the twentieth century. A total of 60 cultural resources have been documented (35 Native American and 25 Euro American or other historic). The majority of the Native American sites are classified as lithic scatters. Among the historic sites, homesteading and ranching are the dominant themes (BLM 2004c).

Wyoming Range Subregion. This subregion covers approximately 860,800 acres, 4.5 percent of which has been surveyed for cultural resources. A total of 137 cultural resources have been documented (75 Native American and 62 Euro American or other historic). The majority of the Native American sites are classified as campsites and lithic scatters. Among the Euro American or other historic sites, homesteading and ranching are the dominant themes. The Sublette and Dempsey-Hockaday Cutoffs of the Oregon-California NHT pass through the southern tip of the subregion on BLM and private lands (BLM 2004c).

Management challenges for cultural resources in the planning area include continued identification and evaluation of National Register eligibility of archeological sites; mitigation of adverse effects due to resource development; addressing cumulative and indirect effects from resource use; balancing resource protection with demands on the resource from multiple use; identification and protection of TCPs; implementation of important management tools, including the cultural resources database and digitization of cultural resource basemaps into GIS; the ability to conduct cultural resource inventories above and beyond those required under Section 106; and striving for consistency with adjacent and overlapping land management plans (BLM 2003a).

The BLM national management objectives are expressed in *BLM Manual 8100, Cultural Resource Management,* as follows:

- Identify, plan the appropriate use of, and manage cultural resources on public lands and in areas of BLM responsibility.
- Respond in a legally and professionally adequate manner to (1) the statutory authorities concerning historic preservation and cultural resource protection, and (2) the principles of multiple use and ecosystem management.
- Recognize the potential public and scientific uses of, and the values attributed to, cultural resources on the public lands, and manage the lands and cultural resources so that these uses and values are not diminished, but rather are maintained and enhanced.
- Contribute to land use planning and the multiple use management of the public lands in ways that make optimum use of the thousands of years of land use history inherent in cultural resource information, and that safeguard opportunities for attaining appropriate uses of cultural resources.
- Protect and preserve in place representative examples of the full array of cultural resources on public lands for the benefit of scientific and public use by present and future generations.
- Ensure that proposed land uses, initiated or authorized by BLM, avoid inadvertent damage to federal and nonfederal cultural resources.

In addition, specific objectives recently were expressed in BLM Information Bulletin No. 2002-101, *Cultural Resource Considerations in Resource Management Plans,* which states that all RMPs will include at least the following two goals (BLM 1986a):

- Preserve and protect significant cultural resources and ensure that they are available for appropriate uses by present and future generations.

- Imminent threats from natural or human-caused deterioration, or potential conflict with other resources uses, are reduced by identifying priority geographic areas for new field inventory, based upon a probability for unrecorded significant resources.

The first goal requires resource use allocation decisions in the RMP in which all cultural properties in the planning area must be allocated to the following uses according to their nature and relative preservation value (BLM 1998c):

- Scientific Use - preserved until research potential is realized.
- Conservation for Future Use - preserved until conditions for use are met.
- Traditional Use - long-term preservation.
- Public Use - long-term preservation and on-site interpretation.
- Experimental Use - protected until used.
- Discharged from Management - no use after recordation and not preserved.

The second goal requires a Class I regional overview of the planning area to identify priority areas in need of new field inventory where unrecorded significant resources could be found. A Class I regional overview is a professionally prepared study that includes a compilation and analysis of all reasonable available cultural resource data and literature; a management-focused, interpretive, narrative overview; and synthesis of the data.

According to the management objectives of the existing RMP (BLM 1986a), the BLM plans to continue to identify, protect, manage, and enhance cultural resources located on its lands or on nonfederal lands that may be affected by BLM undertakings. The *Kemmerer Resource Management Plan* (BLM 1986a) provides the following general direction:

- All historical, archeological, and cultural sites eligible for or listed on the NRHP are protected or mitigated.
- The need for cultural resource management plans for specific resources is determined on a case-by-case basis.
- NSO for fluid minerals is designated for the NRHP-listed Bridger Antelope Trap.

Native American Concerns

Native American traditional resources include TCPs, traditional resources that are eligible for the NRHP, and sites of cultural concern that are not eligible for the NRHP, but identified as significant by Native American groups and may be protected under the American Indian Religious Freedom Act (AIRFA). In general, Native American traditional resources can include archeological sites; stone alignments; petroglyphs and pictographs; plant, animal, and lithic resource collection areas; spiritual locations; and other traditional use locations that may have spiritual or other cultural meaning to Native Americans. The locations of many such traditional resources are considered confidential and are not released to the public to protect the resources. When a specific management need arises that concerns a traditional cultural resource or site of cultural concern, the BLM consults with one or more of the following tribes, as appropriate.

- Eastern Shoshone (Wyoming)
- Northern Arapaho (Wyoming)
- Shoshone Bannock (Idaho)
- Northern Ute (Utah)

3.5.1.2 National Historic Trails

In 1968, the National Trails System Act provided for the development of a national system of trails in urban, rural, and wilderness settings. Originally, the Act specified three categories of national trails: scenic trails, recreation trails, and connecting or side trails. In 1978, historic trails were added as another category. Today, only Congress may establish NHTs. In 1995, the NPS established the National Trails Office in Salt Lake City, Utah. In 2006, the name was changed to the National Trails System Office which administers the Oregon, the California, the Mormon-Pioneer and the Pony Express NHTs. However, the National Trails System Office does not manage trail resources on a day-to-day basis. The responsibility for managing trail resources remains in the hands of the current trail managers at the federal, state, local and private levels.

There are segments of four NHTs within the planning area, as well as associated cultural resource sites. The four trails are sometimes referred to collectively as the "Oregon-California-Mormon Pioneer-Pony Express Trail" because their routes overlap in many areas. In the planning area, the corridor divides with individual routes and cutoffs leading west, northwest, and southwest through Sweetwater, Lincoln, and Uinta counties. Long stretches of the primary trail routes and major trail alternatives are on public lands. Conditions of the trails range from highly visible, well-developed ruts, to areas where the trail is no longer locatable. The trail setting has varying degrees of historic integrity. Some trail segments have been covered by modern roadways. NHTs in the planning area are visited by both intentional and incidental tourists. Portions of the trails can be explored from the comfort of cars and paved surfaces, by hiking, and by horseback. Map 28 depicts the routes of the trails within the planning area.

All variants of NHTs in the planning area were previously determined to be eligible for nomination to the NRHP under Criterion A because they are associated with events that made significant contributions to broad patterns of American history. The NHT variants in the planning area are composed of the physical traces left by wagons and draft animals, the scenery visible from the trails, associated sites such as emigrant camps and graves, locations where important events were documented, and landmarks used by emigrants to navigate along the trails. Their significance in American history is demonstrated in segments and sites that possess integrity of location, design, setting, materials, workmanship, feeling, and association. Previous cultural investigations and BLM aerial reconnaissance, supported by ground-truthing, assessed the conditions of all of the NHT variants in the planning area in terms of their integrity. Defined segments are classified Class 1 through Class 4, based on their condition and degree of integrity. This BLM classification system takes into consideration all aspects of NHTs as historic properties, including settings and the other relevant qualities of integrity, and provides overall evaluations of relatively longer segments of trail. These trail classes differ from the five categories defined in the Oregon-California Trails Association (OCTA) *Mapping Emigrant Trails MET Manual* (OCTA 1996), which are intended for field documentation of fairly short trail segments.

Pursuant to Section 106 of NHPA, all undertakings in the vicinity of NHTs will be analyzed for their potential effects on historic properties. These site-specific reviews of undertakings may require that proposed projects evaluate and possibly mitigate impacts to NHT historic integrity by considering effects on the trail settings beyond the immediate area of the proposed management actions.

Class 1 Trail: Undiminished Trail Trace and Setting. Under this category, the trail traces and associated sites all retain integrity of location, setting, feeling, and association. Class 1 segments are the best examples of trail in the planning area because they readily convey the historic sense of the period of the trail's significant use. Class 1 segments retain excellent integrity of location, because the physical traces and sites remain in their historically documented locations. The form, structure, and style of wagon ruts reflect integrity of association, because they are sufficiently intact to convey a direct link to historic events. The OCTA MET Class 1 coincides with this category, with some MET Class 2 segments that may be classified in this group. The overall settings contribute to the eligibility of the site so they impart a sense of their historic period of use, and contribute to the integrity of feeling that allows an observer to

imagine the emigrant experience on the trail. There may be developments on the landscape, but they do not detract from the feeling or sense of the historic period. If important historical events occurred within a particular trail segment, they are considered to be supplemental values but are not necessary for a Class I designation. Management actions are designed to protect the physical trail traces, associated sites, and landmarks from adverse effects by establishing a protective corridor that extends from ¼ mile to one mile on each side of a trail trace and around each site, depending on the alternative. Management actions for preservation of Class 1 trail settings require that project designs retain the existing character of the landscape so developments do not dominate the visible area or detract from the feeling or sense of the historic period, for distances from within one mile and up to ten miles on each side of the trails to encompass the foreground/middle ground and background distance zones, depending on the alternative. The area of potential effect must include consideration of any visual intrusion to the setting. If important historical events occurred within a particular trail segment, they are considered to be supplemental values but are not necessary for a Class 1 designation.

Class 2 Trail: Good Trail and Setting. Trail traces and related sites in this category retain good integrity of location and association because they are physically intact. The historic settings generally retain the existing character of the landscape in federal sections. Although Class 2 segments may contain some developments, they do not attract the attention of the casual observer and they do not dominate the setting sufficiently to detract from the feeling or sense of the period of the trail's significant use. Trail segments may be assessed as contributing to the trail's overall National Register eligibility because of their integrity of location and association, but the integrity of setting may be considered contributing or non-contributing depending on the degree of visibility of existing developments. If important historical events occurred within a particular trail segment, they are considered as supplemental values. Such documented events could raise a Class 2 segment to a Class 1 designation. The OCTA MET Classes 2 and 3 would be encompassed by this category. Management actions are designed to protect the physical trail traces, associated sites, and landmarks from adverse effects within a protective corridor that extends from 500 feet to ½ mile on each side of a trail trace and around each site, depending on the alternative. Management actions for preservation of Class 2 settings require that project designs retain the existing character of the landscape so developments do not dominate the visible area or detract from the feeling or sense of the historic period, for distances from ½ mile to three miles on each side of the trails to encompass the foreground/middle ground distance zones, depending on the alternative.

Class 3 Trail: Compromised Historic Setting. Class 3 trail traces and related sites retain some integrity of location and association, but the historic setting likely contains developments that detract from the feeling or sense of the period of the trail's significant use. The OCTA MET Class 4 would correspond to this category. Management actions are focused on preservation of intact trail traces, associated sites, and landmarks within a protective corridor from 100 feet to ¼ mile on each side of a trail trace and around each site, depending on the alternative. Generally, the setting would not be considered an important aspect of integrity that contributes to the trail's National Register eligibility. If important historical events occurred within a particular trail segment, they are considered as supplemental values and could, in rare cases, elevate a Class 3 segment to a Class 2 designation, superseding the physical integrity of the trail trace. Management actions are applied to a corridor within ½ mile of trail traces and sites, or according to the appropriate VRM class for the area, depending on the alternative.

Class 4 Trail: No Trail Trace or Sites. Under this category, the trail's physical trace no longer exists because of its destruction by natural forces or human developments. The OCTA MET Class 5, and some MET Class 4 segments, would be included in this category. Regardless of the condition of the surrounding landscape, the historic setting is no longer relevant to these segments in terms of management actions. However, because the trail did exist in these segments at one time, there is a probability for the presence of trail related sites which could require management of settings, if identified. Where trail traces are destroyed and no sites are documented, none of the qualities of integrity are

retained in these segments that do not contribute to the trail's eligibility and no special management actions are proposed for destroyed trail segments.

Management actions for NHTs generally address management of trails for long-term heritage and educational values, reducing imminent threats from natural or human-caused deterioration, and reduction of conflicts with other resource uses.

Trails are protected from visual intrusion and surface disturbance to maintain the integrity of setting. Generally, visual intrusion and surface disturbance are restricted or prohibited within 1,320 feet of either side of a historic trail (depending on topography and surface disturbance) or within the visual horizon of the trail, whichever is closer (BLM 1986a).

The *Oregon/Mormon Pioneer National Historic Trails Management Plan* was prepared in 1986 to guide BLM management of the NHTs (BLM 1986b). To meet the objectives of the plan, protective measures have been prescribed within individual BLM districts for sites and segments on public lands (BLM 1986b). Specific BLM management responsibilities currently include the following (BLM 1986b).

- Regularly monitor the status of all Wyoming sites and segments identified in the comprehensive plan to identify changes in ownership or impending developments; keep the NPS informed.
- Arrange to have inventories and studies performed; seek public access; define boundaries; erect and maintain trail markers; provide and maintain local facilities; issue and enforce regulations; work closely with the NPS, and other public or private interest groups; and nominate qualified sites to the NRHP.
- BLM managers are directed to maintain the scenic/historic integrity of historic sites and cross-country segments on public lands, to avoid destruction of trail resources, to mitigate unavoidable impacts, to accord the trails a priority status in the land use planning process, and generally extend to the trails the type of protection afforded to other nationally significant historic sites.

BLM Manual 8110, *Identifying Cultural Resources,* defines six use categories for cultural resources, including historic trails, scientific use, conservation for future use, traditional use, public use, experimental use, and discharged from management. A cultural property may be allocated to more than one use category, and allocations are revised when circumstances change or when new data become available (BLM 1998c). Of specific interest for NHTs are the categories of traditional use and public use:

- **Traditional Use**. This category refers to use of the cultural resource itself. Traditional use properties are critical to a community's beliefs, customs, and practices. The regulatory threshold for management of a property for Traditional Use is eligibility for the NRHP. In Wyoming, these kinds of resources are most commonly associated with Native Americans, although certain locations along the Mormon Pioneer NHTs also may be considered traditional resources.
- **Public Use**. Long-term preservation and onsite interpretation are most appropriate for cultural resources that have visually obvious manifestations of the site's historical or archeological importance. Examples of these resource types are well-defined wagon ruts and marked graves on the NHTs, and the features at Fort Laramie National Historic Site in eastern Wyoming.

3.5.1.3 Oregon National Historic Trail

From 1843 to 1868, some 350,000 Euro American emigrants followed the Oregon Trail westward to Oregon, California, and Utah. Farmers bound for the valleys of Oregon, Mormons seeking religious freedom in the Salt Lake Valley, and miners all used the Oregon Trail. The route was later used by religious missionaries, the Pony Express, the federal Overland Mail service, and the first transcontinental telegraph.

The Oregon Trail was used by fur trappers and traders who followed well-worn Native American trails. To exploit the rich fur country of the Pacific Northwest, the American Fur Company established a trading post in Astoria near the mouth of the Columbia River in 1810. Wilson Price Hunt led the company's first overland expedition in 1811, crossing the Wind River Range through Union Pass and the Rocky Mountains via Teton Pass. His party then followed the Snake and Columbia rivers to Astoria. Robert Stuart led the company's return expedition in 1812, following the same water route and pass through the Rockies, crossing the Wind River Mountains via South Pass. From there he continued east along the Sweetwater and North Platte rivers, traveling west to east along an extensive portion of what would become the Oregon Trail (BLM 2004c).

South Pass was rediscovered in 1824 by a party of trappers, led by Jedediah Smith, looking for a westward crossing of the Wind River Range. The pass was thereafter commonly used and became well known to the public. In 1830, David E. Jackson and William L. Sublette led a caravan of wagons loaded with trade goods along the eastern portion of the Oregon Trail as far as South Pass. In 1832, Captain Benjamin L.E. Bonneville took the first wagons across South Pass and into the Green River basin. These expeditions demonstrated that the Oregon Trail could accommodate wagon traffic. In the coming decades, thousands of emigrant wagons journeyed westward through South Pass (BLM 2004c).

The Bidwell-Bartleson party (1841) usually is credited as the first group of emigrants to traverse the entire Oregon Trail, although it abandoned its wagons at Fort Hall, Idaho, and completed the journey with pack animals. In that same year, John C. Fremont traveled an extensive portion of the emigrant road, and later published the first accurate map and guidebook for travelers. In 1843, the first large party of Oregon-bound emigrants—135 men, 130 women, and 610 children—rolled westward from Independence, Missouri. Many historians use the year 1843 to formally mark the beginning of the great westward migration (BLM 2004c).

In 1846, Oregon became a territory of the United States. By that time, a considerable number of Euro Americans had already settled there, tipping the balance for United States acquisition. Prior to the California Gold Rush of 1849, more than 12,000 emigrants used the Oregon Trail (BLM 2004c). After the 1849 discovery of gold in California, the number of emigrants jumped to as many as 30,000 that year and to 55,000 in 1850. By 1852, gold rush traffic had ebbed, and most emigrants headed for Oregon (BLM 2004c). Moderate use of the Oregon Trail continued throughout the 1850s and 1860s. Later, gold strikes in Colorado created a peak year in 1859, with 30,000 emigrants using the trail. Traffic subsided during the Civil War, but gradually increased to 25,000 in 1865/1866 (BLM 2004c).

Trail historians generally use the year 1869 to mark the end of traditional covered wagon migration, as well as the pre-settlement period throughout the Oregon Trail corridor. With the completion of the transcontinental railroad in that year and the beginning of the settlement of the intervening territories, the character of western emigration changed. However, wagon travel by emigrants who could not afford rail or stage transportation and those traveling shorter distances between or within territories continued (BLM 2004c).

Fort Bridger, 1842 – 1890. Jim Bridger and Louis Vasquez constructed Fort Bridger in 1842 and 1843 as a trading post. Ten years later the post was purchased by the Mormons and occupied until the Mormon War of 1857, when the Mormons abandoned and burned the post. In 1858, the remnants of the fort became a United States military installation that remained in service until 1890. Between Fort Laramie and Fort Bridger, emigrants had two major supply points along the Oregon Trail in present-day Wyoming as well as additional protection from patrolling soldiers. Today Fort Bridger is a Wyoming State Historic Site and is listed on the NRHP.

Bear River Divide, 1843 – 1868. Euro American interest in the Bear River Divide dates to the 1820s when mountain men blazed their trails through the region. John Charles Fremont visited the area in 1843 and his expedition produced the first map showing the Bear River Divide. Within a few decades, emigrant wagons followed the route. The Bear River Divide portion of the Oregon Trail is considered to be the

primary route of the Oregon Trail as it approaches the Utah state line between Fort Bridger, Wyoming, and Fort Hall, Idaho (BLM 2004c). After stocking up on supplies at Fort Bridger, most emigrants bound for Oregon took the Bear River Divide route. The trail ascended the divide from the east by one of three routes. Little Muddy Creek led westward to the mouth of Chicken Creek, and on to the top of the Divide. Variations included Road Hollow, Little Muddy, Divide Segment, North Bridger Creek, and South Bridger Creek (BLM 2004c). At least some of the California gold rush travelers of 1849 and the early 1850s also used the Bear River Divide. Today, good physical remnants still exist along the trail.

Lander Cutoff, 1857 – 1868. The Lander Cutoff was one of the last east-to-west emigrant trails to be established. It was surveyed and built in 1857/1858 by engineer Frederick W. Lander for the Department of the Interior. It is the only stretch of the Oregon Trail system to be subsidized and constructed by the federal government (BLM 2004j). This cutoff sought to speed mail delivery to the West Coast and provide safer and easier roads for emigrants (BLM 2004c). What became the Lander Cutoff was actually the central division of a wagon road stretching from Fort Kearny, Nebraska, to Honey Lake, California. This route avoided a long desert crossing and alkaline water, and afforded better forage and wood than existing routes. The new road angled northwest along the base of the Wind River Range from South Pass, then bore westerly across the New Fork River and Green River, followed South Piney Creek, and crossed the Wyoming Range via Thompson Pass and the Salt Range via Wagner Pass. It then turned north through Star Valley and continued westward to Fort Hall, Idaho. When completed, the Lander Cutoff was approximately 345 miles long and connected Gilbert Station at South Pass to City of Rocks, a point west of Fort Hall near the present Idaho-Utah border. Traffic increased in 1859 due to the Colorado gold rush, although westbound travelers would have diverged southward to Colorado before reaching the Lander Cutoff. The last recorded sighting of a westbound emigrant train on the Lander Cutoff was in 1912 (BLM 2004c). Today, the route is well marked in most places. The BLM and the USFS-managed lands predominate with public roads following much of the route (BLM 2004j).

Sublette Cutoff, 1841 – 1868. The Sublette Cutoff provided a shorter alternative to the Lander Cutoff and the main trail past Fort Bridger. The cutoff paralleled the present-day Sweetwater-Sublette county line on the Sweetwater side, then turned southwest and descended to the Green River south of LaBarge. The Stephens-Townsend-Murphy party crossed the route in 1844, although inscriptions at Names Hill, located along the Cutoff, indicate that it was probably used by the early fur trappers in the 1820s and 1830s. The first years of the California gold rush were the high mark for emigrant use of the Sublette Cutoff. In 1849, an estimated 65 percent of the travelers used this route, and by 1850, an estimated 9 of every 11 teams chose the Sublette Cutoff (BLM 2004c). At one time it became the main variation of the Oregon Trail west of South Pass. By 1848, Mormons had established ferries on the Green River, indicating sufficient traffic to make this venture worthwhile. From the Green River, the emigrants could then choose the more northerly Dempsey-Hockaday Cutoff or continue on the main Sublette Cutoff, which crossed Hams Fork, then crossed over a series of steep ridges before descending into the Bear River Valley, where it joined the road between Fort Bridger and Fort Hall. The Sublette Cutoff was later eclipsed by other routes to the south and gradually fell into disuse, except for local and regional traffic in the late nineteenth and early twentieth centuries (BLM 2004c). Today, the Sublette Cutoff is well-marked and crosses BLM-managed public lands for much of its distance (BLM 2004l).

Slate Creek and Dempsey-Hockaday Cutoffs, 1851 – 1868. The Slate Creek Cutoff was one of the southerly shortcuts on the Sublette Cutoff. It was located between the Big Sandy River on the east and the Green River on the west. Many nineteenth century emigrants chose these shortcuts to avoid the almost 50-mile desert crossing of the Sublette Cutoff to the north. The Slate Creek Cutoff diverged from Big Timber Station on the main Oregon Trail and followed the Slate Creek drainages joining the main Sublette Cutoff on Slate Creek Ridge and at Rocky Gap on Oyster Ridge north of Kemmerer. The Slate Creek Cutoff was utilized mostly between 1852 and 1859, when the Lander Cutoff diverted much of the emigrant traffic. Emigrant Springs was an important stop along the Slate Creek Trail and is listed on the NRHP. This area was heavily used as a rest stop and campsite for travelers (WYSHPO 2004a). Emigrant

Springs and Johnston Scout Rocks, another NRHP-listed site just south of Emigrant Springs, are registers for early travelers whose inscriptions date from 1850 to 1888. The name of the Johnston Scout Rocks derives from the inscription, "T.C. Johnston" and "1860 Scouts" (WYSHPO 2004b). By the early 1890s, more than 30 years had passed since the Slate Creek Cutoff was used as an emigrant route, and the area was being settled by ranchers dependent on Opal, the nearest railhead to the south (BLM 2004c).

The Dempsey-Hockaday trail was a shortcut on the Sublette Cutoff in Lincoln County northwest of Kemmerer. In 1854, John Hockaday discovered this 16.7-mile route across the Bear River Mountains. The trail crossed Commissary Ridge, Hams Fork Plateau, and then rejoined the Sublette Cutoff at the crest of Dempsey Ridge (BLM 2004c). Today, The Slate Creek and Dempsey-Hockaday cutoffs are primarily located on BLM-managed public lands, with occasional trail markings (BLM 2004m).

Hams Fork Cutoff, 1841 – 1868. This poorly documented cutoff was a well-watered route that diverged from the main Oregon Trail at Granger and followed the Hams Fork upstream in a northwesterly direction to the Sublette Cutoff. The route bypassed Fort Bridger (BLM 2004c). Today most of this route is paralleled by U.S. Route 30 between Granger and Kemmerer. The Hams Fork Cutoff is associated with the Mormon War of 1857-58, and several government expeditions of the USGS used portions of the route in the 1870s. The Oregon Short Line Railroad was built along this same route in 1881 and 1882 (BLM 2004c). Today, this trail is unmarked and located mostly on private lands (BLM 2004n).

Blacks Fork Cutoff, 1857 – 1858. The Blacks Fork Cutoff of the Oregon Trail is a poorly documented shortcut on the main Oregon Trail. The main trail headed southwest to Fort Bridger and then swung northwest before heading west out of present-day Wyoming. The Blacks Fork Cutoff proceeded due west from Granger, following a portion of the Blacks Fork River and the current Lincoln-Uinta county line. It rejoined the main trail east of Cumberland Gap. The Blacks Fork Cutoff may have been used extensively by Mormon emigrants during and after the Mormon War of 1857 to avoid federal troops (BLM 2004c). The prominent ruts and swales along its course indicate that the cutoff received heavy usage.

Today, the route of the Oregon Trail is well-marked by BLM concrete marker posts and by white carsonite stakes placed on private lands by the Oregon-California Trails Association. Automobile tour route signs are posted on public roads and highways paralleling the trail (BLM 2004o). Table 3-26 identifies NRHP-listed sites associated with the NHTs in the planning area.

Table 3-26. NRHP-Listed Sites Associated with National Historic Trails in the Kemmerer Planning Area

Site	County	Trail Association	Description
Emigrant Springs	Lincoln	Slate Creek Cutoff	Emigrant register and campsite on BLM land
Johnston Scout Rock	Lincoln	Slate Creek Cutoff	Emigrant register on BLM land
Fort Bridger	Uinta	Oregon Trail	Emigrant supply stop/military post on State land
Granger Stage Station	Sweetwater	Pony Express	Pony Express and stage station on State land

Source: NRIS 2004
NRHP National Register of Historic Places

3.5.1.4 California National Historic Trail

The California Trail, designated an NHT in 1992, carried more than 250,000 gold seekers and farmers to the gold fields and farmlands of California during the 1840s and 1850s. This was the greatest mass migration in American history (NPS 2004a). The California Trail system developed over a period of years, and numerous cutoffs and alternate routes were tried to locate the best terrain, the shortest length, and sufficient water and grass for livestock. The general route began along the Missouri River, but the specific route that emigrants and Forty-niners used depended on their starting point in Missouri, their

final destination in California, the condition of their wagons and livestock, and yearly changes in water and forage along the different routes. During the Gold Rush years, most of the Forty-niners took any one of a series of shortcuts that bypassed the southern dogleg of the original trails to Fort Bridger. Today, trail marking and land ownership patterns are the same as the Oregon and Mormon Pioneer trails (BLM 2004o).

3.5.1.5 Mormon Pioneer National Historic Trail

Roughly, 70,000 Mormons, led by Brigham Young, traveled along the Mormon Pioneer Trail from 1846 to 1869 to escape religious persecution (NPS 2004b). The general route from Nauvoo, Illinois, to Salt Lake City, Utah, covers about 1,300 miles. The Trail crosses five states over both public and private land. It was designated an NHT in 1978 (NPS 2004b).

Mormon emigrants, using wagons, handcarts, and traveling on foot, generally followed or paralleled the Oregon Trail for about 397 miles from Fort Laramie in eastern Wyoming to Fort Bridger in southwestern Wyoming. At Fort Bridger, where the Oregon Trail turned north, the Mormon trail left the Oregon Trail and used the Hastings Cutoff to reach the Salt Lake Valley of Utah. This route traveled around the south edge of the Great Salt Lake and over the Salt Desert. The ill-fated Donner Party pioneered the route in 1846. Mormons continued to use the cutoff until the 1869 completion of the transcontinental railroad.

Mormon emigrants established mileposts, toll ferry crossings, and camping spots along the trail; improved the road when necessary; and published the Latter Day Saints' Emigrants Guide, one of the earliest trail guides (BLM 2004c). As Mormon settlements gradually spread in all directions, including east into southwestern Wyoming, church members maintained ferry sites on the Green River crossings of the Oregon Trail (BLM 2004c). The Oregon Trail was also used as a major freight route to supply the growing Mormon settlements in Utah. As early as 1849, Ben Holladay began serious freighting on the Oregon Trail by taking 50 freight wagons to Salt Lake City and subsequently to California. The Mormons also developed their own freight lines after 1850 (BLM 2004c).

Today, the Mormon Pioneer Trail route through Wyoming is nearly identical to the Oregon Trail route from Fort Laramie to Fort Bridger. The same patterns of land ownership and trail markings apply to both trails (BLM 2004o).

3.5.1.6 Pony Express National Historic Trail

In 1850, the federal government began contract mail service to western settlements via the Oregon Trail. The contractors had mixed success due to harsh weather and Native American attacks. In 1860, the short-lived Pony Express was established; it operated for only 18 months. The Pony Express Trail was used by relay-riders on fast-paced horses to carry mail across the country from Missouri to California in only 10 days (NPS 2004c). Completion of a transcontinental telegraph system led to the abandonment of the Pony Express in 1861 (BLM 2004c). In 1862, regular stage stops were established along the Oregon Trail in present-day Wyoming, using most of the existing Pony Express and stage stations (BLM 2004c). The Pony Express Trail route follows the Oregon Trail route through eastern Wyoming and South Pass to Fort Bridger. From there it uses the Mormon Pioneer Trail into the Salt Lake valley. Today, the route is well marked, both on the actual trail and on nearby highways (BLM 2004o).

Hams Fork Station (South Bend Station/Granger Stage Station), listed on the NRHP, was established around 1856 near the confluence of the Hams Fork and Blacks Fork rivers. Throughout the 1860s there was considerable activity around Hams Fork Station, beginning with the operation of the Pony Express in 1860 and 1861. In 1862, the Overland Stage operation was changed from the South Pass route to a new line that rejoined the old original route at Hams Fork. At that time, the station became known as South Bend Station. The UPRR arrived at Hams Fork in 1868 and the old stage station became part of a rail camp and the rail station of Granger (WYSHPO 2004c).

3.5.2 Native American Concerns

Native Americans inhabited the planning area region for thousands of years before European contact. They used the region for hunting, fishing, and collecting plants, as well as for religious ceremonies and burial of the dead.

The lands managed by the Kemmerer Field Office fall within the judicially established Native American land areas of the Shoshone Tribe (USACE 1999). In the late nineteenth and early twentieth centuries, the planning area was used by Eastern Shoshone, Shoshone-Bannock, and Ute tribes in the vicinity of Fort Bridger. Ute bands occupied territory directly south of the planning area (BLM 2004c). The Kemmerer Field Office currently consults with the following tribes regarding Native American issues and concerns:

- Northern Arapaho
- Eastern Shoshone
- Shoshone-Bannock
- Northern Ute

The BLM also may consult with other Native American groups and tribes, as appropriate.

Native American concerns are governed by a number of legal mandates, including the NHPA, the AIRFA, the Native American Graves Protection and Repatriation Act (NAGPRA), federal regulations, EOs, and BLM guidelines as summarized in Chapter 1. The section of treaty rights discusses Native American treaty rights and the BLM's trust responsibilities in more detail.

3.5.2.1 Native American Sensitive Sites

Native American tribes have not specifically identified culturally sensitive sites within the planning area; however, this does not mean that no such sites exist: people typically are reluctant to identify resources with traditional or religious significance. In addition, this site type has only recently been recognized as a separate category and documented as such. Identifying culturally sensitive sites occurs through consultation with tribes, including interviews and on-the-ground site visits with elders or culturally knowledgeable practitioners, exploration of oral traditions, and ethnographic research.

Sites that may fall into the culturally sensitive category could include burials and stone cairns; rock art sites; rock alignments, including drive lines and stone circles; brush corrals and animal traps; natural formations or plant collection areas; viewsheds; landscapes; the former location of historically recognized villages; or other locales. Burials, in particular, are of concern to most Native Americans, and the NAGPRA mandates that consultation occur between the federal agency and tribes to establish the affiliation of any human remains. Burials are not commonly located, but some are known within the planning area (BLM 2003a).

3.5.3 Tribal Treaty Rights and Trust Responsibilities

Native American treaty rights in the planning area are defined in Article 4 of the 1868 Fort Bridger Treaty, in which the Shoshone people are provided "the right to hunt on the unoccupied lands of the United States so long as game may be found thereon." This right applies to all public domain lands. The Kemmerer Field Office consults with tribes to develop specific measures to ensure that areas important to Native American communities are not transferred from federal ownership, physically modified, or impacted by decisions in ways that would restrict or deny access to Native Americans for traditional uses protected by treaty rights. No trust lands, no reservation lands, and no tribal properties are known to occur in the planning area.

Treaty Rights

During the 1800s, the U.S. government negotiated treaties with Native American tribal governments and obtained the vast majority of public domain land in the lower 48 states. Treaties are negotiated

settlements that define federal obligations toward Native American tribes. Some 60 tribes negotiated and reserved their treaty rights to off-reservation lands and resources. The rights reserved to Native American tribes vary quite a bit from treaty to treaty. Hunting, fishing, gathering rights, and certain other land uses are the most common rights reserved through the treaty (BLM 1990b). Treaties affecting tribes in the planning area region are summarized below.

1863 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Bands of Shoshone. The treaty set the boundaries of the Eastern Shoshones to reflect their traditional base since the early 1800s from the upper Snake River on the north, east to the Wind River Mountains, and south into northern Colorado and Utah. The reservation established by this treaty included 44,672,000 acres in Colorado, Utah, Idaho, and Wyoming. It did not include the present-day boundaries of the Wind River Reservation east of the Wind River Mountains. Under the terms of the 1851 Treaty of Fort Laramie, the Crow people had been given almost all the land now encompassed by the Wind River Reservation (east of the Wind River Mountains) (Stamm 1999).

1868 Treaty of Fort Bridger. This treaty was an agreement between the U.S. government and the Eastern Shoshone-Bannock tribes. It established the boundaries of the Wind River Reservation (now 3,054,182 acres) (Eastern Shoshone Tribe 2004). Unlike the earlier Treaty of Fort Bridger (1863), which outlined boundaries of Shoshone territory west of the Wind River Mountains, the 1868 Treaty gave the tribes the right to occupy what had been their hunting grounds and winter camps to the east (Stamm 2003). In so doing, it denied claims to the Wind River valley made by competing tribes, such as the Arapaho, Crow, or Oglala Sioux (Stamm 2003).

1872 Brunot Cession Agreement. Ratified in 1874, this agreement reduced the Wind River Reservation by nearly one-third and opened the ceded southern portion to Anglo settlement. Pursuit of this agreement and the land it provided was largely motivated by a nationwide economic depression in 1873.

1896 Big Horn Hot Springs Land Cession Agreement. This agreement provided for the cession of the land that contains the Big Horn Hot Springs, a series of naturally occurring geothermal springs located at what was the northeast corner of the reservation. The total land ceded was an area of 10-square miles. The justification for this land transfer was the development of the land around the hot springs, which were rapidly developing a tourist clientele. The square mile around the hot springs was ceded to the state of Wyoming. The most important feature of this agreement is that it established the Arapahos as equal partners to the Shoshones in the rights to claim the reservation.

1904 Land Cession Agreement. This agreement cut the reservation area roughly in half. Instead of paying the tribes outright, the government planned to compensate the tribes from the funds generated by selling the acquired lands under homestead, town site, coal, and mineral laws. This agreement was a source of disagreement between the Arapaho and Shoshone tribes. This agreement took place against a backdrop of renewed efforts to carry out the plans of the General Allotment Act (the Dawes Act) of 1887, which would also reduce tribal holdings, opening additional land to Anglo settlement.

Trust Responsibilities

Trust responsibility is the U.S. government's permanent legal obligation to exercise statutory and other legal authorities to protect tribal lands, assets, resources, and treaty rights, as well as a duty to carry out the mandates of federal law with respect to Native American tribes. *BLM Manual 8160 – Native American Coordination and Consultation* (BLM 1990b) defines trust responsibility as the obligation of the BLM to make "a reasonable and good faith effort to identify and consider, and to carry out programs in a manner sensitive to and consistent with, Native American concerns and tribal government planning and resource management programs."

The BLM acknowledges all Native American tribes that have historically and traditionally used land in the planning area and treats federally recognized tribes as sovereign nations. The BLM has initiated consultation with the Eastern Shoshone, Shoshone-Bannock, Northern Arapaho, and Northern Ute tribes

in the planning area. An important component of this process is to continue to foster meaningful relationships with these tribes to understand and incorporate tribal culture, resources, needs, interests, and expectations into the RMP revision process.

Treaty Rights and Trust Responsibilities Policy

It is the objective of the U.S. Department of the Interior (USDI) to recognize and fulfill its legal obligations to identify, protect, and conserve the trust resources of federally recognized Native Americans and tribal members, and to consult with tribes on a government-to-government basis whenever plans or actions impact tribal trust resources, trust assets, or tribal health and safety (USDI 1995).

The BLM has the following policy:

- Recognize traditional Native American cultural and religious values as important, living parts of our Nation's heritage, and develop the capability to address adequately any potential disruption of the traditional expression or maintenance of these values that might result from BLM land use decisions.
- Coordinate and consult regularly with appropriate Native American groups to identify and consider their concerns in BLM land use planning and decisionmaking, and fully document all coordination and consultation efforts.
- Review proposed land use planning decisions and other major BLM decisions for consistency with tribal land use and resource allocation plans.
- Participate in developing consistent interagency guidance, procedures, and expertise to address Native American and tribal government policies and programs.
- Avoid unnecessary interference with Native American religious practices.
- Protect sensitive and confidential information about Native American values, practices, and the specific locations with which they are associated from disclosure to the public, to the greatest degree possible under law and regulation (BLM 1990b).

3.5.4 Paleontological Resources

Scientifically significant fossils include all vertebrate fossil remains (body and trace fossils) and plant and invertebrate fossils determined, on a case-by-case basis, to be scientifically unique. Paleontological resources (fossils) include the bones, teeth, body remains, traces, or imprints of plants and animals preserved in the earth since a past geologic time. All fossils offer scientific information, but not all fossils offer significant scientific information. Among paleontologists, fossils generally are considered scientifically significant if they are unique, unusual, rare, diagnostically or stratigraphically important, or add to the existing body of knowledge in a specific area of science. Most fossils occur in sedimentary rock formations. Although experienced paleontologists generally can predict which formations will contain fossils and what types of fossils will be found based on the age of the formation and its depositional environment, predicting the exact location where fossils will be found without field surveys is usually not possible (BLM 2003a).

Resource Condition

Geologic units in the planning area are classified according to the Probable Fossil Yield Classification, usually at the formation or member level, according to the probability of yielding resources of concern to land managers, primarily vertebrate fossils. The classification uses a ranking of 1 through 5, with Class 5 assigned to units with the highest potential for fossils. The classifications are described below.

Class 1. Igneous and metamorphic geologic units, or units with highly disturbed preservational environments not likely to contain recognizable fossil remains. Management concern is negligible for Class 1 resources and mitigation requirements are rare.

Class 2. Sedimentary geologic units not likely to contain vertebrate fossils or significant nonvertebrate fossils. Management concern is low for Class 2 resources and mitigation requirements are not likely.

Class 3. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence, or units of unknown fossil potential. Management concern may extend across the entire range of management. Ground-disturbing activities require sufficient mitigation to determine whether significant resources occur in the area of the proposed action.

Class 4. Class 4 units are Class 5 units with lowered risk of human-caused adverse impacts or lowered risk of natural degradation. Ground-disturbing activities require assessment to determine whether significant resources occur in the area of the proposed action. Mitigation may include full monitoring of significant localities.

Class 5. Highly fossiliferous geologic units that regularly produce vertebrate fossils or significant nonvertebrate fossils that are at risk of natural degradation or human-caused adverse impacts. Class 5 areas receive the highest level of management focus. Mitigation of ground-disturbing actions is required and may be intense. Areas of special interest are designated and intensely managed.

In the planning area, the Bridger, Green River, Wasatch, and Evanston formations are the only formations (described below) rated as Class 5 geologic units.

Bridger Formation. This formation has produced at least 25 families of fossil Eocene mammals and is world-renowned among paleontologists. Numerous invertebrate and plant localities also occur in this formation, including fossil mollusks, leaves, algae, pollen, spores, and insects.

Green River Formation. This Eocene-age formation contains a spectacular assemblage of vertebrate and invertebrate fossils. Fossil Butte National Monument, administered by the NPS, lies about 10 miles west of Kemmerer. It was created in 1974 to preserve, display, and interpret paleontological resources of the Green River and Wasatch formations. This 50-million-year-old lake bed contains one of the richest fossil concentrations in the world with complete paleo-ecosystems that span 2-million years recorded in limestone (NPS 2004d). A wide range of species are found in the formation, including more than 25 kinds of fish and many varieties of insects, plants, reptiles, birds, and mammals (NPS 2004d).

Wasatch Formation. This Eocene-age formation contains extensive mammal remains. At Fossil Butte National Monument, for example, the fossil assemblages contain at least 8 species of reptiles and as many as 34 species of mammals. Reptiles include lizards, turtles, crocodiles, and alligators. Mammals include carnivores, perissodactyls, condylarths, artiodactyls, and primates, among others. Aquatic reptiles dominate the lower two assemblages, while mammals and lizards dominate the upper assemblage (Gunnell 2002).

Evanston Formation. This formation straddles the Cretaceous and Paleocene boundary, which is considered significant in terms of providing evidence of a mass extinction of dinosaurs, as well as other species. The formation contains an extensive collection of Paleocene mammals.

Management challenges for paleontological resources include implementation of proper mitigation requirements, appropriate land use decisions and prescriptions, compilation of data about known or potential paleontological localities, compilation of data on geological formations that may contain fossils and their overall sensitivity for fragile or rare resources, methods of accessing those data in a timely fashion, and development of recreation and interpretive opportunities. Issues of concern that could

represent challenges to the management of paleontological resources include all surface-disturbing activities, such as oil and gas exploration and development; coalbed methane development; other mineral development (leasable, locatable, and salable); ROW; and land-tenure adjustments. In addition, adequately trained staff and proper funding are needed.

Management of paleontological resources aims to protect scientifically significant fossils for the benefit of the public. Paleontological resources on BLM lands in the planning area are currently managed under the RMP (BLM 1986a), which directs the following:

- Authorizations for surface-disturbing operations are conditioned to minimize adverse impacts to paleontological resources.
- Operations causing disturbance in the Green River Formation require a paleontological survey by a qualified paleontologist and mitigating measures, as appropriate.
- For surface disturbance in other vertebrate-bearing formations, including the Bridger and Wasatch formations, a survey may be required depending on the extent of the proposed disturbance and the proximity of known paleontological sites.
- A paleontologist must have an approved permit from the Wyoming State Office of the BLM to survey and collect fossils from public land.
- Holders of authorizations for actions in all geological formations that may impact paleontological resources are required to stop operations and contact the BLM if paleontological or fossil resources are found.

Collecting fossils from public lands is allowed with some restrictions, depending on the significance of the fossils. Hobby collection of common invertebrate or plant fossils by the public for personal use is allowed in reasonable quantities using hand tools. Some commercial quarries exist on private land within the planning area. Commercial collecting of paleontological resources on public land is not permitted. Collecting significant fossils (all vertebrate and any administratively designated plant or invertebrate fossils) may be done only under permits issued by the BLM to qualified researchers. The basic permit is the survey and limited surface collection permit issued for reconnaissance work and collection of surface finds, with a 1-square meter limit to surface disturbance. If the work exceeds 1-square meter or requires mechanized equipment, the researcher must apply for an excavation permit. Prior to authorization of an excavation permit, and in some cases for survey permits in other management areas (MAs), the BLM must prepare an Environmental Assessment for the proposed location. Some BLM-approved paleontologists also serve as consultants to companies when mitigation is required for their projects on public land. All fossils collected under a permit remain public property and are placed in an approved repository.

3.6 Land Resources

Lands Resources include Lands and Realty, Renewable Energy, ROW and Corridors, Livestock Grazing Management, Recreation, Travel Management, OHVs, and Visual Resource Management (VRM). Each individual resource section includes a description of the resource, the current condition of the resource, management challenges, and management actions.

3.6.1 Lands and Realty

The Kemmerer Field Office lands and realty objectives are to (1) manage public lands to support goals and objectives of other resource programs, (2) provide for uses of public lands according to regulations and compatibility with other resources, and (3) improve management through land-tenure adjustments. The key activities of the lands and realty program include (1) land use authorizations (e.g., leases and permits, ROW, recreation and public purpose (R&PP) leases, airport leases) and (2) land-tenure adjustments (e.g., sales, exchanges, donations, purchases, and withdrawals). The BLM works cooperatively with federal agencies, the State of Wyoming, counties and cities, and other public and private land holders in the execution of the Kemmerer Field Office lands and realty program.

Land Use Authorizations

Land use authorizations include various authorizations to use BLM-administered land, such as leases, permits, and easements, under FLPMA Section 1732(b); ROW under FLPMA Sections 1761-1771 and Section 185 Mineral Leasing Act of 1920, as amended (30 USC Section 185); R&PP leases under the R&PP Act of 1926, as amended (43 USC 869 et seq.); Desert Land Entries, under the Act of March 3, 1877, as amended (43 USC 321 et seq.); and airport leases under the Act of May 24, 1928, as amended. Past and current conditions associated with these components of land use authorizations are described below.

Leases, Permits, and Easements

Section 1732(b) of the FLPMA authorizes the BLM to issue leases, permits, and easements for the use, occupancy, and development of public lands. Permits are typically issued to resolve trespass cases or to authorize minimum impact activities that involve either little or no land improvement, construction, or investment. Historically, permits within the Kemmerer Field Office area have been requested for rig stack construction associated with oil and gas development or to provide interim authorization for trespass issues.

Leases under Sections 302, 303, and 310 of the FLPMA are long-term and typically require a substantial economic investment in the land. The Kemmerer Field Office has not had a demand for land use leases for the past 20 years. Historic lease uses included agricultural development and National Guard use.

Easements are granted to ROW holders when the public land is being conveyed out of federal ownership (i.e., sale, exchange, R&PP conveyance, etc.) The BLM Kemmerer Field Office does not routinely issue easements. Easements may be used to assure that uses of public lands are compatible with nonfederal uses occurring on adjacent or nearby land, for example a scenic easement. There are no easements currently issued in the planning area.

Recreation and Public Purposes Act Leases and Sales

The R&PP Act authorizes the sale or lease of public lands for recreational or public purposes to state and local governments and to qualified nonprofit organizations. There are three active R&PP Act leases currently authorized in the planning area. Leases for the Pine Creek Ski Area near Cokeville and the Lions Club Park outside of Kemmerer were issued to Lincoln County. The Buford Foundation has an R&PP lease for a youth camp in Star Valley. Lincoln County is working on completing requirements to acquire patents on both of their R&PP leases, which would have reversion clauses on the patents if the

lands transferred out of their lease. If the lands transferred out of the county's ownership, the patents would be revoked, as described under 43 CFR 2741.9. The Kemmerer Field Office has received a few inquiries from local communities to develop R&PP leases, but does not have any applications on file at the present time.

Airport Leases

Airport leases are granted in conjunction with the Federal Aviation Administration for public airports.

Land-tenure Adjustments

Land ownership (or land-tenure) adjustments refer to those actions that result in the retention of BLM-administered land, disposal of BLM-administered lands, and (or) the acquisition by the BLM of nonfederal lands or interests in land. The FLPMA requires that public lands be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted.

Tracts of land designated in BLM land use plans as potentially available for disposal were, in the past, more likely to be conveyed out of federal ownership through an exchange rather than a sale. The end result of this approach is that very few land-tenure adjustments were completed over the years. The land exchange process is lengthy, and land exchanges are difficult to complete. While there are any number of possible land exchanges that BLM can consider, it has become increasingly difficult to develop exchanges with high public benefits and reasonable processing costs. Almost all BLM efforts and any available budgetary resources for land-tenure adjustments were concentrated on land exchanges; consequently, very few land sales were processed. Land-tenure adjustments will be more balanced between land exchanges and land sales in the future. In addition, the BLM's priority is to process energy-related ROW first, followed by other nonenergy-related work. Given the current high demand for energy-related ROW, work on nonpriority land exchange and land sale actions will be limited within the planning area for the foreseeable future.

Acquisition of lands and interests in lands is an important component of the BLM's land management strategy and is accomplished through several means, including exchange, purchase, donation, and condemnation, as described below. Acquisition by condemnation is rare and has not been used by the BLM for any acquisition in the planning area. Lands and interests in lands are acquired to provide the following:

- Improve management of natural resources through consolidation of federal, state, and private lands.
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources.
- Implement specific acquisitions authorized or directed by acts of Congress.

Exchanges

Exchanges, that is, the process of trading lands or interests in lands, are the primary means by which land acquisition and disposal are carried out. Public lands may be exchanged for lands or interests in lands owned by corporations, individuals, or government entities. Except for those exchanges that are congressionally mandated or judicially required, exchanges are voluntary and discretionary transactions with willing land owners. The lands to be exchanged must be of approximately equal monetary value and located within the same state. Exchanges must also be in the public interest and conform with applicable BLM land use plans.

Land exchanges are the BLM's preferred method of acquisition. They are used to (1) bring lands and interests in land with high public resource values into public ownership, (2) consolidate land and mineral

ownership patterns to achieve more efficient management of resource and BLM programs, and (3) dispose of public land parcels identified for disposal through RMPs.

At present, the only recent land exchange within the Kemmerer Field Office is the Rocky Mountain Elk Foundation consolidated land exchange completed in 2003.

Purchases

BLM has the authority, under Section 1715 of the FLPMA, to purchase lands or interests in lands. Similar to other acquisitions, purchase is used to acquire key natural resources or to acquire legal ownership of lands that enhance the management of existing public lands and resources. Acquiring lands and interests in lands through purchase helps consolidate management areas to strengthen resource protection. Purchases can be accomplished with Land and Water Conservation Funds, donations, or receipts from the Federal Land Transaction Facilitations Act sales. Purchases are used primarily to enhance recreational opportunities, acquire crucial wildlife habitats, or access. There have not been any direct purchases completed in the planning area. Land exchanges are the primary opportunity for acquiring lands to enhance recreational opportunities, protect historical properties, or acquire crucial wildlife habitats.

Easements are purchased to secure public access to public lands. The BLM currently manages 36 separate easements acquired for public access in the planning area. These easements account for approximately 38 miles of road covering approximately 361 acres. The easements currently held by the BLM in the Kemmerer Field Office were granted by the following entities, both public and private:

- Private landowners granted more easements than any other single or group of entities, with a total of 16 (44.4%).
- The next largest grantor of easements (36.1%) was a group of companies including the Etcheverry Sheep Company, Utah Power and Light, Peternal Brothers, Inc., The Thompson Land and Livestock Company, Union Pacific Land Resource Corporation, Kemmerer Coal Company, and Chevron Mining, Inc.
- The State of Wyoming granted five easements (13.8%).
- The Town of Kemmerer granted one easement (2.7%).
- The Kemmerer Wyoming Stake of the Latter-Day Saints granted one easement (2.7%).

Table 3-27 lists the total lengths and areas of existing easements; however, these distances may not represent continuous segments. For example, the 11.35 miles of easement on Smiths Fork Road actually represent six separate easements.

Donations

The BLM occasionally receives gifts or donations of lands or interests in land when an entity elects not to receive the market value for the interests being conveyed.

Land Sales

Section 1713 of the FLPMA authorizes the sale of public lands. The objective of BLM land sales is to provide a means for disposal of public lands found, through the land use planning process, to be suitable for disposal. Public lands must be sold at not less than fair market value and meet the sale criteria of the FLPMA. The BLM's current policy and regulations require the use of competitive sale procedures unless the authorized officer determines the public interest would best be served by modified competitive bidding or direct (noncompetitive) sale. Properties identified for disposal are identified in Appendix G.

Table 3-27. Existing Access Easements in the Kemmerer Planning Area

Easement	Length (Miles)	Area (Acres)
Kemmerer FNC	0.265	1.0
Smith Fork Road	2.33	27.16
Lyman Cattle FNC	4.538	11.1
Butcher Knife SP	0.486	4.19
UPR Coyote SP	0.595	4.03
Smiths Fork Road	9.017	88.65
Dempsey FNC	0.47	1.0
Dempsey Road	9.938	92.86
Lucky Break PIT RES	0.075	3.67
IGO Road	2.362	28.67
Horse Creek Road	1.2331	14.97
Dee Ranch Road	3.49	42.15
Project RE-W4-36 (no geographic name)	0.495	6.0
Project RE-W4-45 (no geographic name)	0.214	2.5
Project RE-W4-47 (no geographic name)	1.95	23.85
VanTassel Road	0.019	0.236
Kemmerer PPLN	0.078	0.140
Raymond Canyon Road	0.267	1.72
South Fork Fontenelle Road	0.515	5.89
TRL Creek Road	0.254	1.545

Section 1719 of the FLPMA authorizes the conveyance of federal minerals through sale and specifies the conditions under which mineral rights will be conveyed. Conveyances shall reserve all minerals to the United States unless there are no mineral values in the land or the reservation of the mineral rights interferes with or precludes a more beneficial nonmineral use of the land. Under most circumstances, the BLM will require an exploratory program and extensive mineral report on the lands in question. Mineral rights are only conveyed upon payment by the applicant of fair market value for those mineral interests and all administrative costs of processing the application to acquire the mineral rights.

Withdrawals

A withdrawal is a formal action that sets aside, withholds, or reserves Federal lands by administrative order or statute for public purposes. The effect of a withdrawal is to accomplish one or more of the following:

- Segregates (closes) Federal land to the operation of all or some of the public land laws and/or mineral laws
- Transfers total or partial jurisdiction of Federal land between Federal agencies
- Dedicates Federal land for a specific public purpose

Withdrawals in the Kemmerer Resource Management area can be categorized into two major types including:

- Congressional – legislative withdrawals made by Congress in the form of public laws. Examples include designation for national parks, wild and scenic rivers or wilderness
- Administrative – withdrawals made by the President, Secretary of Interior, or other officers of the executive branch of the Federal Government. Examples include stock driveways and public water reserves

There are nine existing withdrawals to other federal agencies within the planning area (see Table 3-28). Other agency withdrawals usually do two things—transfer jurisdiction to the other agency and close the withdrawn public land to the operation of the public land laws including mineral location. This plan will not make decisions on revocation of other federal agency existing withdrawals. However, this plan does recognize that should a withdrawal be revoked by action of another agency, those lands that are suitable for return to public land status for management by the BLM will be managed in the same fashion as adjoining public lands.

Table 3-28. Existing Other Agency Withdrawals within the Kemmerer Field Office Planning Area

Withdrawals	Administering Agency	Acres
Green River Reclamation Project[1]	Bureau of Reclamation	17,000
Seedskadee Reclamation Project[1]	Bureau of Reclamation	3,600
Meeks Cabin Reservoir	Bureau of Reclamation	435
Seedskadee Wildlife Refuge[1]	USFWS	1,060
Grey's River Elk Refuge	USFWS	657
Fossil Butte National Monument	NPS	7,420
Flaming Gorge National Recreation Area	USFS	120
Recreation, Administration, and Roadside Sites	USFS	3,950
Air Navigation Site	DOT	120

[1]Some of these areas may overlap, so the actual acreage withdrawn is less than the sum of the individual withdrawals. Lands originally withdrawn for the Green River Project, which was never built, are now managed as part of the Seedskadee Project.

BLM Bureau of Land Management
DOT Department of Transportation
NPS National Park Service
USFS U.S. Forest Service
USFWS U.S. Fish and Wildlife Service

There are five existing withdrawals administered by the BLM in the planning area (see Table 3-29). It is now federal policy to restrict all withdrawals to the minimum time required to serve the public interest; maximize the use of withdrawn lands consistent with their primary purpose; and eliminate all withdrawals that are no longer needed.

Table 3-29. Existing BLM Withdrawals within the Kemmerer Field Office Planning Area

Withdrawals[1]	Administering Agency	Acres
Public Waterway Reserves	BLM	2,105
Stock Driveways[2]	BLM	480
Coal	BLM	136,100
Phosphate	BLM	44,600
Oil Shale[2]	BLM	420,500

[1]Some of these areas may overlap, so the actual acreage withdrawn is less than the sum of the individual withdrawals.
[2]These withdrawals have been recommended for full or partial restoration; however, final action has not yet been taken.
BLM Bureau of Land Management

Public Water Reserves (PWR)

By Executive Order No. 107, dated April 17, 1926, the President of the United States ordered that every smallest legal subdivision of the public land surveys which was vacant, unappropriated, unreserved, public land and which contained a spring or water hole be withdrawn and reserved for public use in accordance with the provisions of Section 10 of the Act of December 29, 1916 (39 Stat. 865; 43 U.S.C. 300). The Executive Order was designed to preserve for general public use and benefit all unreserved public lands containing water holes or other bodies of water needed or used by the public for watering purposes. Even though it did not specify geographic areas, the order established a public water reserve for all springs and water holes capable of providing enough water for general use for watering purposes.

In general, no effort has been made to identify all these withdrawn sites so it is not known how many there are or where they are. A public water reserve reserves a water right for BLM for public water holes and springs. PWRs are closed to surface entry and to nonmetalliferous mineral entry under the Pickett Act of June 25, 1910.

Before 1926, PWRs were identified on a site-specific basis and were established when springs and water holes were physically identified on public lands. After the springs and water holes were identified, the locations would be incorporated into chronologically numbered PWRs. PWRs with early numbers before 107 usually refer to site specific reservations.

After 1926, an open ended PWR was created through an Executive Order entitled "Public Water Reserve No. 107". PWR 107 authorized the withdrawal of certain vacant unappropriated, unreserved public land containing a spring or water hole and those lands within a quarter of a mile around the spring or water hole. PWR 107 ended the site specific system of reserving springs and water holes.

Generally PWRs do not necessarily reserve the entire yield of each public spring or water hole, but rather PWRs reserve water for domestic human consumption and for stock watering. Usually all water from a PWR in excess of the minimum amount necessary for public watering purposes is available for appropriation under State water law, and may be leased for water purposes.

Stock Driveways

Stock driveways were created under the Pickett Act of June 25, 1910 . A stock driveway withdrawal reserves public lands for the free public use in moving livestock to summer and to winter ranges or to shipping points and to ensure public access to various watering places on the Federal range.

Originally, stock driveway reservations were withdrawn from disposition under the mining laws, but not from the mineral leasing laws. The Act of January 29, 1929 (45 Stat. 1144; 43 USC 300) provided that stock driveway withdrawals do not apply to deposits of coal and other minerals, and they are closed to surface entry. The regulations provide that all prospecting and mining operations need to be conducted to cause minimum interference and hazards to the use of the surface for stock driveway purposes.

Mineral Withdrawals

Mineral withdrawals were done to protect the mineral resource involved from encumbrances that could interfere with development, particularly mining claims, and entry under the public land laws. Mineral withdrawals can overlap other existing withdrawals and take precedent over the area with the exception of stock driveway withdrawals. See maps 34 through 36 for the location of oil shale, coal, and phosphate withdrawals in the planning area.

Oil Shale

Oil shale withdrawals generally segregate land from metalliferous and non-metalliferous mineral location, and from entry under the public land laws. However, the western edge of the Green River Basin portion of the oil shale withdrawal has been modified in two areas by Wyoming Oil Shale Classification Order #1. One area allows metalliferous mineral locations, the other allows non-metalliferous mineral locations.

Coal

Coal withdrawals segregated land from non-metalliferous mineral location, and from entry under the public land laws.

Phosphate

Phosphate withdrawals exist in the western portion of the planning area known as the Overthrust Belt, and protect phosphate resources by closing the lands to non-metalliferous mineral location.

Desert Land Entries

The Desert Land Entries Act was passed by Congress on March 3, 1877, to encourage and promote the economic development of arid and semiarid public lands in the western United States. The purpose of the Act is to permit the reclamation by irrigation of arid public land through individual effort and private capital. Lands not producing any reasonable remunerative agricultural crop by the usual means or methods of cultivation without artificial irrigation may be considered for a desert land entry. The lands must be untimbered, surveyed, unreserved, and unappropriated. Tracts need not be contiguous, but should be sufficiently close to each other so as to be managed satisfactorily as an economic unit. The proposed crop may include any agricultural product that the land under consideration is generally adapted and would return a fair reward for the expense of producing it.

There have been no successful desert land entry applications filed in the Kemmerer Field Office planning area primarily due to soil characteristics, irrigation requirements, salinity issues, and the practicability of farming the lands as an economically feasible operating unit. The growing season in this area is very short, which limits many agricultural opportunities. The costs to develop the parcel do not equate to the value of the crop.

Management challenges identified for lands and realty in the planning area are based, in part, on historic activities and trends, as well as current and future needs of public resources and internal and external customers. Management challenges include managing BLM lands to adequately meet the needs of multiple uses per the FLPMA; improving the management of natural resources; obtaining important lands needed for the protection of endangered species, enhancing biological diversity, increasing recreational opportunities, and preserving archeological and historical resources; bringing into public ownership lands and interests in land with high public resource values; consolidating land and mineral ownership patterns for more streamlined management of resources and BLM programs; and disposing of lands identified for disposal.

Management actions for lands and realty generally address meeting the needs of internal and external customers through land disposal, withdrawal, purchase, and sale. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.2 Renewable Energy

Renewable energy generally is defined as energy derived from sources continuously replenished by natural processes. These sources include wind, solar, biomass, and geothermal. Wind energy refers to the kinetic energy generated from wind produced by power-generating turbines. Solar energy is the use of the sun's energy to produce electricity, often through the use of photovoltaic panels that convert sunlight directly into electricity using semiconductor materials. Biomass (also called bioenergy) is the process of converting forestry and agricultural crops, crop-processing wastes and residues, animal manures, and landfill methane gas into electricity. These waste products are either burned directly or converted into fuels that can be burned to produce energy. Geothermal energy is heat in the form of hot water, steam, or rocks near the surface of the Earth's crust used for direct heating and cooling, or for the generation of electricity (Energy Atlas 2004). Nonrenewable energy sources generally are limited to

fossil fuels, such as coal, oil, and gas, which the Mineral Resources section of this document addresses. The following discussion focuses on potential sources of renewable energy within the planning area.

Wyoming represents one of the strongest potential wind resources in the country and presently is an exporter of wind power to several surrounding states. The state also has some potential for solar, biomass, and geothermal energy; however, the demand for these renewable energy sources is not as strong. One geothermal energy development project exists within the planning area. The Auburn Hot Springs in the Star Valley contains numerous vents emitting carbon dioxide and hydrogen sulfide gas and saline water ranging from 68 ºF to 140 ºF. Hot springs locations occur along northwest-trending high-angle faults (Hinckley and Breckenridge 1977).

Currently, the installed renewable energy capacity in Wyoming is 284.65 megawatts (MW) of wind energy, 0.05 MW of solar energy, and 0 MW of biomass and geothermal energy (AWEA 2005; Energy Atlas 2004). A recent study, "Assessing the Potential for Renewable Energy on Public Lands," presented a nationwide overview of renewable resources on BLM lands. In this study, Wyoming was determined to have a high potential for wind-energy development and a low potential for solar, biomass, and geothermal energy (BLM 2003a). Because the current demand and development potential for solar, biomass, and geothermal energy are lower, wind energy is the primary focus in the remainder of this section.

At present, there is one wind farm located within the planning area. The Uinta County Wind Project, administered by Uinta County Wind Farm, LLC, a subsidiary of FPL Energy Wyoming, LLC, comprises 80 windmills, all located on private and state lands. While no windmills are located on BLM-administered lands, there are 14 miles of associated access roads and powerlines permitted on BLM-administered lands, totaling 136.4 acres. An additional 27 miles of access roads and powerlines are located on adjoining private and state lands.

Wind-energy potential within the planning area is described by wind power class as shown in Table 3-30. This information is derived from U.S. Department of Energy (DOE) National Renewable Energy Laboratory wind-energy potential data (NREL 2002). Wind power class areas comprise large geographic areas, within which there are numerous areas of land that do not meet the overall resource potential for each wind power class. This being the case, there is likely a rather large margin of error in the mapped locations and boundaries, and, thus, in any acreage calculations.

Table 3-30. Wind Energy Potential by Wind Power Class

Wind Power Class	Resource Potential	Wind Speed (mph)
1	Poor	0-12.5
2	Marginal	12.5-14.3
3	Fair	14.3-15.7
4	Good	15.7-16.8
5	Excellent	16.8-17.9
6	Outstanding	17.9-19.7
7	Superb	> 19.7

Source: NREL 2002
> greater than
mph miles per hour
NREL National Renewable Energy Laboratory

NEPA encourages the development of renewable energy resources as part of an overall strategy to develop a diverse portfolio of domestic energy supplies for the future (National Energy Policy Development Group 2001). Wind-power generating capacity in the United States quadrupled between 1990 and 2003 (GAO 2004). BLM's general policy is to encourage the development of wind energy in acceptable areas.

Management challenges for developing renewable energy projects in the planning area are based, in part, on the fact that market trends and market value determine the pace and magnitude of renewable energy development. The demand for renewable energy is illustrated by development projects throughout the west on public and private lands. The importance of renewable energy sources increases in the planning area as nonrenewable energy prices increase and as the need grows for more and cleaner energy sources. Therefore, interest in wind-energy development involving BLM-administered lands is increasing in the western United States. Current management does not limit wind-energy development to specific areas or power classes.

To facilitate renewable energy production and development of renewable sources, the BLM works cooperatively with the DOE, USDA, EPA, Council on Environment Quality (CEQ), and members of the Western Governors' Association (BLM 2005b). The cooperative effort will continue to address problems facing the west and facilitate renewable energy production, including areas in the planning area.

Due to the wind-energy potential in the west and the associated interest and applications for wind energy on BLM lands, the BLM prepared a *Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands* (BLM 2005b). BLM will refer to this EIS when considering development of wind-energy resources on BLM-administered lands in the planning area. Management actions for renewable energy include the consideration of renewable energy projects throughout the planning area on a case-by-case basis with consideration of other resource values and generally to support national energy plans and policies regarding the development of renewable energy projects. These actions are included in the alternatives and are described in more detail in Chapter 2.

3.6.3 Rights-of-Way and Corridors

ROW and corridors often involve narrow strips of land used for various infrastructure purposes within the planning area. A ROW grant is an authorization to use specific pieces of public land for a certain project, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. Over the past 20 years, ROW on BLM-administered lands in the planning area have been approved for roads; to support oil, gas, and mineral resource exploration and development; and for powerlines, telecommunication cables and sites, pipelines and associated facilities, such as compressor stations. An important component of the ROW program is the intrastate and interstate transportation of commodities that ultimately are delivered as utility services (e.g., natural gas, electricity) to residential and commercial customers. Equally important on the local level is the growing demand for legal access to private homes and ranches using ROW grants.

The BLM and other agencies (Office of Electricity Delivery and Energy Reliability, DOE, and the USFS) are preparing the West-wide Energy Corridor Programmatic EIS. The EIS will evaluate potential impacts associated with the proposed Kemmerer RMP to designate corridors on federal land in the 11 Western States (including Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities. The BLM and other agencies issuing the EIS will amend, as necessary, their respective land use plans by designating a series of energy corridors effective upon signing of the Record(s) of Decision.

Currently, more than 1,600 ROW exist in the planning area issued under a variety of laws over time and administered according to the conditions specified in the specific ROW grant. On the average, 100 to 125 new or amendment ROW applications are processed annually. In the 20-year period from 1985 through 2005, BLM issued approximately 1,150 ROW, or 45,000 acres of public land in the planning area. On the average, 60 ROW authorizing use of around 27 acres per ROW, or 1,620 acres total per year, have been authorized in the planning area.

The majority of the ROW workload in the Kemmerer Field Office area results from oil and gas lease development. During the last 20 years, BLM approved more than 500 APDs within the Kemmerer Field Office area. On the average, each APD has a corresponding road ROW, as well as a pipeline ROW.

During the 20-year period from 1985 through 2005, a large number of major ROW applications were processed and approved in the Kemmerer Field Office. These major ROW include fiber optic lines, as well as major pipelines, plant sites, and large powerlines. The fiber optic lines followed I-80 and railroad lines, as well as pipeline routes. Most of the large pipeline projects begin or end at the Williams Opal Plant, near Opal, Wyoming, and pass through the Muddy Creek Compressor area before heading east toward the Granger Plant, southwest toward Utah and California, or west on the Ignacio-Sumas Pipeline route. There are three major communication sites in the planning area, each with more than three users. In addition to these three sites, 24 other communication sites occur in the planning area. On average, the Kemmerer Field Office processes two major ROW applications per year, and expects this level of major ROW project activity to continue.

Currently, no designated future corridors on lands administered by the Kemmerer Field Office exist. Typically, ROW were established in the least environmentally damaging areas and following de facto utility and travel systems, but these are not necessarily located in preferred locations. Recommendations for the siting of utility corridors through the planning area were made by the Western Utility Group-Western Regional Corridor Study Committee (WUG 1992). Exclusion areas to protect sensitive resources prohibit ROW, corridor, and wind energy development. Avoidance areas, which include seasonal restrictions on construction and other surface-disturbing activities, are areas where special environmental (e.g., wildlife crucial winter range) and (or) management considerations limit the timing of when ROW and corridors can be constructed. Established exclusion and avoidance areas identified in the Kemmerer Field Office 1986 RMP included:

- Woodruff Narrows and Morgan Canyon (to protect bald eagle winter roost sites)
- Bridger Antelope Trap
- Sensitive plant population locations (four total)
- Raymond Mountain WSA
- Greater sage-grouse, raptor, elk calving, and (or) other species activity habitats
- Slopes in excess of 25 percent
- Class I and Class II VRM areas
- Areas ¼ mile or visible on horizon (whichever is closer) from a historic trail
- During periods when soil material is saturated, frozen, or when watershed damage is likely to occur
- Riparian areas.

Historically, pipelines were required to be buried within the ROWs throughout the planning area, with the exception of the Painter Reservoir, Carter Creek and Whitney Canyon and other isolated instances. Pipelines range from about 3½ inches up to 36 inches in diameter.

A large portion of the regional demand for public ROW has focused on exporting renewable and nonrenewable energy products through and from the sparsely populated western states to areas of high population. Recently, west coast power demands dominated this activity. The upsurge of exploration and development of cleaner burning energy fuels, such as natural gas and coal bed methane, has resulted in the need for more pipelines and higher pipeline capacities.

Management challenges for ROW and corridors result from other conflicting resources (i.e., wildlife, cultural, soils), but the increased need for power transmission, telecommunications, infrastructure improvements, and pipeline capacity is anticipated. As stated above, no designated corridors are on lands

administered by the Kemmerer Field Office at this time. The demand for ROW and corridors is influenced by specific actions within the planning area (such as oil and gas leasing) and by economic forces and other external pressures and conditions independent of resource management decisions in the planning area. For example, the demand for expanded infrastructure capabilities through the planning area results from state or national needs and requirements. Technological advancements also have brought new demands for public land, largely related to wind and solar energy and telecommunications (e.g., cellular and fiber optic). ROW placement can be impeded due to existing ROW (powerlines, gas pipelines) in the planning area. Considerations must be made for safety. Therefore, a minimum distance must be maintained (topple height for high profile structures, 1,500 foot gas lines without cathodic protection). The safety considerations would also affect placement of wind towers within areas of existing powerlines.

Management actions for ROW and corridors include meeting the anticipated needs for power transmission, telecommunication, infrastructure, and pipeline throughput capacity; making public lands available to meet the needs for major ROW customers (e.g., an intrastate pipeline); and making public lands available to meet the needs for smaller ROW (e.g., roads or pipelines for oil fields, access roads for private homes and ranches). Management actions are incorporated in the alternatives for ROW and corridors and described in more detail in Chapter 2.

3.6.4 Livestock Grazing Management

Livestock grazing includes the grazing of domestic animals (e.g., cattle, sheep, horses, and goats) within the planning area and is authorized on BLM-administered lands by the Taylor Grazing Act of 1934, the FLPMA of 1976, and the Public Rangelands Improvement Act of 1978. The Kemmerer Field Office currently administers grazing on 224 allotments, of which 159 are permitted under Section 315(b) of the Taylor Grazing Act and 65 are leased under Section 315(m) of the Act. Fees received from livestock grazing under Sections 3 and 15 of the Taylor Grazing Act are distributed as follows.

- Inside Grazing Districts (Section 3 of the Taylor Grazing Act)
  - 50.0% Kemmerer Range Improvement Fund*
  - 12.5% State
  - 37.5% United States Treasury
- Outside Grazing Districts (Section 15 of the Taylor Grazing Act)
  - 50.0% Kemmerer Range Improvement Fund*
  - 50.0% State

  *Secretary of the Interior may divert funds to special projects at the national level.

Allotments vary in size, number of permittees, and number of animal unit months (AUMs). The largest allotment, Granger Lease (470,680 acres), provides 36,091 AUMs for three livestock operators. Multiple smaller allotments occurring within the planning area comprise 40 acres or less, one operator, and as few as five AUMs.

The 224 allotments in the planning area provide livestock AUMs for 229 permittees/lessees operating cattle, sheep, and horses on BLM-administered land. Of the 224 allotments, 73 currently allow grazing by sheep, 185 by cattle, and 9 by horses. Due to allotments that allow grazing by more than one type of livestock, these numbers exceed the total number of 224 allotments in the planning area. The 157,249 AUMs currently available in the planning area are divided among cattle (97,190 AUMs), sheep (59,505 AUMs) and horses (554 AUMs).

Livestock are moved from local ranch operations to allotments and between allotments by trucking or trailing. Trailing livestock herds has typically been the means of transport for sheep from winter ranges to the east to spring/summer ranges to the west. Historically, livestock have trailed within the Kemmerer

Planning Area by means of the North Trail/Slate Creek Trail complex (Lincoln County) and the South Trail complex (Uinta County).

Several allotments in the planning area are managed cooperatively between BLM and grazing associations (e.g., Smithsfork, Cumberland, and Rock Creek). In addition, the BLM has developed allotment management plans (AMPs) on 18 allotments, employs coordinated resource management on 18 allotments, and has informal grazing systems implemented on 5 allotments. Improved soil and vegetative conditions benefitting livestock, wildlife and riparian resources have resulted from many of the cooperative management plans. Two examples of highly successful efforts are the Lost Creek/Ryan Creek and Willow Creek Cooperative Management Plans. To provide a description of existing conditions in the planning area, several of the larger allotments are briefly summarized in this section.

Cumberland/Uinta Allotment

The Cumberland/Uinta Allotment is 337,659 acres with authorized livestock use by cattle (89.1%) and sheep (10.9%). Most of this allotment (215,335 acres) is administered by the BLM with the remaining acreage divided between state and private ownership (BLM 2000b). Most of the Cumberland/Uinta Allotment is located in Lincoln and Uinta counties between Kemmerer and Evanston, Wyoming; however, this allotment also includes land in Rich County, Utah, east of the Bear River. Forage allocation for the Cumberland/Uinta Allotment is 48,788 AUMs (BLM 2000b). Remaining livestock grazing within the Cumberland/Uinta Allotment is managed in accordance with the Cumberland/Uinta Allotment Cooperative Management Plan (BLM 2000b).

Rock Creek Allotment

The Rock Creek Allotment is an 81,815-acre cattle and sheep allotment comprising 60,784 acres of public land, 13,301 acres of state land, and 7,113 acres of private land located between Kemmerer and Cokeville, Wyoming (BLM 2002d). The Rock Creek Allotment provides a total of 14,161 livestock AUMs, including 10,515 for cattle and sheep use, 720 AUMs reserved for trailing, and 2,926 AUMs reserved for wildlife. Livestock grazing within the Rock Creek Allotment is managed in accordance with the Rock Creek AMP Revision (BLM 2002e).

Smithsfork Allotment

The Smithsfork Allotment is a 86,240-acre cattle and sheep allotment located north and east of Cokeville, Wyoming (BLM 2005j). Most (64,725 acres) of the Smithsfork Allotment is BLM-administered land, but 14,627 acres of private and 11,585 acres of state land are included. Total AUMs for the Smithsfork Allotment include 6,212 AUMs for cattle and 3,605 AUMs for sheep. Livestock grazing within the Smithsfork Allotment is managed in accordance with the Smithsfork AMP (BLM 2005j).

Twin Creek Allotment

The Twin Creek Allotment is a 42,693-acre cattle (35.9% authorized use) and sheep (64.1% authorized use) allotment (BLM 2005k). Most (34,438 acres) of the Twin Creek Allotment is BLM-administered land, but 5,593 acres of state and private land are voluntarily incorporated in the allotment. Total AUMs for the Twin Creek Allotment include 1,826 AUMs for cattle and 2,706 AUMs for sheep. Livestock grazing within the Twin Creek Allotment is managed in accordance with the Twin Creek A MP (BLM 2005k).

The Kemmerer Field Office administers livestock grazing on BLM-administered land in Utah and Idaho for allotments that cross the Wyoming State line. For example, the Cumberland/Uinta and the Crawford Mountain allotments include 23,153 and 800 acres, respectively, in Utah. Four allotments include the following acres in Idaho: Erwin Creek (3,880 acres), Boyd Hollow (7,491 acres), Christy Canyon (10,954 acres), and Poison Creek (21,806 acres). An MOA between the Kemmerer Field Office, Salt Lake Field Office, and the Idaho Falls District Office controls management of BLM-administered lands in interstate allotments.

The *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming* (BLM 1998a) provides the standards for the basis for assessing and monitoring rangeland conditions and trends within the planning area. As of May 2008, rangeland health assessments have been performed on 148 allotments. Current management evaluates 10 percent of grazing allotments annually to determine whether they meet standards for healthy rangelands.

BLM-administered public lands are important to local ranch operations throughout the planning area because the majority of ranching operations hold public land grazing permits or leases. The public lands are often intermingled with private and state lands, which are grazed as one unit. Public lands maintain the integrity of many ranch operations and support the cultural lifestyle and livelihood of the grazing permittees/lessees. In many cases, if ranchers lost their BLM grazing permit(s)/lease(s), the viability of their ranch operation would be seriously affected, thereby making it extremely difficult for them to stay in the livestock business. In the southwestern portion of the planning area in Uinta County and for the permits/leases in northern Lincoln County (Star Valley area), public lands generally are less important to the viability of most of the grazing operations. In these areas, BLM-administered public lands usually comprise isolated 40, 80, or 160-acre tracts of land, and the viability of most grazing operations likely would be maintained if the BLM grazing permits/leases were lost.

Animal Unit Month (AUM) Allocations and Allotments

Since the latter part of the nineteenth century, lands within the planning area have been used by ranchers for grazing livestock. In the early part of the twentieth century, there were more sheep than cattle in Wyoming; however, sheep numbers reached their peak in the 1920s and have steadily declined since then.

The Kemmerer Field Office manages lands for livestock grazing in Lincoln, Uinta, and Sweetwater counties in Wyoming, as well as allotments that extend into Utah and Idaho. The largest federal surface acreages exist in Lincoln County. Approximately 1.4-million surface acres of public land are available for grazing within the 224 grazing allotments. Grazing allotments typically contain a combination of federal, state, and private lands and range in size from approximately 7 acres to 470,680 acres, with an average allotment size of 10,149 acres. The Kemmerer Field Office administers 272 grazing permits/leases, allowing approximately 157,249 AUMs of livestock forage. Actual AUMs used annually in the planning area typically correspond to authorized AUM removal. Grazing systems used on public lands within the planning area fall into the following six categories: yearlong, season long, early season, late season, split season, and rotation (i.e., deferred rotation, rest rotation, and time-controlled grazing systems). Of the 272 grazing permits/leases in the planning area, approximately 21 percent (57) authorize year-round use, which is a reflection of the intermingled land pattern that exists across the planning area. The majority of these ranch operations use pastures containing public land throughout the year.

The number of AUMs authorized by the Kemmerer Field Office has declined slightly since 1985, due primarily to changes in ownership from mining operations and land exchanges, allotment boundary adjustments that have been made with adjoining BLM offices, and suspension of AUMs. Population growth and development is expected to continue throughout the planning area, which could result in a local decrease in AUMs because of a loss of surface acreage for livestock grazing.

Rangeland Health and Productivity

Livestock grazing can have both beneficial and adverse impacts on rangeland health and productivity. In general, rangeland health is most adversely impacted in areas where livestock congregate, such as areas with water, shade, and (or) more palatable forage; therefore, management is often geared toward improving the overall distribution of livestock within an allotment. This is accomplished through implementing BMPs, developing AMPs or coordinated resource management plans, changing grazing systems, and implementing range improvement projects (i.e., fencing, water development projects, salt and mineral licks). Kovalchik and Elmore (1992) describe the compatibility of different livestock grazing

systems with willow-dominated plant associations, similar to those found in some riparian areas of the planning area.

Livestock may congregate in areas where conditions are favorable, such as watering or shaded areas, or where fence lines abut. When livestock congregate for long periods, it can be detrimental to the soils and vegetation in the area. In addition to congregation areas, livestock movement transports seed and propagates of INNS, thereby expanding infestations of these species. Congregation areas, transport of INNS, and adverse impacts to vegetation from livestock and native ungulates have historically contributed, and in some cases continue to contribute, to the challenge of managing rangeland health and productivity in the planning area.

Some benefits of livestock grazing on rangeland health include improving vegetative cover, plant vigor, and reducing INNS infestations. One tool used to decrease the extent of INNS in an area is to have livestock graze in an INNS-infested area at a crucial point in the plant's life-cycle. For example, goats can graze thistle prior to seed set and cattle can graze areas infested with cheatgrass in early spring, thereby reducing the plant's vigor and seed production and making water and nutrients more available to native vegetation.

In 1985, the BLM established three categories for allotments to identify areas where management was potentially needed, as well as to prioritize workloads and the use of range improvement dollars. Allotments were classified as Improve Existing Resource Conditions (I), Maintain Existing Resource Conditions (M), or Custodial Management (C). When allotments in the planning area were originally categorized, resource conditions in some of the allotments placed in the "I" category were not necessarily in need of improvement. Criteria that were used to place allotments in the "I" category included the amount of public land present in the allotment; willingness of permittees/lessees to invest in management; opportunities for constructing range improvements; existence of grazing related resource conflicts; allotments having moderate-to-high forage production potential and production at low to moderate levels; identification by ranchers of the BLM opportunities for improvement in range condition; a static or downward range trend; livestock management that could be improved through water distribution; seasons of use or other factors; and the existence of opportunities for a positive economic return on public investments.

Currently, 39 allotments are classified as "I" (improve), 115 as "M" (maintain), and 67 as "C" (custodial) (Map 42). Some allotments are not assigned a category. The "I" and "M" category allotments contain approximately 1,361,104 acres of BLM-administered land, or 96 percent of the total acreage of BLM-administered surface in the planning area. The majority of the allotments with an "I" designation in the planning area occur west and northeast of Kemmerer in Lincoln County and in the southeast corner of the planning area (south of Granger) in Uinta and Sweetwater counties. The majority of the allotments with an "M" designation occur south of Kemmerer in Lincoln and Uinta counties. In the past, allotments in the "I" category generally received top priority; however, with the current emphasis on evaluating rangeland health on a watershed basis, some management actions may be implemented on "M" or "C" category allotments to resolve problems within a watershed.

Changes in federal grazing regulations required the BLM to evaluate rangeland health and manage domestic livestock in accordance with the *Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the State of Wyoming,* approved August 12, 1997 (BLM 1998a). The six standards set forth (see sidebar) relate primarily to physical and biological features of the landscape and are intended to be within control of the land manager and achievable by the user. These standards relate to all BLM resource programs. Rangeland health can be positively or negatively impacted by any resource program or resource use. Other technical reports have provided guidance to BLM to set proper livestock utilization levels, including within riparian areas based on the riparian rating category.

The standards are used to enhance sustainable livestock grazing and wildlife habitats while protecting watersheds and riparian ecosystems. Guidelines are specified in AMPs or agreements, but may not in themselves cause an allotment to meet the standards. The Kemmerer Field Office follows the guidelines identified in allotments with management plans and agreements. Current management strives to prevent overgrazing and a downward trend on all grazing allotments; however, the emphasis is on I and M category allotments.

Approximately 10 percent of the public lands in the planning area are assessed annually for rangeland health. By the end of FY 2004, 50 allotments totaling 477,824 acres were evaluated. Twenty-six allotments (280,238 acres) were found to meet rangeland health standards. The remaining 24 allotments (197,586 acres) did not meet one or more standards. In 2 of the 24 allotments not meeting standards, livestock were determined not to be the primary factor causing degradation of rangeland health. In the remaining 22 allotments not meeting rangeland health standards, past or present livestock use was determined to be the contributing factor. The rangeland standards assessment is a point-in-time evaluation of the physical function and biological health of the rangelands within an allotment.

Other factors contributing to rangeland health degradation include roads channeling runoff into stream channels adding sediment and changing hydrology, culverts in roads causing headcuts, oil and gas development, and drought. The rangeland health standards most often not met were Standard #2, which addresses riparian and wetland areas, and Standard #3, which addresses upland plant communities. In upland communities, INNS, poor plant vigor, and composition of plant communities are contributing factors for not meeting Standard #3.

When it has been determined that an allotment is not meeting the standards for healthy rangelands as a result of livestock management practices, then additional management guidelines or BMPs have (or will be) implemented. Numerous grazing allotments within the planning area have seen improvements in rangeland health as a result of changes in livestock management practices. Improved rangeland health is beneficial not only for the livestock industry but for wildlife, watershed health, water quality, soil stability, and aesthetic values. Some examples of management guidelines and BMPs implemented include: rest rotation, deferred rotation, changes in season-of-use, and managing placement of mineral blocks to protect riparian habitat and cultural resources.

Standards for Healthy Rangelands in Wyoming

- ***Standard #1.*** Within the potential of the ecological site (soil type, landform, climate, and geology), soils are stable and allow for water infiltration to provide for optimal plant growth and minimal surface runoff.
- ***Standard #2.*** Riparian and wetland vegetation has structural, age, and species diversity characteristics of the stage of channel succession and is resilient and capable of recovering from natural and human disturbance to provide forage and cover, capture sediment, dissipate energy, and provide for groundwater recharge.
- ***Standard #3.*** Upland vegetation on each ecological site includes plant communities appropriate to the site that are resilient, diverse, and able to recover from natural and human disturbance.
- ***Standard #4.*** Rangelands are capable of sustaining viable populations and a diversity of native plant and animal species appropriate to the habitats. Habitats that support or could support threatened, endangered, species of special concern, or sensitive species are to be maintained or enhanced.
- ***Standard #5.*** Water quality meets state standards.
- ***Standard #6.*** Air quality meets state standards.

Some issues with rangeland health cannot be resolved solely by limiting or eliminating livestock grazing. Working cooperatively with allotment permittees/lessees, WGFD, the Bear Lake Regional Commission, wildlife/recreation interests, mineral interests, Conservation Districts, and the Lincoln/Uinta County Extension Service and Weed and Pest Districts, the Kemmerer BLM implements other range improvements to address rangeland health concerns. Some examples include: prescribed burning, water developments, fencing, and changes in season-of-use to provide for needed rest.

Recurrent monitoring is conducted on various allotments to determine whether objectives are being met and if adjustments in management need to be made. Some of the established monitoring methods include: greenline transects, belt transects, proper functioning condition assessments, upland and riparian utilization monitoring, photo plots, and ocular observations. Over the last 40 to 50 years, an improvement in range condition has occurred due largely to improved grazing management practices; development of range improvement projects, such as fences and water developments; and, in some cases, reduction in livestock numbers or change in kind of livestock. To various degrees, improvements in range condition generally are anticipated to continue under all alternatives based on vegetation treatment and range improvement projects and development of guidelines for those areas determined not to meet rangeland health standards. INNS is one factor that may adversely impact the improving trend.

Vegetation and rangeland improvement projects have been, and will continue to be, implemented on BLM-administered public lands. Between 1985 and 2004, approximately 430 acres per year were treated with prescribed burns. These projects typically included adjacent landowners and, therefore, encompassed a greater extent of land than reported; however, it is unknown how much more land would be impacted by these types of projects within the planning area. An estimated 1,950 acres per year were burned due to wildland fire between 1985 and 2004. Both planned (i.e., prescribed) and unplanned (i.e., wildland) fires typically are beneficial to rangeland health, livestock production, wildlife, and watershed health in the long-term.

Rangeland improvement projects can serve as management tools or BMPs to control or improve livestock distribution and use within an allotment. These projects consist primarily of fences, reservoirs, springs, water wells, and vegetative treatments. When properly implemented, rangeland improvement projects assist in maintaining or improving rangeland health and increase forage production. On average, the BLM completes 11 to 12 new range improvement projects per year to meet specific management goals and objectives.

Management challenges facing livestock grazing in the planning area include balancing multiple resource uses, such as wildlife use of forage and wildlife compatible fences; ongoing coordination with ranchers, the public, and interested stakeholders; the spread of INNS; livestock grazing management strategies that improve “I” category allotments and address long-term monitoring needs; seasonal use needs of operators; and rangeland health standards. Existing challenges in the planning area also include meeting the standards for rangeland health, controlling livestock access and season of use, limiting soil erosion, maintaining diverse vegetation and sufficient forage, providing sufficient water, managing the relatively small and isolated parcels of public lands, managing the distribution of livestock, managing potential conflicts with recreation and oil and gas development, and enforcement of unauthorized use. Management actions designed to address these challenges are incorporated in the alternatives that are described in more detail in Chapter 2.

3.6.5 Recreation

Federal lands within the planning area provide a broad spectrum of outdoor opportunities that afford visitors the freedom of recreational choice with minimal regulatory constraints (Map 43). Recreational opportunities are offered to the public on all BLM-administered lands within the planning area where legal access exists. Public access is more common in the western portion of planning area.

The BLM Kemmerer Field Office recreation program has the responsibility for managing dispersed recreation throughout the approximately 1.4-million acres of BLM-administered surface land in the planning area with minimal regulatory constraints, primarily enacted for purposes of public safety and resource protection. Occurring in combination with other resource activities, dispersed recreation includes, but is not limited to, sightseeing, touring, photography, wildlife viewing, floating, mountain biking, camping, fishing, and hunting. In addition, there are numerous NHTs on public lands that receive varying levels of use. NHTs are addressed in the Heritage Resources section of this document. Using

OHVs in the collecting of shed antlers is an increasingly popular recreational and commercial activity. This activity has adversely affected wintering herds of elk and mule deer. OHV use in the winter, usually snowmobiles, on crucial winter ranges has become a problem because it adds to the stress level of wintering wildlife and has caused the abandonment of some winter range by elk and deer. OHV use is addressed in the Off-Highway Vehicle section of this document. These recreational opportunities are available to the public on most BLM-administered lands within the planning area.

In addition to general dispersed recreation, the Kemmerer Field Office manages several developed recreation sites with widely varied levels of development ranging from minor improvements for parking to multisite-hosted campground facilities. Most of the currently organized campground areas (Fontenelle Creek, Slate Creek, Weeping Rock, and Tail Race campgrounds) are located on Bureau of Reclamation (Reclamation) lands but managed by the BLM. Fontenelle Reservoir, also on Reclamation lands, in the northeast corner of the planning area, is used for boating, fishing, camping, and hunting. The Pine Creek Canyon campground is located on BLM-administered lands. The BLM also provides for use of an existing snowmobile trail system, cross-country ski trail, and OHV hill-climb area.

Recreational Use Patterns

In the Kemmerer planning area, it is estimated that there are 160,000 recreational visits per year. A recreational visit is defined as a visit to BLM-administered lands and waters by a person for the purpose of engaging in any recreation activity, except those that are part of or incidental to the pursuit of a gainful occupation, whether for a few minutes, a full day, or longer. Visitor numbers for hunting and fishing (the most intensive recreational use planning area wide) also have been generated. These numbers have remained fairly constant over time because they depend on wildlife population numbers and available licenses and, therefore, do not depict known increasing recreational trends. The numbers for hunting and fishing, therefore, generally reflect the magnitude of recreational demand on public lands. Table 3-31 illustrates hunting and fishing recreational days for Wyoming, public lands in Wyoming, and public lands within the Kemmerer Field Office for 1998 through 2001. These estimates were derived from the percentage of BLM-administered land within the state and hunting and fishing recreation days. The recreation days used in these calculations were provided by the WGFD (2002). The methodology was developed by Romaniello et al. in 2000. The results were compared to a USFWS recreational survey conducted in 1996 and shown to be reliable estimates of recreational use on public lands.

Table 3-31. Hunting and Fishing Recreation Days[1]

Year	Wyoming	BLM (public lands statewide)	KFO (public lands only)
1997	5,119,973	1,464,312	111,287
1998	5,670,961	1,621,894	123,263
1999	5,872,695	1,679,590	127,648
2000	5,865,240	1,677,458	127,486
2001	5,682,137	1,625,091	123,507

Sources: BLM 2003a; WGFD 2002
[1]Recreation days are defined by WGFD as whole or partial days of hunting or fishing.
BLM Bureau of Land Management
KFO Kemmerer Field Office

Literature reviews show that increasing recreational use trends are expected to continue (Wyoming State Office of Travel and Tourism 2004; Haas 2002; Cole 1996), which will increase the complexity of managing dispersed recreation.

Recreation Management

Management prescriptions on public lands emphasize monitoring, education, and enforcement to reduce user conflicts and provide resource protection. Monitoring and enforcement of dispersed recreation is limited, especially in areas with a small percentage of public lands or limited access.

As needs arise and resources allow, the BLM places signs to identify public and private land boundaries, interprets resources, and provides regulatory and informational kiosks in high use areas. Detailed information is available to the public through informational pamphlets, land ownership maps, and online websites. Moreover, the BLM promotes educational programs that inform the public and increase awareness. Some examples of these programs include Tread Lightly, Leave No Trace, and Operation Respect.

In addition to managing lands for general dispersed recreational activities, the Kemmerer Field Office also administers Special Recreational Permits (SRPs) for specific nonexclusive commercial or competitive recreational activities. These permits are issued to provide a mechanism to accommodate commercial recreational use, protect natural and cultural resources, and provide a mechanism to accommodate commercial recreational uses. Permits are processed on a case-by-case basis. The five general categories of SRPs are commercial, competitive, vending, individual or group use in special areas, and organized group activity and event use (BLM 2003f). Lengths of permits depend on activities proposed, the area in question, and the past record of the potential permittee. Permits can be issued for periods ranging from 1 to 5 years.

Currently, SRPs issued by the Kemmerer Field Office are to commercial and competitive event organizers that provide recreational opportunities or services without permanent facilities and for periods of less than 6 years. There are 13 commercial outfitters operating in the Kemmerer Field Office. Permits are for hunting guides, snowmobile riding, and mountain bike races.

The Special Recreation Management Area (SRMA) is an area with a commitment to provide specific recreational activities and opportunities. Each SRMA has a distinct, primary recreation-tourism market as well as a corresponding and distinguishing management strategy. The Kemmerer Field Office currently does not have areas identified as SRMAs within the planning area, but a recreation area management plan continues to be proposed for the Pine Creek Canyon area. Anything not delineated as an SRMA is an extensive recreation management area (ERMA). Management within all ERMAs is restricted to custodial actions only. The entire planning area is managed as an ERMA.

Management activities are designed to ensure the continued availability of outdoor recreation opportunities sought by the public and that are not readily available from other public or private entities. These management actions and prescriptions emphasize monitoring, enforcement, and mitigation to reduce user conflicts and provide resource protection. Monitoring and enforcement of dispersed recreation is limited, however, especially in areas with a small percentage of public lands or limited access.

3.6.6 Travel Management

Transportation management involves the infrastructure and legal rights to provide people the opportunity to use and travel to and through specific lands within the planning area. The emphasis of the following discussion is on BLM's travel management program, which includes providing means for legal access and maintenance and development of various transportation facilities. The Kemmerer Field Office transportation program manages legal access to and across public lands utilized for recreation, renewable and nonrenewable energy development, range management, public access, and communication site management. Travel management includes travel ways, travel management, and travel systems. Management encompasses all forms of transportation, including mechanized and motorized vehicles such as bicycles, motorized ATVs, cars and trucks, and pedestrian and equestrian modes of access as well.

Acquisition of lands and interests in lands, and the tools used to acquire access, are discussed in detail in the Lands and Realty section of this document. ROWs to meet transportation needs are addressed in the Rights-of-Way and Corridors section of this document. OHV and related issues are discussed in the Off-highway Vehicles section of this document.

Access is acquired using several different tools, including purchase, exchange, reciprocal ROW, donation, and condemnation. ROW reservations are used to establish and record access roads across private land. Cooperative agreements with landowners are used on occasion, but do not provide long-term legal public access. Both the transportation and ROW programs are active and receive a great deal of public interest because access is important for resource users and managers.

The primary components of the transportation network and facilities in the planning area include roads, railroads, and airports. A large number of the BLM system roads that currently provide access to public lands were first built and maintained by the oil and gas industry. These roads are chiefly improved dirt roads. Not all roads are maintained. Roadways managed by BLM within the Kemmerer Field Office are limited to four easements. The key components of the transportation network within the planning area are presented in Volume 2, Map 1.

The transportation infrastructure within the planning area is closely related to historic trails, as many automobile routes and railroads eventually paralleled some of the trail routes. At the beginning of the twentieth century, there was a dramatic increase in Wyoming roadways as a result of increased automobile use and the burgeoning oil and gas industry. The highways of this era were named rather than numbered and frequently followed rail lines and rivers.

The planning area is crossed by several primary and secondary highways that connect most communities, as well as a series of county roads that provide the general public access to remote locations within the planning area. U.S. 30 South from Granger to Evanston to Salt Lake City, was the original Abraham Lincoln Memorial Highway. U.S. 30 North traveling through Kemmerer was never designated historically as the Lincoln Highway. U.S. 89 runs north-south through the northwest edge of the planning area from the Idaho State line on the south end to Alpine Junction in the north, where it passes out of the planning area. U.S. 189 runs south to north-northeast, passing through Kemmerer and a large part of the planning area. I-80 crosses the southern portion of the planning area, entering from the west at the Idaho border. It runs roughly west-southwest to east-northeast, passing though Evanston and Lyman before exiting the planning area approximately 15 miles east of Granger.

Rail travel through Wyoming began with the construction of the UPRR in the late 1860s. The federal government subsidized developing rail lines with substantial land grants that were, in turn, developed for mineral, agricultural, and tourist potential. Passenger service declined dramatically in the 1980s and there is not regularly scheduled passenger rail service in the region. However, the railroad is still the largest carrier of bulk freight in Wyoming, shipping coal, agricultural products, and other goods.

The planning area is home to several public and private airports. The towns of Evanston, Afton, Kemmerer, Fort Bridger, and Cokeville have small municipal airports. Scheduled commercial air service is available in Rock Springs, Salt Lake City, and Jackson Hole. Many small airstrips, located on public and private lands, are scattered throughout the region. For the most part, these facilities were developed by local ranchers to support their ranch operations. Those on public land are available for use by the public.

Much of the transportation infrastructure necessary within the planning area is in place, but the need for additional major road facilities has not been identified. Highways in the planning area generally are considered to be in good condition and have excess capacity (most of the attention to infrastructure is aimed at reconstruction of aging or dilapidated facilities and routine maintenance) (BLM 1997c).

Management challenges identified for the transportation management program in the Kemmerer Field Office are based, in part, on historic activities and existing conditions and trends. Management

challenges include the lack of legal public access to some parcels of public land; unrestricted access to areas that may pose a threat to public health and safety (e.g., abandoned mine lands) or significant resource values (e.g., NHTs and crucial winter range); maintenance of current legal public access routes to public lands; many legal public access routes not identified by information and (or) direction signs; increased road use based on anticipated increases in oil and natural gas activity and recreational use demand; expansion of the road network to support anticipated increases in oil and natural gas operations in compliance with multiple-use concepts within the FLPMA; roads that are no longer needed; and road design and construction considering other resource programs to minimize impacts.

The Kemmerer Field Office transportation management program is aimed at managing access to and across the public lands. Please refer to the Lands and Realty section of this document for related information on land use authorizations and land-tenure adjustments. Transportation management areas may be designated and a travel management plan may be developed during RMP implementation to address management challenges. Management actions designed to address the challenges identified in this section are incorporated in the alternatives and described in more detail in Chapter 2.

3.6.7 Off-Highway Vehicles

For regulatory purposes, 43 CFR 8340 defines an OHV as "any motorized vehicle capable of or designated for, travel on or immediately over land, water, or other terrain." The majority of OHV use on public lands occurs on unpaved roads and two-track routes. The common perception of OHVs is that they generally are all-terrain vehicles, snowmobiles, motorcycles, and dune buggies. However, in the planning area, the most common vehicles used are four-wheel drive trucks and sport utility vehicles. The national objectives for OHV management are to provide for OHV use while protecting natural resources, promoting safety of all users, and minimizing conflicts among the various users of public lands. Travel management is an ongoing process and includes inventorying, rerouting, upgrading, and closures of roads, as well as the addition of roads and trails.

OHV Use within the Planning Area

Road networks within the planning area comprise a series of county roads, BLM-maintained roads, two-track routes, and snowmobile trails. The maintenance and use of these travel ways has become an integral part of public land management, as these roads are used for both recreational and nonrecreational purposes.

Typical recreational OHV activities within the planning area include enduro races, trial competitions, all-terrain vehicle and motorcycle trail riding, and snowmobiling. OHV use, in itself, has become a popular method to exploring public lands. In addition, OHV use provides access for nonmotorized recreational purposes, such as fishing, hiking, mountain biking, horseback riding, and primitive camping opportunities. People with disabilities may be allowed to travel on OHVs in otherwise closed areas on a case by case basis. This would require a request to the Kemmerer Field Office to initiate the exception.

Nonrecreational OHV use of the planning area includes agricultural management, energy development, and land management activities. OHVs also are used for noncommercial collection of decorative rock and native plant materials. Employees of government agencies, ranchers, timber companies, energy companies, and utility providers are permitted users who utilize OHVs to access and maintain the infrastructure required for the continued operation and maintenance of their facilities. The BLM uses OHVs for range inspections, vegetation treatments, surveying and mapping, inventories, monitoring, fire suppression, project construction, and maintenance.

The BLM has established OHV and snowmobile area designations in accordance with the BLM Land Use Planning Handbook requirements and 43 CFR 8342.1. These designations outline management

prescriptions and set restrictions on OHV use. Possible OHV designations are open, closed, or limited (see Glossary).

OHV Use and Environmental Concerns

The OHV designations for the majority of public lands within the planning area are currently either "limited to existing roads and trails" or "limited to designated roads and trails." OHV operators may go off of roads and trails to perform necessary tasks.

The BLM recognizes the differences between OHVs and snowmobiles in terms of use and impact. OHV's impact the land surface whereas snowmobiles generally do not. However, both can be disruptive activities that have similar impacts to wildlife (e.g., noise). Therefore, travel by snowmobiles is permitted off existing routes and in all open or limited areas (unless otherwise specifically limited or closed to snowmobiles) if they are operated in a responsible manner without damaging the vegetation or harming wildlife. Current snowmobile restrictions and conflicts include the following. Snowmobile use in the Pine Creek Canyon is limited to groomed trails. There are 23 miles of groomed snowmobile trails on BLM-administered surface land in the planning area. The cross-country ski trail is not part of the groomed snowmobile trails system and has been identified as an area of conflict between snowmobilers and cross-country skiers. Snowmobile use is limited to available dates prior to January 1 in crucial big game winter range areas and is prohibited in most of the Raymond Mountain WSA, except for Raymond Basin.

While these designations provide for a wide variety of OHV use, and there are a number of travel routes on public lands throughout the planning area, the majority of recreational OHV use occurs in areas with legal and physical access in conjunction with large blocks of public lands. Areas where OHV access is restricted or substantially limited include the Raymond Mountain WSA and the seasonal closure of 287,160 acres in crucial big game winter range from January 1 to April 30.

The popularity and use of OHVs has grown substantially in a relatively short period of time. Areas that were once infrequently visited are now popular places for recreational touring and other OHV-related activities. However, off-road or other inappropriate use of these vehicles can cause environmental degradation and increased conflicts among user groups. The Green Hill is an area of conflict between OHV users and residents of the adjacent neighborhood. Another OHV conflict area exists within the boundary of Raymond Mountain WSA where two small roads remain open for use and are used by 4-wheelers to enter into the WSA, and then travel illegally throughout the WSA.

Certain environments are more susceptible to OHV damage, including crucial winter ranges, wildlife breeding areas, riparian habitats, and areas with steep slopes or sensitive soils. Typical seasonal closure restrictions for wildlife habitats would not apply to tasks performed in support of a permit or authorization issued by the BLM. In addition, other government entities that require entry to perform tasks related to management, maintenance and control of wildlife would be exempt from the seasonal closure rule.

OHV use in the planning area is expected to continue. The lack of appropriate signage, a shortage of law enforcement personnel, the increase in OHV use throughout the planning area, and a general lack of understanding of land use ethics have increased inappropriate uses of OHVs on federal lands and represent management challenges for the BLM. Management actions to address these challenges are included as part of the alternatives described in Chapter 2.

3.6.8 Visual Resources Management

The purposes of VRM are to manage the quality of the visual environment and to minimize the visual impact of development activities, while maintaining the viability of all resource programs. VRM involves applying methods for evaluating landscapes and determining appropriate techniques and strategies for maintaining visual quality and reducing adverse impacts. A summary of the BLM VRM program follows:

- Lands have different visual values that warrant different management.
- The VRM inventory is used to systematically identify and evaluate visual resources based on scenic quality, visual sensitivity, and distance zones. The evaluation produces a numerical index value.
- Inventoried visual resource values are considered during the RMP process along with allocated resources in order to establish VRM management classes. These classes have established objectives that dictate how the visual resources would be managed under the various alternatives.
- Visual values are considered along with all other resource values during the RMP process when determining VRM objectives. Management decisions reflect the multi-disciplinary analysis.
- VRM objectives established through the RMP process provide the limits for the design and construction of all surface-disturbing activities.
- Proposed projects are analyzed using the Contrast Rating Process to determine if management objectives would be met and to identify mitigation measures to minimize visual impacts.

VRM in the planning area focuses on values and resources in broad areas with vast vistas of native landscapes and unique areas of spectacular quality. Examples of areas with high visual values include Raymond Mountain, Rock Creek Ridge, and Slate Creek Ridge. Examples of key resources include Fossil Butte National Monument and the Green River.

Such visual resource values are defined through the implementation of the BLM's VRM methodology, beginning with a classification system comprising three phases: inventory (as outlined in BLM Handbook 8410-1, *Visual Resource Inventory and Evaluation*); establishment of management classes through land use plans; and analysis of management actions to ensure compliance (as outlined in BLM Handbook 8431-1, *Visual Contrast* Rating). Current VRM classes for portions of the planning area were established in 1986 (VRM Class map). A collection of isolated parcels in the northern portion of the planning area, known as Star Valley, were excluded from consideration during the 1986 Kemmerer RMP effort. As a result, no VRM class determinations were made for these areas. The acreage in each VRM class are identified in Table 3-32 and the spatial distribution of these acreages are shown on Map 54.

VRM classes I through IV range from completely natural landscapes to landscapes containing extensive human modification, respectively. Boundaries and corresponding acreages are subject to change as more inventories and evaluations are conducted.

Heavily impacted areas are normally populated with highly visible large-scale facilities or exhibit obvious surface disturbance. High-profile visual intrusions involve concentrated development, such as buildings, industrial facilities, infrastructure associated with oil and gas fields, quarries, and ROW involving surface disturbance. Surface-disturbing activities associated with these areas are readily noticeable due to the amount of contrast with the representative landscapes.

Table 3-32. Current VRM Classes, Associated Objectives, and Acreage of BLM-Administered Surface Lands

Management Class	Class Objective	Acreage
Class I	To preserve the existing character of the landscape. The level of change to the characteristic landscape must be very low and must not alter or attract attention.	0
Class II	To retain the existing character of the landscape. The level of change to the characteristic landscape must be low.	129,771
Class III	To partially retain the character of the landscape. The level of change to the characteristic landscape must be moderate.	378,979
Class IV	To provide for management activities that requires major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.	878,411

Low-profile visual intrusions include range improvements, fences, and two-track routes, and are found throughout the planning area. Individually, these intrusions provide minimal disturbance to visual resources; however, the cumulative impact of these intrusions, over time, can disrupt the overall character of the landscape and adversely impact visitor experience.

According to the established VRM classes BLM-administered surface lands include no areas of Class I land, 129,771 acres of Class II land, 378,979 acres of Class III land, and 878,411 acres of Class IV land.

Resource Condition and Trends

The condition of visual resources in the planning area varies greatly depending on location, the amount of activity, and the overall character of the landscape. Some areas have been impacted by large-scale development, grazing management, and recreational activities, while other portions have remained relatively undeveloped. The Kemmerer Field Office initiated a scenic quality evaluation in 2003 to prepare for the upcoming RMP revision. Results of this evaluation identified that large, undeveloped portions of the planning area were generally identified as having a scenic quality rating of A or B. These results were adjusted through a sensitivity analysis to determine sensitivity ratings for various portions of the field office. The data were further refined by applying preliminary distance zone buffers from sensitive viewing areas including recreational roads/facilities, NHTs, and cultural sites. This preliminary data set was refined by current and potential management decisions to provide a range of visual resource inventory classes for this RMP revision.

A collection of isolated parcels in the northern portion of the planning area, known as Star Valley, were excluded from consideration during the 1986 Kemmerer RMP effort. As a result, no VRM class determinations were made for these areas. The current management (Alternative A) is a result of this early action. After the 2003 evaluation and subsequent reviews VRM class determinations were made for this area.

In addition to describing the VRM classes within the planning area, another important aspect of VRM includes identifying rehabilitation areas. Rehabilitation areas, in which the existing visual intrusions exceed acceptable levels and class objectives, should include visual resource mitigation measures. An example of a potential rehabilitation need is the transmission line that crosses a Class II area being managed for the presence of NHTs.

Public concerns, including the quality of recreational experiences on public lands; protecting landscapes along NHTs; scenic values and scenic quality; and the costs of development for mitigation, present management challenges for the BLM. Other management challenges for VRM include the environmental consequences of concentrated recreational use, degradation caused by widespread use of OHVs on public lands, overlap of NHTs and linear utility facilities, effective mitigation along travel routes, lack of data

supporting the validity of current VRM classes within the Kemmerer planning area, the checkerboard land pattern, and monitoring the long-term impact of management standards and practices. Management actions are incorporated in the alternatives and described in more detail in Chapter 2.

The BLM plans to continue VRM according to all laws, regulations, and policies, and to maintain the overall integrity of visual resources, while allowing for modification and changes to occur to meet other resource objectives. This would include the evaluation and potential reclassification of areas according to new data. The Kemmerer Field Office also recognizes the need to ensure VRM is consistent with other land use plans within and adjacent to the planning area (Wasatch National Forest and Bridger Teton National Forest).

3.7 Special Designations

This section describes areas existing, proposed, recommended, or eligible for consideration as ACECs, Research Natural Areas (RNAs), Other Management Areas (MAs), Wild and Scenic Rivers (WSRs), WSAs, or Back Country Byways.

3.7.1 Areas of Critical Environmental Concern, Other Management Areas, and Research Natural Areas

Pursuant to the FLPMA of 1976, Section 1702(a), an ACEC is defined as an area "within public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards." While an ACEC may emphasize one or more unique resource, other existing multiple-use management can continue within an ACEC, so long as the uses do not impair the values for which the ACEC was designated. These areas are managed pursuant to BLM Handbook Section 1613 (BLM 1988b). Raymond Mountain is the only ACEC currently designated in the planning area.

RNAs protect natural ecosystems for the purposes of scientific study and education and for maintenance of biological diversity. They serve as a baseline or reference areas and help answer resource management questions and are managed to maintain the natural features for which they were established and to maintain natural processes. Because of the emphasis on natural conditions, the areas provide the opportunity to study ecosystems or their component parts and to monitor succession and other long-term ecological change. Nonmanipulative research and monitoring activities are encouraged in RNAs and can be compared with manipulative studies conducted in other areas. Currently no RNAs are designated in the planning area.

MAs, ACECs, SRMAs, WSAs, RNAs, or WSRs are areas with unique characteristics that warrant managing in a manner other than standard management actions and activities to protect those characteristics. An MA may emphasize one or more unique resources, but other existing multiple-use management may continue within an MA, so long as the uses do not impair the values for which the MA was established. There are no MAs currently identified in the planning area.

Fourteen areas were nominated for ACEC consideration during the scoping process of the RMP revision. Nine of the nominated areas met both the relevance and importance criteria (identified in BLM Handbook Section 1613) and are carried forward for additional consideration and analysis in the RMP revision. In addition, two of the nominated areas, which did not meet the relevance and importance criteria for ACECs, were carried forward for additional analysis as MAs.

Table 3-33 summarizes areas existing, proposed, or eligible for consideration as ACECs, MAs, or RNAs. Also included in Table 3-33 are the resource values of concern identified for each area.

Table 3-33. Existing and Proposed Areas Designated, Proposed, or Eligible for Consideration as ACECs, MAs, or RNAs in the Kemmerer Planning Area

Existing or Proposed Areas	Designation or Consideration	Resource Value(s) of Concern
Existing		
Raymond Mountain	ACEC	Protects the needs of the sensitive Bonneville cutthroat trout and identifies priority for riparian management.
Proposed		
Raymond Mountain Expansion	ACEC	Proposed as an expansion to the existing ACEC to protect sensitive wildlife habitats and winter ranges, as well as scenic values.

Table 3-33. Existing and Proposed Areas Designated, Proposed, or Eligible for Consideration as ACECs, MAs, or RNAs in the Kemmerer Planning Area *(Continued)*

Existing or Proposed Areas	Designation or Consideration	Resource Value(s) of Concern
Special Status Plant Species Habitat	ACEC or RNA	Special status plant species populations - habitats
Cushion Plant Communities	ACEC or RNA	Cushion plant populations - habitats
Bridger Butte	ACEC	Protects sensitive cultural values, including Native American sensitive sites, NHTs and other historic and associated sites, and special status plant species.
White-Tailed Prairie Dog Complexes	ACEC	Protects a keystone sage-steppe species.
Dry Fork Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Upper Tributary Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Lower Tributary Watershed	ACEC	Provides habitats for populations of Bonneville cutthroat trout, as well as other native nongame aquatic species and the leatherside chub.
Fossil Basin	ACEC	Proposed to protect and highlight the paleontological deposits in the area, as well as scenery and views from Fossil Butte National Monument.
Rock Creek Tunp	MA	Protect sensitive overlapping of wildlife habitats (big game winter ranges and migration corridors, greater sage-grouse yearlong habitats, sagebrush obligate and special status species habitats); cultural values, including NHTs and associated sites; and special status plant species.
Bear River Divide	MA	Protect sensitive overlapping of wildlife habitats (big game winter ranges and migration corridors, greater sage-grouse yearlong habitats, sagebrush obligate and special status species habitats); cultural values, including NHTs and associated sites; and special status plant species.

ACEC Area of Critical Environmental Concern
RNA Research Natural Area
MA Management Area
NHT National Historic Trail

3.7.1.1 Existing Special Designations

Raymond Mountain ACEC

The Raymond Mountain ACEC was designated in 1982 as part of the Pioneer Trails Management Framework Plan and lies within the Raymond Mountain WSA and adjacent to other federal land and state and private lands (Map 61). The Raymond Mountain ACEC includes 12,667 acres of BLM-administered surface and mineral estate along the northwestern edge of the planning area and lies wholly within the area managed by the Thomas Fork HMP (BLM 1979). The Raymond Mountain ACEC designation is based on a recommendation within the Thomas Fork HMP to designate aquatic and riparian habitats of the Thomas Fork drainage as an ACEC to amplify management needs of the Bear River (Bonneville) cutthroat trout (BLM 1982), a BLM sensitive species. Referring to habitat for the Bonneville cutthroat trout in this area, the 1979 Thomas Fork HMP indicates, "overall, 73 percent of the fisheries habitat in this drainage is in an apparent declining trend." In addition to brush spray projects, BLM (1979) indicates "… intensive utilization of riparian vegetation by livestock, and beaver historically resulted in reduced channel stability, accelerated stream bank erosion, channel downcutting, lower water tables, and disclimax in riparian vegetation communities." Cooperative management strategies developed with local livestock permittees/lessees have provided additional protections for sensitive resources in the area

through livestock reductions and season of use restrictions. Livestock grazing currently is permitted within the Raymond Mountain ACEC.

The BLM manages the Raymond Mountain watershed to protect the needs of the sensitive Bonneville cutthroat trout, which is in danger of being extirpated from the drainage. The Raymond Mountain ACEC provides yearlong habitats for all life stages of the Bonneville cutthroat trout and other native nongame aquatic species (WGFD 2004b).

Management of the Raymond Mountain ACEC benefits riparian areas. For example, no surface-disturbing activities are allowed in riparian habitats within the ACEC. In addition, two-track routes descending from the IGO Speedway into Raymond Canyon and the Raymond Canyon road are closed to OHV use. Historically, OHV use in this area caused soil erosion and disturbed aquatic habitat of Raymond Creek (BLM 1982). A seasonal closure of these roads exists within big game winter range during severe climatic conditions from December 1 to May 15 (BLM 1982). One mile of the Huff Creek stream bank has been stabilized and two exclosures have been installed.

Currently within the ACEC, no oil and gas leases or mining claims exist. The Raymond Mountain ACEC exhibits no to low development potential for oil and gas. Coal occurrence potential within the Raymond Mountain ACEC is low to moderate with no development potential. Most of the Raymond Mountain ACEC exhibits moderate-to-high phosphate occurrence potential and low trona occurrence potential.

3.7.1.2 Proposed Special Designations

Raymond Mountain Expansion ACEC

Within the planning area, the proposed 33,928-acre Raymond Mountain Expansion ACEC includes 27,026 acres of BLM-administered surface, 28,430 acres of federal mineral estate, and is located north of Cokeville (Map 62). This area is proposed as an expansion to the existing ACEC to protect sensitive Bonneville cutthroat trout habitat, riparian resources, wildlife habitats and winter ranges, as well as scenic values (VRM Scenery A qualities).

The area includes sensitive fish and wildlife species and is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 2 for the Pinedale Regional Fish Division and Area 10 for the Green River Regional Wildlife Division. The WGFD identified areas throughout Wyoming in greatest need of attention and (or) restoration and labeled these priority areas. The *Strategic Habitat Plan* (WGFD 2001) identifies goals, objectives, and strategies to restore these priority areas. Bonneville cutthroat trout and other native nongame aquatic species habitats occur within the proposed expansion area. The area contains crucial winter range for the Wyoming Range mule deer, West Green River elk, and Lincoln moose herd units (WGFD 2004b). In addition, the area also includes a migration corridor for mule deer, and while not overlapping, lies adjacent to several active greater sage-grouse leks. The area also encompasses part of an LAU, the Wyoming Grizzly Bear Management Area, and the Wyoming Audubon Society Important Bird Area.

Most of the Raymond Mountain Expansion ACEC area exhibits low oil and gas development potential. Occurrence potential for coal and phosphate within the Raymond Mountain Expansion ACEC is low to moderate, whereas occurrence potential for trona is low.

Special Status Plant Species Habitat ACEC/RNA

Within the planning area, no areas of special status plant species habitats are currently designated as ACECs or RNAs. However, alternatives to current management identify up to 907 acres of the planning area (774 acres of BLM-administered surface and 793 acres of federal mineral estate) containing special status plant species habitats as an ACEC and (or) an RNA. The proposed areas include known populations for any, or all, of eight special status plant species known to exist in the planning area. Particular species of concern include Trelease's racemose milkvetch, Entire-leaved peppergrass, Large-

fruited bladderpod, Western bladderpod, Prostrate bladderpod, Beaver Rim phlox, Tufted twinpod, and Dorn's twinpod.

Special status plant species habitats are located in multiple locations within the planning area including areas subject to OHV use, mineral development, and livestock grazing. The majority of the proposed ACEC/RNA areas exhibit low or moderate oil and gas development potential and none of the proposed areas exhibit high oil and gas development potential. Occurrence potential for coal within the proposed ACEC/RNA areas is low and most of the areas are classified as having a low to moderate occurrence potential for phosphate. The occurrence potential for trona within the proposed ACEC/RNA areas is low.

Cushion Plant Communities ACEC/RNA

Within the planning area, no areas of cushion plant communities are currently designated as ACECs or RNAs. However, alternatives to current management identify up to 62 acres of the planning area (all BLM-administered surface and federal mineral estate) (see maps 62 and 64). The proposed ACEC and RNA areas comprise known populations and seven endemic species. Cushion plant communities are sparsely vegetated areas with low-growing, mat-like tufts of vegetation with bare soil and gravel between the individual plants. Cold winters, little rainfall, and strong winds contribute to the development of these specialized communities. The communities are vulnerable to surface disturbance and have a slow recovery time. Usually 50 years or more are required to restore the communities to their original native state after disturbance. The cushion plant communities frequently contain uncommon and regional endemic plant species. Species composition varies from one community to another. Typical associates found in these areas include different species of phlox, twinpods, bladderpods, and legumes.

The area northeast of Kemmerer proposed for inclusion in the ACEC includes active livestock grazing and oil and gas development. The proposed ACEC/RNA area exhibits moderate oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

Bridger Butte ACEC

Within the planning area, the Bridger Butte area is not currently designated as an ACEC. However, alternatives to current management identify up to 1,127 acres of the Bridger Butte area as an ACEC. The proposed ACEC is located south of I-80 between Lyman and Evanston (see maps 62 and 64) and is intended to protect sensitive cultural values, including NHTs and associated sites. Historical accounts and emigrant diaries repeatedly refer to Bridger Butte as an important landmark that signified their approach to Fort Bridger, an important rest stop on the journey west. In addition, several Native American tribes have identified Bridger Butte as an area of tribal significance (BLM No date).

The area includes habitats for special status plant species populations, including tufted twinpod, prostrate bladderpod, Maybell locoweed, and Payson beardtongue. Rare animals inhabiting the area include the Uinta ground squirrel and Idaho pocket gopher. In addition, the area of the Blacks Fork includes populations of roundtail chub and flannelmouth suckers (WGFD 2004b). The proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

White-Tailed Prairie Dog Complexes ACEC

Within the planning area, white-tailed prairie dog complexes are not currently designated ACECs. However, alternatives to current management identify three areas up to 30,913 acres (30,913 acres of BLM-administered surface and 28,739 acres of federal mineral estate) of white-tailed prairie dog complexes within the planning area as ACECs. The proposed areas encompass white-tailed prairie dog complexes a minimum of 100 acres in size and the proposed designation is intended to protect white-tailed prairie dog habitats. In Wyoming, the white-tailed prairie dogs are considered sensitive species by the BLM. In addition, prairie dog complexes provide habitats for the burrowing owl (also a BLM sensitive species) and the endangered black-footed ferret. The proposed ACECs occur in multiple locations within the planning area, primarily in the checkerboard land pattern area (Map 62).

These areas can occur in areas of moderate-to-high oil and gas and trona development; however, most of the proposed areas exhibit low oil and gas development potential. Occurrence potential for coal for most of the proposed areas is low, with less than 500 acres each classified as moderate or high. In addition, most of the proposed areas also have low occurrence potential for phosphate and trona.

Dry Fork Watershed ACEC

Within the planning area, Dry Fork Watershed currently is not designated an ACEC. However, alternatives to current management identify up to 4,690 acres (3,172 acres of BLM-administered surface and 4,054 acres of federal mineral estate) within the planning area as an ACEC. The proposed Dry Fork Watershed ACEC is depicted on Map 62 and extends from its confluence with the Smiths Fork River upstream to the Bridger-Teton National Forest boundary. The area provides yearlong habitats for all life stages of core conservation populations of Bonneville cutthroat trout as well as other native nongame aquatic species (BLM 2004p). The *Conservation Agreement and Strategy for Bonneville Cutthroat Trout, in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for managing these species. Habitat for the leatherside chub is also present in the area. The proposed Dry Fork Watershed ACEC also provides moose winter range and yearlong habitats for greater sage-grouse; lynx and wolverine also could inhabit the area.

Livestock grazing occurs throughout the proposed ACEC. Relatively small portions of the area are leased for oil and gas, exhibiting low oil and gas development potential. Coal occurrence potential within the proposed ACEC is moderate and most of the area is classified as having low occurrence potential for phosphate and trona.

Upper Tributary Watershed ACEC

Within the planning area, the Upper Tributary Watershed currently is not designated as an ACEC; however, alternatives to current management identify up to 5,595 acres (4,291 acres of BLM-administered surface and 4,924 acres of federal mineral estate) within the planning area as an ACEC. The proposed Upper Tributary Watershed ACEC is depicted on Map 62 and includes the Upper Smiths Fork River from the confluence of Hobble Creek with the Smiths Fork and West Fork Smiths Fork, Trespass Creek, Porcupine Creek, and Hobble Creek watersheds to the Bridger-Teton National Forest boundary.

The area provides yearlong habitats for all life stages of core conservation populations of Bonneville cutthroat trout, as well as other native nongame aquatic species, including the leatherside chub. The *Conservation Agreement and* Strategy *for Bonneville Cutthroat Trout in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for managing these species. The area provides moose and elk winter range and is a major mule deer migration corridor. Portions of the area provide breeding and nesting habitats for greater sage-grouse; lynx and wolverine also could inhabit the area. The majority of the proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal, phosphate, and trona.

Lower Tributary Watershed ACEC

Within the planning area, Lower Tributary Watershed currently is not designated an ACEC. However, alternatives to current management identify up to 1,371 acres (1,351 acres of BLM-administered surface and 1,359 acres of federal mineral estate) within the planning area as an ACEC. The proposed Lower Tributary Watershed ACEC is depicted on Map 62 and includes Coal Creek and Sawmill Creek watersheds. The proposed boundary is from the confluence with Smiths Fork River to the Bridger-Teton National Forest boundary. The area provides yearlong habitats for all life stages of core conservation populations of Bonneville cutthroat trout, as well as other native nongame aquatic species, including the leatherside chub. The *Conservation Agreement and Strategy for Bonneville Cutthroat Trout in Colorado, Utah, and Wyoming* (CRCT 2001) provides specific conservation measures for the management of these species.

The area provides moose and elk winter range and is a major mule deer migration corridor. Portions of the area provide breeding and nesting habitats for greater sage-grouse; lynx and wolverine also could inhabit the area.

The majority of the proposed ACEC exhibits low oil and gas development potential and low occurrence potential for coal. The proposed ACEC exhibits moderate occurrence potential for phosphate and trona.

Fossil Basin ACEC

Within the planning area, the Fossil Basin area is not currently designated as an ACEC; However, alternatives to current management identify up to 451,452 acres (201,660 acres of BLM-administered surface and 250,146 acres of federal mineral estate) of the Fossil Basin within the planning area as an ACEC and (or) MA. The Fossil Basin ACEC could include areas within the Fossil Basin that extend from well north of the current Fossil Butte National Monument to the southern boundary of the field office area, as defined by a USGS geologic map (Koespel 2004). A nomination from the Sierra Club for a Fossil Lake ACEC suggested a boundary that encompasses the viewshed area surrounding the National Monument and possibly other fossil-bearing areas as defined by a USGS geologic map by (Koespel 2004). The proposed area is intended to protect fossil resources. The area contains world-renowned fossil resources, especially high quality vertebrate fossils. Additional information regarding the fossil resources within the Fossil Basin can be found in Buchheim and Eugster (1998) and McGrew and Casilliano (1974).

The majority of land within the proposed ACEC exhibits low oil and gas development potential; however, some acreage exhibits moderate to high oil and gas development potential. Similarly, coal and phosphate occurrence potentials within the proposed ACEC are low to high. Occurrence potential for trona within the proposed area is low.

Rock Creek/Tunp MA

Within the planning area, the Rock Creek/Tunp area currently is not identified for other management; however, alternatives to current management identify up to 63,278 acres of the Rock Creek/Tunp area as an MA. The proposed area is located northwest of Kemmerer (maps 62 and 64) and is intended to protect sensitive overlapping wildlife habitats, cultural values, NHTs and associated sites, and special status plant species. The area includes significant physical traces of the Oregon-California NHT that retain historic scenic qualities. This area also provides habitats for, and identified locations of, several special status plant species.

This area is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 1 for both the Green River Regional Wildlife Division and the Pinedale Regional Fish Division. The area contains overlapping big game crucial winter ranges and a north-south migration corridor for mule deer, as well as migration corridors for elk, pronghorn, and moose. Currently, the area is closed during the winter season to motorized vehicles to protect wintering big game. The area supports yearlong and seasonal habitats for greater sage-grouse, other sensitive sagebrush obligate species, and all local big game species. In addition, the northeast portion of the proposed MA contains designated elk parturition habitats. The area also contains a raptor migration corridor and potentially provides habitats for Bonneville cutthroat trout, bluehead suckers, and leatherside chub. Roundtail chub and flannelmouth suckers also may utilize the Willow Creek drainage.

The entire proposed MA exhibits low oil and gas development potential. Most of the proposed MA exhibits low occurrence potential for coal; however, approximately 5,000 acres exhibit moderate occurrence potential. Phosphate occurrence potential within the proposed MA is mostly moderate with less than 10,000 acres classified as low and less than 1,000 acres classified as high occurrence potential. The entire proposed MA has low occurrence potential for trona.

Bear River Divide MA

Within the planning area, the Bear River Divide area currently is not identified for other management; however, alternatives to current management identify up to 146,322 acres of the Bear River Divide area as an MA. The proposed area is located southwest of Kemmerer (maps 62 and 64) and directly south of the proposed Rock Creek/Tunp MA. The two areas are connected by underpasses that allow movement of big game from one side of U.S. Highway 30 to the other. The Bear River Divide MA is intended to protect and enhance critical wildlife habitats, cultural values, and paleontology resources. The area includes traces of the Oregon-California NHT, Bear River Divide Trail Landmark, Fossil Butte National Monument viewshed, and internationally renowned fossil fish paleontological resources.

This area is within the Wyoming Department of Game and Fish's Strategic Habitat Plan Priority Area 1 for both the Green River Regional Wildlife Division and the Pinedale Regional Fish Division (WGFD 2004b). The WGFD reports that the area "…contains crucial big game winter range for the Wyoming Range mule deer, Uinta mule deer, West Green River elk, Carter Lease antelope, and Bear River Divide moose herd units" (WGFD 2004b). The area also contains a north-south migration corridor for mule deer, as well as migration corridors for elk and pronghorn. Currently, the area is closed during the winter season to motorized vehicles to protect wintering big game. The area supports yearlong and seasonal habitats for greater sage-grouse, other sensitive sagebrush obligate species, and all local big game species. The area also contains a raptor migration corridor. In addition, the area potentially provides habitats for Bonneville cutthroat trout, bluehead suckers, and leatherside chub. Roundtail chub and flannelmouth suckers also may utilize area drainages.

The eastern portion of the proposed Bear River Divide MA is located over the Fossil Basin paleontological feature, and the northeast portion is part of the viewshed area of Fossil Butte National Monument. This area is proposed to protect and highlight the paleontological deposits in the area, as well as scenery and views from Fossil Butte National Monument.

A number of gas plants, including Carter Creek, Road Hollow, and Whitney Canyon, occur in the area, including associated surface pipelines. The proposed MA exhibits low to high oil and gas development potential. Coal and phosphate occurrence potentials within the proposed MA primarily have low to moderate oil and gas development potential. Trona occurrence potential within the proposed MA is low.

3.7.2 Wild and Scenic Rivers

Currently no WSRs are designated within the planning area. The Wild and Scenic Rivers Act of 1968 (16 USC § 1271 et seq.) provides for protection of certain selected rivers and their immediate environments that possess outstandingly remarkable values (Interagency Wild and Scenic Rivers Coordination Council 2002). Rivers can be designated into the national system by an act of Congress or by the Secretary of the Interior at the request of a state governor. A designated river is classified as wild, scenic, or recreational based on the presence of development and activity within a river's corridor. Classifications serve as a baseline land use description and guide management activities within the river corridors. Comprehensive management plans for WSRs are developed within 3 years of designation.

Step I – Eligibility Criteria

All of the perennial, ephemeral, and intermittent waterways that exist on BLM-administered surface in the planning area were reviewed. Upon review, resource specialists assessed each waterway under the eligibility criteria of free-flowing and possessing one or more outstandingly remarkable values. Of the 201 waterways reviewed in the planning area, 188 were found to have no outstandingly remarkable values and were dropped from further consideration, while 13 were determined to meet the WSR eligibility criteria. Four of these 13 eligible waterway segments actually include the main waterway segment and at least one tributary that together were reviewed as "waterway units." They are the Bridger Creek, Pine Creek, Raymond Creek and Smiths Fork River "units." The other nine waterways involving public lands

determined to meet the eligibility criteria are Bear River, Blacks Fork River, Coal Creek, Dempsey Creek, Emigrant Creek, Fontenelle Creek, Hams Fork, Huff Creek, and Slate Creek (South Fork). Table 3-34 details the waterway segments moving forward for additional study.

Table 3-34. Kemmerer Planning Area List of Eligible Waterways

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Bear River				
T.18N., R.120W., Sec. 20 Miles: 1.16	Yes	Recreational, Wildlife – Popular fishing, camping, and eagle viewing area. Important winter roost habitat for bald eagles.	Yes	Scenic
Blacks Fork River				
(1) T.13N., R.116W., Sec. 18 (2) T.13N., R.166W., Sec. 6 Miles: 1.77	Yes	Scenic, Recreational, Ecological – Unique landscape with variety of vegetation. Important regional fishing area. Unique mix of plant species.	Yes	(1) Recreational (2) Scenic
Bridger Creek Unit				
Bridger Creek: T.19N., R.120W., Sec. 1, 12 T.20N., R.120W., Sec. 22, 26, 27, 35 Miles: 0.97	Yes	Scenic, Historical – Interpretive site overlooking pristine historical landscape. Main route of Oregon Trail with a number of well-preserved ruts.	Yes	Scenic
North Bridger Creek: T.20N., R.119W., Sec. 17, 18; R.120W., Sec. 17, 18, 22, 23 Miles: 4.69	Yes	Scenic, Historical – Interpretive site overlooking pristine historical landscape. Main route of Oregon Trail with a number of well-preserved ruts.	Yes	Scenic
Coal Creek				
T.28N., R.119W., Sec. 25, 26 T.28N., R.119W., Sec. 26, 27 T.28N., R.119W., Sec. 27 Miles: 2.96	Yes	Recreational and Fisheries – Popular fishing area. Important Bonneville Cutthroat trout fisheries.	Yes	Recreational
Dempsey Creek				
T.24N., R.117W., Sec. 29, 30 T.24N., R.117W., Sec. 29, 32, 33 Miles: 1.24	Yes	Scenic, Historical – Overlooks pristine historical landscape. Contains the best preserved section of the Dempsey/ Hockaday Trail.	Yes	Scenic
Emigrant Creek				
T.23N., R.115W., Sec. 9, 10, 14 T.23N., R.115W., Sec. 13, 14, 23, 24, 25; R.114W., Sec. 30 Miles: 6.15	Yes	Scenic, Historical - Overlooks pristine historic landscape. Location of the Slate Creek cutoff of the Emigrant Trail, includes inscriptions and graves.	Yes	Scenic
Fontenelle Creek				
(1) T.25N., R.115W., Sec. 21 (2) T.25N., R.115W., Sec. 21, 28 (3) T.25N., R.115W., Sec. 34; T.24N., R.115W., Sec. 6 (4) T.24N., R.115W., Sec. 6 (5) Fontenelle Gap T.24N., R.115W., Sec. 2, 3, 4 Miles: 6.08	Yes	Scenic, Recreational – Destination fishing stream. Spectacular Canyon at Fontenelle Gap.	Yes	(1) Scenic (2) Scenic (3) Scenic (4) Wild (5) Wild

Table 3-34. Kemmerer Planning Area List of Eligible Waterways *(Continued)*

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Hams Fork				
T.23N., R.117W., Sec. 25, 36 Miles: 0.13	Yes	Recreational – An important fishery that allows year-round fishing opportunities.	Yes	Recreational
Huff Creek				
T.27N., R.119W., Sec. 21, 22 T.27N., R.119W., Sec. 15 T.27N., R.119W., Sec. 3, 10 T.28N., R.119W., Sec. 27, 34 Miles: 6.02	Yes	Scenic, Fisheries, Wildlife – Narrow river valley with spectacular views. Important Bonneville cutthroat stream. Canada lynx critical habitat.	Yes	Recreational
Pine Creek Unit				
Pine Creek: T.25N., R.118W., Sec. 26, 34, 35 Miles: 3.68	Yes	Scenic, Recreational, Wildlife – Spectacular canyon with exceptionally clear water, cascades, good plant diversity. Provides hiking, hunting, and camping opportunities. Canada lynx critical habitat.	Yes	Recreational
Unnamed Tributary: T.24N., R.118W., Sec 3, 4 T.25N., R.118W., Sec 35 Miles: 1.32	Yes	Scenic, Recreational – Spectacular canyon with exceptionally clear water, cascades, good plant diversity. Provides hiking, hunting, and camping opportunities. Canada lynx critical habitat.	Yes	Recreational
Raymond Creek Unit				
Raymond Creek: T.26N., R.119W., Sec. 4, 5, 6 T.27N., R.119W., Sec. 28, 33 Miles: 4.10	Yes	Scenic, Recreational, Fisheries, Wildlife – Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Raymond Creek South Fork: T.26N., R.119W., Sec. 4, 9 Miles: 2.33	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Cougar Hollow: T.27N., R.119W., Sec. 34, 35 Miles: 0.97	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Trail Creek: T.27N., R.119W., Sec. 33, 34 Miles: 1.43	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Yellow Pine: T.26N., R.119W., Sec. 3, 4, T.27N., R.119W., Sec. 33 Miles: 1.39	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild

Table 3-34. Kemmerer Planning Area List of Eligible Waterways *(Continued)*

Segment and Miles (across public land)	Free Flowing	Outstandingly Remarkable Values on Public Lands	Eligible	Tentative Classification
Green Canyon: T.26N., R.119W., Sec. 9 Miles: 1.04	Yes	Scenic, Recreational, Fisheries, Wildlife - Canyon with colorful formations, spectacular views and brilliant fall colors. Important recreational area for hiking, backpacking, hunting, horseback riding, fishing, and mountain climbing. Important Bonneville cutthroat trout stream. Canada lynx critical habitat.	Yes	Wild
Slate Creek				
T.22N., R.114W., Sec. 7, 8 Miles: 0.79	Yes	Scenic, Cultural – Deep, narrow canyon with colorful geological features. Benchmark site for prehistoric, stratified campsite.	Yes	Wild
Smiths Fork River Unit				
Smiths Fork River: (1) T.28N., R.118W., Sec. 3, 10 (2) T.28N., R.118W., Sec. 15, 22, 27 (3) T.28N., R.118W., Sec. 27 (4) T.27N., R.118W., Sec. 4, (5) T.27N., R.118W., Sec. 4, 9 (6) T.27N., R.118W., Sec. 16, 21 (7) T.27N., R.118W., Sec. 33 Miles: 4.97	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	(1) Scenic (2) Recreational (3) Recreational (4) Recreational (5) Recreational (6) Recreational (7) Recreational
Smiths Fork, West Fork: T.28N., R.118W., Sec. 4, 9, 10 Miles: 1.34	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Smiths Fork, Dry Fork: T.28N., R.118W., Sec. 4, 9, 16 T.28N., R.118W., Sec. 16 T.27N., R.118W., Sec. 21, 28 T.27N., R.118W., Sec. 33 Miles: 4.28	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Hobble Creek: T.28N., R.118W., Sec. 34 T.28N., R.118W., Sec. 33 Miles: 0.56	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Porcupine Creek: T.28N., R.118W., Sec. 27 Miles: 0.69	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Recreational
Trespass Creek: T.28N., R.118W., Sec. 3, 10 Miles: 0.97	Yes	Scenic, Recreational, Fisheries – Forested river valley with large willow bottom and spectacular views of peaks to the north. Trophy brown trout water with camping and hunting opportunities. Important Bonneville cutthroat stream.	Yes	Wild

Source: Jonas Consulting 2002

N North
R Range
Sec Section
T Township
W West

Step II – Suitability Factors

All of the 13 waterway segments within the planning area found to meet the eligibility criteria are tentatively classified as wild, scenic, or recreational. These segments were further reviewed to determine if they meet WSR suitability factors. Public lands along one waterway (Huff Creek) and one waterway unit (Raymond Creek unit) were found to meet the suitability factors.

The primary factors that caused the review team to arrive at a nonsuitable determination follow:

Factor 1 – Characteristics that do not make the public lands involved a worthy addition to the NWSRS.

Factor 2 – Current status of landownership (including mineral ownership) and land and resource uses in the area, including the amount of private land involved, and any associated or incompatible land uses.

Factor 3 – Reasonable foreseeable potential uses of the public lands involved and related waters which would be enhanced, foreclosed, or curtailed if the area were included in the NWSRS, and the values which may be foreclosed or diminished if the public lands are not protected as part of the NWSRS.

Factor 6 – Ability of the BLM to manage and (or) protect the public lands involved as part of the National Wild and Scenic Rivers System, or by other mechanism (existing and potential) to protect identified values other than by WSR designation.

Eligible waterways identified for further study through BLM planning processes are protected under the BLM's discretionary authority. Existing uses occurring at the time of the evaluation may continue in the same manner and degree on rivers determined eligible for further study. New uses or changes in use will be assessed on a case-by-case basis in an environmental analysis to determine whether the identified waterway values, the free flow, or the tentative classification could be degraded with new or changed use.

In the planning area, the 13 eligible waterway segments are managed to protect the free-flowing, outstandingly remarkable values and tentative classification as WSRs. Brief descriptions of these segments are in Table 3-34. Additional details are available in the Kemmerer Field Office Review of Potential Wild and Scenic Rivers in the Kemmerer Resource Management Plan Planning Area (Jonas Consulting 2002) and can be accessed on the Kemmerer RMP revision website (www.blm.gov/rmp/kemmerer).

3.7.3 Wilderness Study Areas

Pursuant to the Wilderness Act of 1964, Section 2(c), "wilderness" is defined as "… an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain… an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

The FLPMA of 1976 directs the BLM to inventory and study its roadless areas for wilderness characteristics. To be designated a WSA, an area has to have the following characteristics:

- Size – roadless areas of at least 5,000 acres of public lands or of a manageable size
- Naturalness – generally appears to have been impacted primarily by the forces of nature

- Opportunities – provides outstanding opportunities for solitude or primitive and unconfined types of recreation.

WSAs also often have special qualities, such as ecological, geological, educational, historical, scientific, and scenic values.

Raymond Mountain WSA

One WSA exists within the planning area. The Raymond Mountain WSA is located in the Sublette Mountain Range (Raymond Mountains). The WSA is approximately 19-miles long, 4-miles wide at its widest point, and includes approximately 32,880 acres. The WSA has diverse vegetation and step topography. A major portion of the area is forested with Douglas-fir, lodgepole pine, and other coniferous trees, as well as aspen. The southern end of the WSA contains stands of big sagebrush and rock outcrops.

Current management of the Raymond Mountain WSA is subject to the provisions of the *Interim Management Policy and Guidelines for Lands Under Wilderness Review: Update* Document H-8550-1, 11/10/87 (BLM 1995a). Management emphasizes preservation of wilderness values until wilderness determination is made by Congress. The Raymond Mountain WSA exhibits very low oil and gas development potential, moderate-to-high phosphate occurrence potential, and most of the WSA is classified as having low occurrence potential for coal and trona.

3.7.4 Back Country Byways

Currently, no Back Country Byways are designated within the planning area. The BLM began a Back County Byway program in 1989 to focus on enhancing recreational opportunities. A Scenic Byway System was created 2 years later under Section 1047 of the Intermodal Surface Transportation Efficiency Act of 1991. This act recognized the BLM Back Country and Scenic Byways as a component of the national scenic byway system (Section 1032, eligible projects). The objectives of the byway program include the following:

- Enhance opportunities for the American public to see and enjoy the unique scenic and historical opportunities on public lands.
- Foster partnerships at local, state, and national levels.
- Contribute to local economies.
- Enhance the visitor's recreation experience and communicate the multiuse management message through effective interpretative programs.
- Manage visitor use along the byway to minimize impacts to the environment and to provide protection for the visitor.
- Contribute to the national scenic byway system in a way that is uniquely suited to national public lands managed by the BLM.

Emigrant Springs Back Country Byway

The proposed Dempsey Ridge and Emigrant Springs Scenic Back Country Byway is an existing road loop through Lincoln County (Map 65). The loop begins in Kemmerer and travels over Dempsey Ridge to Fossil Butte and back to Kemmerer. Approximately 4.5 miles of the proposed route is a primitive, four-wheel-drive trail; the rest of the proposed scenic Back Country Byway is an upgraded (crowned and ditched) gravel road. This proposed Back Country Byway will be managed with the objective of encouraging responsible motorized recreational use, while protecting the scenic, cultural, and critical wildlife habitat values in the area.

This route provides recreational enthusiasts the opportunity to explore western Wyoming's natural beauty and remote landscapes. The majority of visitation in the Dempsey Ridge and Emigrant Springs Scenic Back Country Byway is anticipated to occur during the summer season. Interpretive kiosks, which include a map of the area, may be placed at both ends of the byway. Specific management prescriptions for the area will be in place for the protection of sensitive soils, wildlife habitats, visual resources, and important cultural and historical sites.

3.8 Socioeconomic Resources

This section describes existing conditions for Social Conditions, Economic Conditions, Health and Safety, and Environmental Justice.

3.8.1 Social Conditions

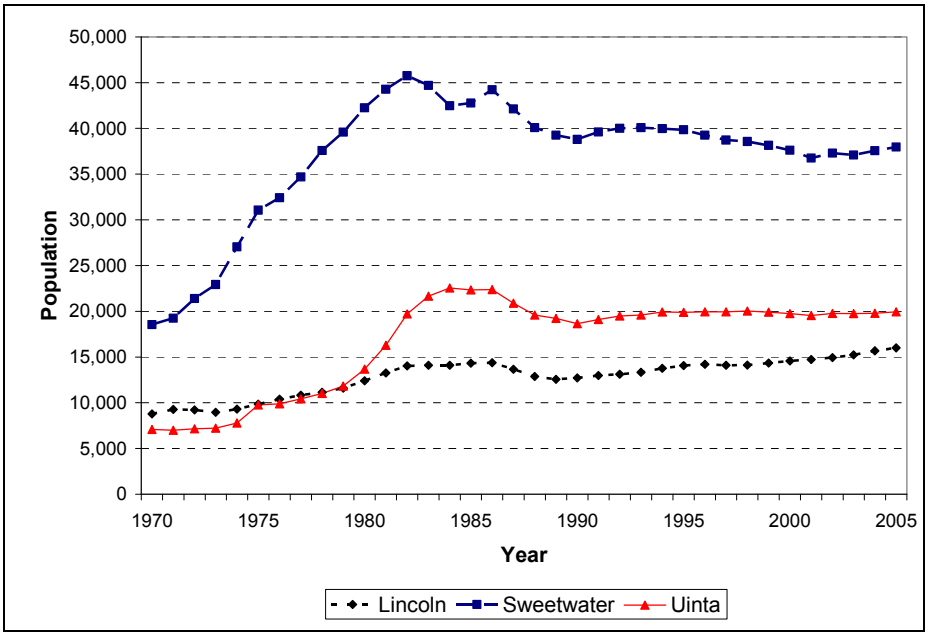
Social Conditions

Social conditions in the Kemmerer Field Office planning area that concern human communities include towns, cities, rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values. BLM management actions can impact social conditions in the planning area and in nearby communities. For this reason, a larger area than the planning area is studied for social conditions. This study area is comprised of the entire counties of Uinta, Lincoln, and Sweetwater. This section provides a summary of demographic information; custom, culture and social trends, and current conditions; and public services. Social conditions often are based on a wide range of community and demographic characteristics and involve broad topics of community interests. Other discussions related to social conditions are provided in the Economic Conditions and Environmental Justice sections of this document.

Population and Demographics

The study area is comprised of Lincoln, Sweetwater, and Uinta counties in Wyoming. In 2005, Sweetwater was the most populous, with 37,975 people, Lincoln County had 15,999 people, and Uinta County had 19,939 people (Wyoming Economic Analysis Division 2006a). All three counties experienced rising populations in the late 1970s and early 1980s during the previous oil and gas boom, and population decreases following the oil and gas bust in the mid-1980s. Since 1990, the population has stayed virtually constant in Uinta County, increased steadily in Lincoln County, and, until 2000, decreased steadily in Sweetwater County (Sweetwater County has seen a small rise in population in recent years) (BEA 2006; Wyoming Economic Analysis Division 2006a). Figure 3-6 provides a visual summary of population trends for the three counties from 1970 to 2005.

Figure 3-6. Population Trends in Lincoln, Sweetwater, and Uinta Counties, Wyoming, from 1970 to 2004



Source: BEA 2006 (data for 1970-2004); Wyoming Economic Analysis Division 2006a (data for 2005)

Table 3-35 provides a tabular summary for each county along with the incorporated cities and towns in each county within the planning area (as well as the whole counties in the study area). The largest city in the Kemmerer Field Office planning area is Evanston, the county seat of Uinta County; the next largest is Kemmerer, the county seat of Lincoln County. Most of the towns and cities in Sweetwater County, including Green River and Rock Springs, are not in the planning area; the only city in Sweetwater County that is in the planning area is Granger.

Table 3-35. Population for Counties and Towns in the Study Area Over Time

Area	1990	2000	2005	% Change (1990-2000)	% Change (2000-2005)	% Change (1990-2005)
Lincoln County	12,625	14,573	15,999	+15.4%	+9.8%	+26.7%
Afton	1,630	1,818	1,831	+11.5%	+0.7%	+12.3%
Alpine	200	550	789	+175.0%	+43.5%	+294.5%
Cokeville	493	506	492	+2.6%	-2.8%	-0.2%
Diamondville	864	716	695	-17.1%	-2.9%	-19.6%
Kemmerer	3,020	2,651	2,560	-12.2%	-3.4%	-15.2%
Opal	95	102	99	+7.4%	-2.9%	+4.2%
Thayne	267	341	357	+27.7%	+4.7%	+33.7%
Unincorporated Areas[1]	5,563	7,458	8,755	+34.1%	+17.4%	+57.4%
Sweetwater County	38,823	37,613	37,975	-3.1%	+1.0%	-2.2%
Granger	126	146	146	+15.9%	0.0%	+15.9%
Rock Springs[2]	19,050	18,708	18,772	-1.8%	+0.3%	-1.5%
Green River[2]	12,711	11,808	11,787	-7.1%	-0.2%	-7.3%
Unincorporated Areas[1]	6,195	6,349	6,670	+2.5%	+5.1%	+7.7%
Uinta County	18,705	19,742	19,939	+5.5%	+1.0%	+6.6%
Evanston	10,904	11,507	11,459	+5.5%	-0.4%	+5.1%
Lyman	1,896	1,938	1,937	+2.2%	-0.1%	+2.2%
Mountain View	1,189	1,153	1,163	-3.0%	+0.9%	-2.2%
Unincorporated Areas[1]	4,716	5,144	4,893	+9.1%	-4.9%	+3.8%

Source: Wyoming Economic Analysis Division 2006a (2000 and 2005 data); Wyoming Economic Analysis Division 2006b (1990 data).

[1]May include some people who live in the county but outside the planning area.

[2]These cities are outside the Kemmerer planning area, but within the study area.

A substantial proportion of the population of the study area lives outside incorporated cities and towns. For instance, about 8,750 people in Lincoln County, or about 55 percent of the county's population, lived outside incorporated areas in 2005. Similarly, 24 percent of the people in Uinta County (4,900 people) and 18 percent of those in Sweetwater County (about 6,700 people) lived outside cities and towns in 2005 (Wyoming Economic Analysis Division 2006a). This population pattern contributes to the largely rural and small-town character of the study area.

Although total population has increased in all three counties since 2000, changes have occurred with respect to the distribution of different age groups. Since 1990, the proportion of people aged 60 and over, and the proportion aged 40 to 59, have increased; however, the proportion of people in their childbearing years (age 25 to 39) and the proportion of children under age 15 have decreased. One implication of this change is declining enrollments in primary and secondary schools; this trend is addressed later in this section. Table 3-36 provides a summary of the changing demographics in each county. As the table shows, the trend toward an older population (higher percentage of residents over age 40) is also a statewide trend. In addition, the percentage of people aged 60 and over has increased in all three counties over time.

Housing

Because boom and bust cycles can impact the demand for housing, it is important to know the supply of housing in the study area. Table 3-37 shows the number of housing units over time for the three counties in the study area. From 2000 to 2005 the number of housing units in Uinta and Sweetwater Counties has increased only slightly (by two percent in Sweetwater County and four percent in Uinta County), but has increased by 14 percent in Lincoln County. As the table shows, while population and housing units have increased markedly in Lincoln County since 2000, they have generally kept pace, so that the housing stock has grown commensurate with population.

Table 3-36. Change in Population Age Groups in Study Area Counties, 1990 to 2000

Percent of Population	Lincoln			Sweetwater			Uinta			Wyoming		
	1990	2000	2005	1990	2000	2005	1990	2000	2005	1990	2000	2005
Percent aged 0-14	32	24	20	29	23	20	34	27	22	25	21	18
Percent aged 15-24	12	14	16	13	16	15	13	16	17	14	15	15
Percent aged 25-39	22	17	16	27	20	18	28	20	17	25	20	18
Percent aged 40-59	20	28	30	21	30	33	18	28	32	21	29	31
Percent aged 60 and over	14	17	18	10	11	13	8	10	12	14	16	17

Source: Wyoming Economic Analysis Division 2006c (data for 2005); Wyoming Economic Analysis Division 2003a (data for 1990 and 2000).

Table 3-37. Housing and Population Over Time in the Study Area

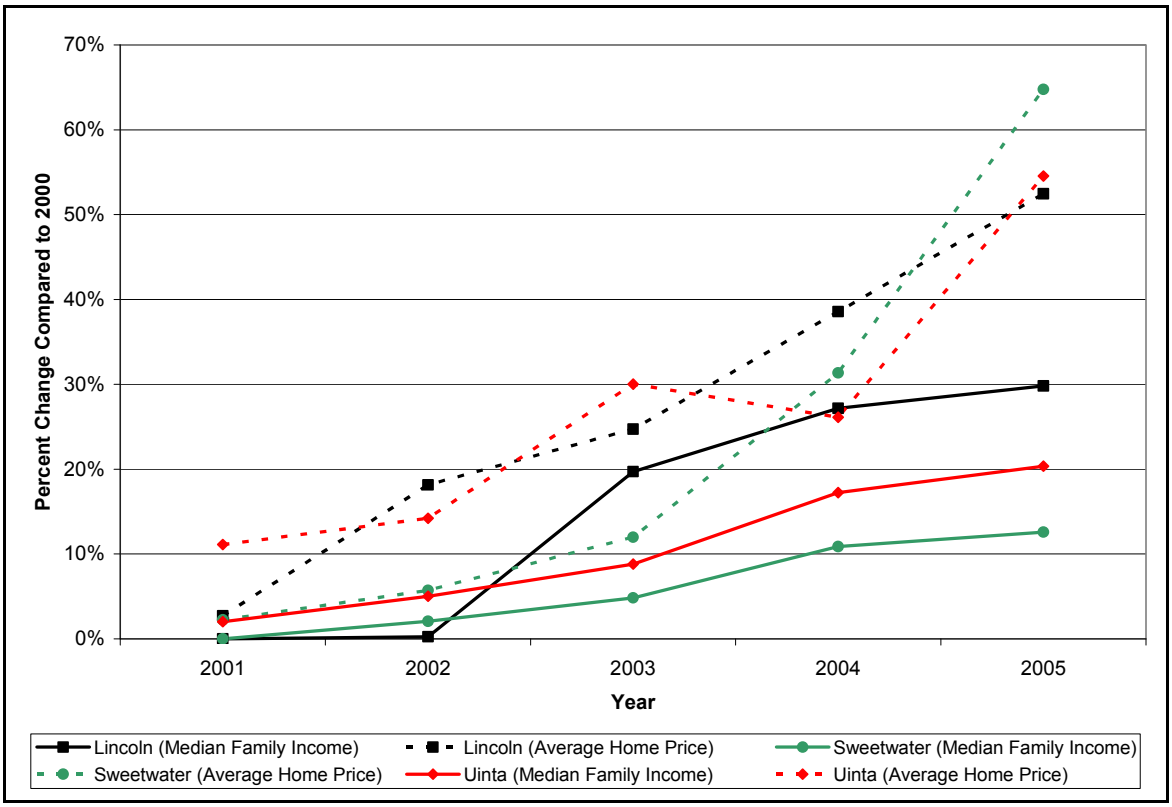
Measure	2005 (Number)	Percent Change Since 2000				
		2001	2002	2003	2004	2005
Lincoln (Population)	15,999	1%	3%	5%	8%	10%
Lincoln (Housing Units)	7,763	3%	6%	8%	11%	14%
Sweetwater (Population)	37,975	-2%	-1%	-1%	0%	1%
Sweetwater (Housing Units)	16,254	0%	1%	1%	1%	2%
Uinta (Population)	19,939	-1%	0%	0%	0%	1%
Uinta (Housing Units)	8,307	1%	2%	3%	3%	4%

Source: Population from Wyoming Economic Analysis Division 2006c; Housing units from Wyoming Economic Analysis Division 2006d.

Some of the growth in housing units, especially in Lincoln County, may be attributable to second homes or vacation homes. As of 2000, 13 percent of homes in Lincoln County were seasonal homes, which makes Lincoln County the third-ranked county in the state in terms of percentage of seasonal homes (after Sublette County, at 26 percent, and Teton County at 20 percent). Three percent of the homes in Uinta County and two percent in Sweetwater County were seasonal homes as of 2000 (Wyoming Economic Analysis Division 2003b).

Housing costs have also increased in recent years. Figure 3-7 shows how median family income and average home sales price have changed since 2000. The dashed lines in the figure represent growth in average home prices compared to 2000, while the solid lines represent growth in median family income compared to 2000. As the figure shows, increases in the average home sales price have outpaced increases in median family income in all three counties and in Wyoming as a whole. For example, from 2000 to 2005 median family income increased by 30 percent in Lincoln County while the average home sales price increased by 52 percent.

Figure 3-7. Change in Median Family Income and Average Home Price Since 2000 in the Study Area



Source: Wyoming Housing Database Partnership 2006. All percent changes are based on nominal income and price, because the intent of the figure is to show how income has changed relative to one element of the cost of living (housing for purchase).

Table 3-38 provides the data used to construct Figure 3-7. The table underscores how in all three counties, growth in average home prices has outpaced growth in median family income. In 2001, median family income in Lincoln County was $41,600; in Sweetwater it was $58,000; in Uinta it was $49,900. In 2005, the respective median family income values were $54,000 for Lincoln County, $65,300 for Sweetwater, and $60,050 for Uinta. In 2000, the average home sale price in Lincoln County $123,266; in Sweetwater it was $108,633; and in Uinta it was $89,238. In 2005, the average home sale price in Lincoln County was $187,924; in Sweetwater it was $179,000; and in Uinta it was $137,911.

Table 3-38. Median Family Income and Average Home Sales Price in the Study Area

Measure	Cumulative Percent Change Since 2000				
	2001	2002	2003	2004	2005
Lincoln (Median Family Income)	0%	0%	20%	27%	30%
Lincoln (Average Home Price)	3%	18%	25%	39%	52%
Sweetwater (Median Family Income)	0%	2%	5%	11%	13%
Sweetwater (Average Home Price)	2%	6%	12%	31%	65%
Uinta (Median Family Income)	2%	5%	9%	17%	20%
Uinta (Average Home Price)	11%	14%	30%	26%	55%
Wyoming (Median Family Income)	2%	6%	15%	22%	24%
Wyoming (Average Home Price)	-2%	5%	13%	22%	36%

Source: Wyoming Housing Database Partnership 2006. All percent changes are based on nominal income and price in order to highlight the relative magnitude of changes in median income and housing prices.

Similar to home prices, monthly rents have also increased faster than median family income in some places within the study area. Table 3-39 shows monthly rents in 2006 and changes since 2000, with changes in median family income for the same periods for comparison. Median family income increased from 2000 to 2006, but rents increased as well in all areas, apartment rents increased faster than median family income, and in all areas except northern Lincoln County house rents also increased faster than median family income. Rent for mobile homes generally increased less than median family incomes or increased at the same pace. Rent for mobile home lots grew faster than median family income in Sweetwater and southern Lincoln Counties, but grew slower than median family income in northern Lincoln and Uinta County. The area experiencing the largest rise in rents relative to median income was southern Lincoln County (Kemmerer), followed by Sweetwater County (Rock Springs and Green River).

Table 3-39. Monthly Rent and Median Family Income 2006, and Change from 2000 in the Study Area

Area[5]	Median Family Income		Apartment Rent[1]		House Rent[2]		Mobile Home Rent[3]		Mobile Home Lot Rent[4]	
	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000	2006 ($)	Change From 2000
Lincoln (Northern)	58,700	+41.1%	431	+75.9%	484	+3.9%	178	+12.7%	406	+30.5%
Lincoln (Southern)	58,700	+41.1%	508	+107.3%	748	+60.5%	165	+4.4%	492	+58.2%
Sweetwater	69,400	+19.7%	684	+86.4%	816	+68.6%	238	+20.8%	669	+71.5%
Uinta	63,800	+27.9%	434	+33.1%	576	+30.0%	197	+31.3%	442	+6.5%
Wyoming	58,800	+31.5%	549	+43.0%	748	+37.2%	210	+24.3%	547	+36.4%

Source: Wyoming Housing Database Partnership 2006 (median family income); Wyoming Economic Analysis Division 2006e (rental costs for 2006); Wyoming Economic Analysis Division 2000 (rental costs for 2000).
[1]Two bedroom, unfurnished unit; excludes gas and electric.
[2]Single wide mobile home lot, including water.
[3]Two or three bedroom single family house; excludes gas and electric.
[4]Total monthly rental expense, including lot rent.
[5]Rents are based on a sample in communities that meet certain population thresholds. Northern Lincoln is based on Afton; southern Lincoln is based on Kemmerer; Sweetwater is based on Green River and Rock Springs; and Uinta is based on Evanston. Data for Wyoming as a whole is based on 28 communities across the state, including the largest community in each county and other communities with over 5,000 people or with a population of at least 85 percent of the county's largest city or town. Prior to 2003, the Wyoming Economic Analysis Division did not report data separately for northern and southern Lincoln County.

Table 3-40 shows rental vacancy rates by county. The Wyoming Housing Database Partnership (2006) reported on a survey of rental vacancy rates by county. Summer and winter rental vacancy rates over time have varied; in Lincoln County the summer rental vacancy rate has tended to be lower than the winter vacancy rate in the same year, but in Sweetwater and Uinta Counties the pattern is not as clear. For summer 2006, the survey estimated 1.9 percent of rental units in Lincoln County, 1.9 percent of rental units in Sweetwater County, and 2.5 percent of rental units in Uinta County were vacant. In 2005, the same survey identified rental vacancy rates of 6.7 percent in Lincoln County, 2.4 percent in Sweetwater County, and 3.7 percent in Uinta County (Wyoming Housing Database Partnership 2005). Thus, compared to 2005, rental vacancy rates in 2006 decreased substantially in Lincoln County and increased somewhat in Sweetwater and Uinta Counties. However, because the data are based on a sample, it is not certain whether these rates represent a trend toward lower rental vacancy rates or sampling error. It is important to note that Table 3-40 shows only rental vacancy rates. Comprehensive vacancy data (including properties for sale) from the 2000 Census indicates that vacancy rates in Lincoln, Sweetwater, and Uinta Counties were 23 percent, 11 percent, and 15 percent, respectively (Sonoran Institute 2004a, Sonoran Institute 2004b, Sonoran Institute 2004c).

Table 3-40. Housing and Population Over Time in the Study Area

Year	Lincoln County		Sweetwater County		Uinta County	
	June/July	December	June/July	December	June/July	December
2001	9.1%	14.4%	8.2%	4.5%	4.0%	11.1%
2002	8.8%	14.6%	6.1%	4.5%	12.6%	3.5%
2003	6.6%	5.5%	2.1%	0.9%	10.4%	9.1%
2004	6.8%	17.0%	0.9%	1.6%	8.1%	6.2%
2005	6.7%	10.2%	2.4%	2.4%	3.9%	1.6%
2006	1.9%	n/a	1.9%	n/a	2.5%	n/a

Source: Wyoming Housing Database Partnership (2006); Wyoming Housing Database Partnership (2005).
n/a = Not available.

Custom, Culture, and Social Trends

Land use, resource development, community values, and economic development are closely intertwined in the study area. Community values with respect to land and resource management are central to social issues in the study area because they are closely tied to issues of economic development, custom and culture, and quality of life. Understanding the social and economic development, culture, and history of the area provides valuable insight into how changes to the study area might impact the livelihood and quality of life of residents. This section addresses broad trends in economic development; Section 3.8.2 provides details on economic conditions and trends.

BLM's land and resource management decisions can impact social and economic conditions for all of the communities in the area. BLM's Kemmerer Field Office administers 32 percent of the total land area of Lincoln County (830,000 acres of the total 2.6 million acres) and 30 percent of Uinta County (approximately 400,000 of the 1.3 million acres). Although the Kemmerer Field Office administers just 3 percent of the land in Sweetwater County—184,000 of nearly 6.7 million acres—the Rock Springs and Rawlins BLM field offices administer additional lands within Sweetwater County. BLM also administers federal mineral estate in all three counties; thus, the BLM's management decisions can impact social conditions in all three counties. However, with respect to social conditions related to ranching, where surface ownership is the primary consideration, management decisions of the Kemmerer Field Office have more potential to impact conditions in Lincoln and Uinta counties than Sweetwater County.

The economy of the study area is based primarily on resource development (e.g., mining, agriculture) and services. Mining, including oil and gas, provides a large part of the employment and income of the communities in the study area. Mining has been the key economic driver for development of the communities in southwestern Wyoming and continues to provide much of the economic base in terms of jobs, household incomes, and tax revenues that allow governments at the local, state, and national level to attempt to meet the demand for essential services that is being driven by the growth in the oil and gas sector.

Ranching has been and remains an important part of the history, culture, and economy of the study area. Ranchers and livestock permittees/lessees face pressure as they compete with demands of other users of public lands. However, even under this pressure, socially and economically, the agriculture industry is important to local communities. This is shown by the fact that the livestock industry provides direct and indirect employment, maintenance of scenic vistas, active stewardship of remote lands, wildlife habitats, and the continuation of a way of life that helps draw tourists to the state.

The availability of a wide spectrum of recreational opportunities on public lands is another important component of many lifestyles and communities in the study area. For instance, Flaming Gorge Recreational Area and Fossil Butte National Monument, among the more popular outdoor recreation destinations in the state after Yellowstone, the Grand Tetons, and Devil's Tower, bring tourists and local residents into southwestern Wyoming (BLM 2004c). Because recreation involves diverse groups with

activities that are compatible for some and incompatible with other, changes in management of public lands can impact the various recreational sectors differently.

In general, resource development and resource protection are both important to sustaining the values within the study area. However, the challenge is seeking an appropriate balance between resource development and resource protection, which is central to the BLM's mission and the RMP process. Therefore, even though some individuals and groups give a high priority to resource protection, while others give a high priority to resource development, it is incumbent on the BLM to find an appropriate balance between these two competing philosophies.

Land and resources have profoundly impacted communities in southwest Wyoming from before European settlement through the present day. The first Europeans came to the study area in the early nineteenth century as trappers, explorers, and settlers. Since the mid-1800s, the mining industry has been a key driver in economic growth and development in the region. Coal, oil, natural gas, and trona are the most important mineral commodities in terms of employment and income, but other minerals (e.g., clay, phosphate, vanadium, and zeolite) have played and continue to play a role in the development of the area.

Cumberland Gap, near Kemmerer, is the site referred to in the first written account of coal production in Wyoming in 1843 (Wyoming Business Council 2004). Coal production began in the mid-1800s, and by 1908, coal mining was the leading industry in Wyoming. The Kemmerer Coal Company, which opened mines near Kemmerer around the turn of the century, is still operating at the present time—the longest continuous operation in the state. Demand for coal declined around 1947 when the railroads began to use diesel locomotives, but increased again in the mid-1960s due to the appeal of Wyoming's low-sulfur coal for electricity production (Wyoming Business Council 2004). Although most of Wyoming's coal now comes from the Powder River basin, the Hams Fork and Green River coal regions continue to be productive; coal production in the three counties in the study area comprised more than 13.7 million tons in 2005 (Wyoming Business Council 2004; Wyoming DOR 2006).

Oil and gas development came later, but served as an impetus for economic development in the study area as well. Production of natural gas has been ongoing since 1903. Although the early production was primarily in the Wind River and Big Horn basins, the Overthrust Belt (located primarily in Uinta County) and the Green River basin are now among the leading geologic regions for natural gas production statewide (Wyoming Business Council 2004). Natural gas production statewide has increased steadily since the mid-1980s (Wyoming Business Council 2004). Sweetwater, Uinta, and Lincoln counties ranked third, fifth, and seventh, respectively, in quantity of natural gas produced in 2005 (Wyoming DOR 2006). However, the largest share of the production in Sweetwater County is from wells outside of the planning area and production in Uinta County has been declining over the past five years.

Although oil was first produced commercially in Wyoming in 1851, the lack of nearby markets and the high cost of transporting oil by rail resulted in a low demand for Wyoming oil until World War II (Wyoming Business Council 2004). Today, despite declining overall state production since about 1970, activity in the Overthrust Belt has meant that production in the study area continues to account for a sizable portion of state oil and gas production (Wyoming Business Council 2004). In 2005, the three counties in the study area produced nearly 7 million barrels of oil, or about 14 percent of crude and stripper oil in the state (Wyoming DOR 2006). Depending on international oil prices and technological developments (e.g., directional drilling, enhanced recovery methods, extraction from oil shale), oil production in Wyoming may continue to contribute substantially to the region and state economy (Wyoming Business Council 2004).

Sweetwater County is the only county in the state that produces trona (soda ash), which is used in glassmaking and other industries. The Known Sodium Leasing Area, which encompasses about 1,100 square miles in areas where trona is known to exceed 4 feet in thickness, is located in Sweetwater and Uinta counties, with about half of its area (about 550 square miles) in the Kemmerer Field Office planning area (BLM 2003a). In addition to producing 90 percent of the nation's trona, the mines in the

Known Sodium Leasing Area also produce much of the trona used around the world. Commercial trona production from the area began in 1950. Today trona mining accounts for an estimated 2,800 jobs in Sweetwater County (Sweetwater Joint Travel & Tourism Board 2005).

The importance of minerals and mining in economic development has meant that the communities in the study area are susceptible to boom and bust cycles based on national and international energy and commodity markets. The most recent boom-bust cycle occurred from the mid-1970s through the mid-1980s, with rising international energy costs in the 1970s due to international events that sparked a boom in Wyoming energy development. For example, the thousands of workers and energy-related businesses that came to Uinta County in the late 1970s tripled the population of Evanston within a few short years (Uinta County 2005). When world energy prices declined in the 1980s, the resulting bust left many communities in Wyoming, including some in the study area, saddled with public debt incurred to provide education and other public services to the new population. However, the mining and energy industry continues to be an economic mainstay and provides many relatively high-paying jobs, as well as critical tax revenues, for state and local services. The Economic Conditions section provides additional information on the contributions of mining and other sectors to current employment, earnings, and tax revenues.

Agriculture, especially ranching, also has been important in the development of communities in the study area. Probably the first intentional ranching occurred in the area in the 1840s (BLM 2004c). Extensive ranch settlement in the region followed the construction of the UPRR around 1867. Early ranchers bought worn-out stock from emigrants, turned the animals out on the range to let them recuperate, and sold the healthier stock back to other emigrants (BLM 2004c). Later, the railroad provided a means for transporting animals to more distant markets. With the exception of Star Valley, agricultural settlement in the study area generally consisted of a mix of livestock husbandry and growing hay and grain in irrigable areas. Cattle ranching dominated the area, but sheep ranching was also an important element of the economy (BLM 2004c). Agriculture in Star Valley differed notably from that elsewhere in the study area, partly due to Mormon settlement in the late 1870s and partly because the valley is topographically and, to an extent, climatically different from the remainder of the study area (BLM 2004c). The Mormons and later settlers raised alfalfa, hay, and barley and husbanded dairy cows. Star Valley became a prominent producer of cheese and butter in the early twentieth century (BLM 2004c), although dairying eventually declined in the valley, and as of 2006, all the old cheese factories have closed. However, cattle and sheep grazing, hay production, and other agricultural production continues in the study area.

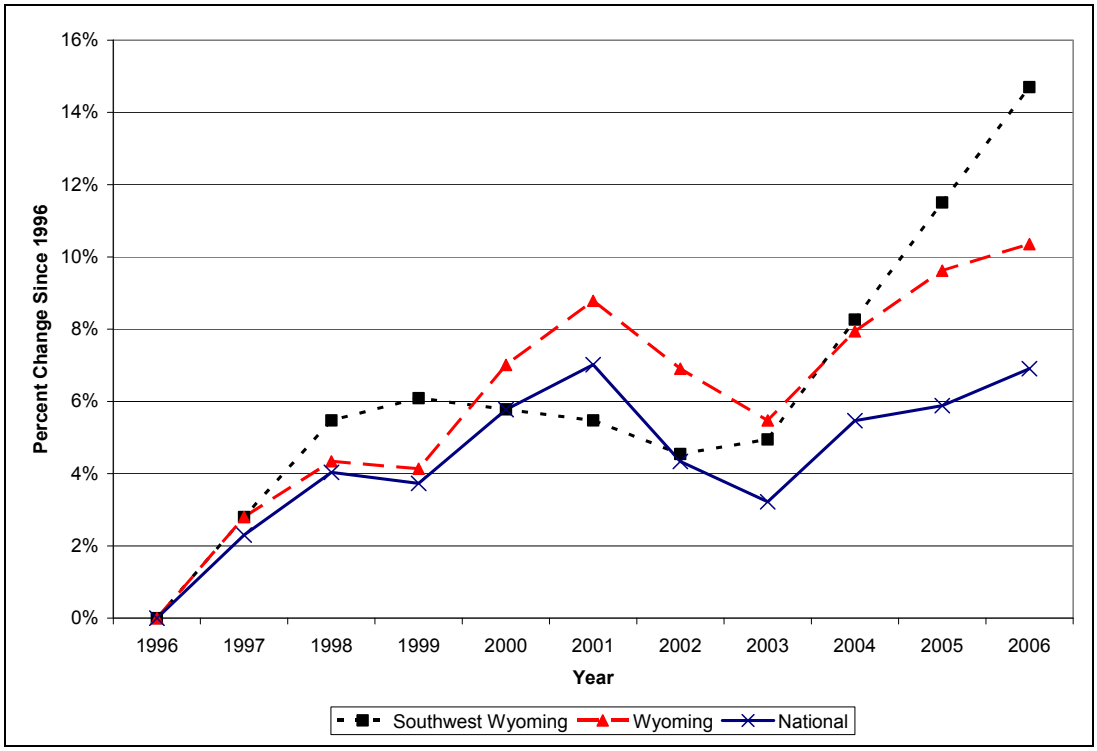
Other industries have influenced social development by providing economic opportunities. For instance, a major maintenance facility for the UPRR was constructed in Evanston in 1871, and for the next 100 years, the UPRR used the Evanston complex for railcar maintenance or related purposes (WYSHPO 2005). Other railroads and similar developments, such as the construction of the Lincoln Highway (later U.S. Highway 30) in the early nineteenth century (BLM 2004c). The land itself also has influenced the social fabric of the communities in the study area, as it has provided hunting and fishing for people from the Native Americans to the early European settlers to today's residents, as well as job opportunities related to recreation of tourists and visitors and scenic vistas and historic places that appeal to tourists and permanent residents. The Economic Conditions section provides additional information about the economic base of the communities in the study area.

One factor that affects the custom, culture, and social trends within the communities is the cost of living. The Wyoming Economic Analysis Division calculates relative changes in cost of living over time by estimating the cost of a set of goods and services that represents the average consumer's purchases for housing, food, health care, travel costs, and other items. If the cost of living for a particular area increases faster than average income, that may mean that long-time residents, especially those on fixed incomes, may find their lifestyle less affordable over time. Over the long-term, a higher cost of living may encourage people to relocate from a community and discourage migration into a community by households not seeking to relocate in conjunction with employment opportunities. Overall migration into

the area will likely decrease, and the demographic and socioeconomic characteristics of those who move in will be determined partially by the cost of living in the area.

Wyoming Economic Analysis Division (2006e) calculates the change in the cost of living over time for a four-county region in southwest Wyoming, consisting of Lincoln, Sweetwater, Uinta, and Sublette counties. Thus, Figure 3-8 shows how the cost of living in southwest Wyoming has changed relative to the cost of living in Wyoming generally and in the U.S. However, it is important to note that the four-county region defined by Wyoming Economic Analysis Division (2006e) differs from the planning area in several ways, including the inclusion of Sublette County as well as all of Sweetwater County. Trends in Sublette County differ from those in the planning area or the study area for two major reasons: first, it is a more popular area for second (vacation) homes; second, the recent energy boom has affected Sublette much more strongly (e.g., resulting in housing shortages and higher housing costs) than the planning area or the study area.

Figure 3-8. Cost of Living Change in the Study Area, 1996-2006

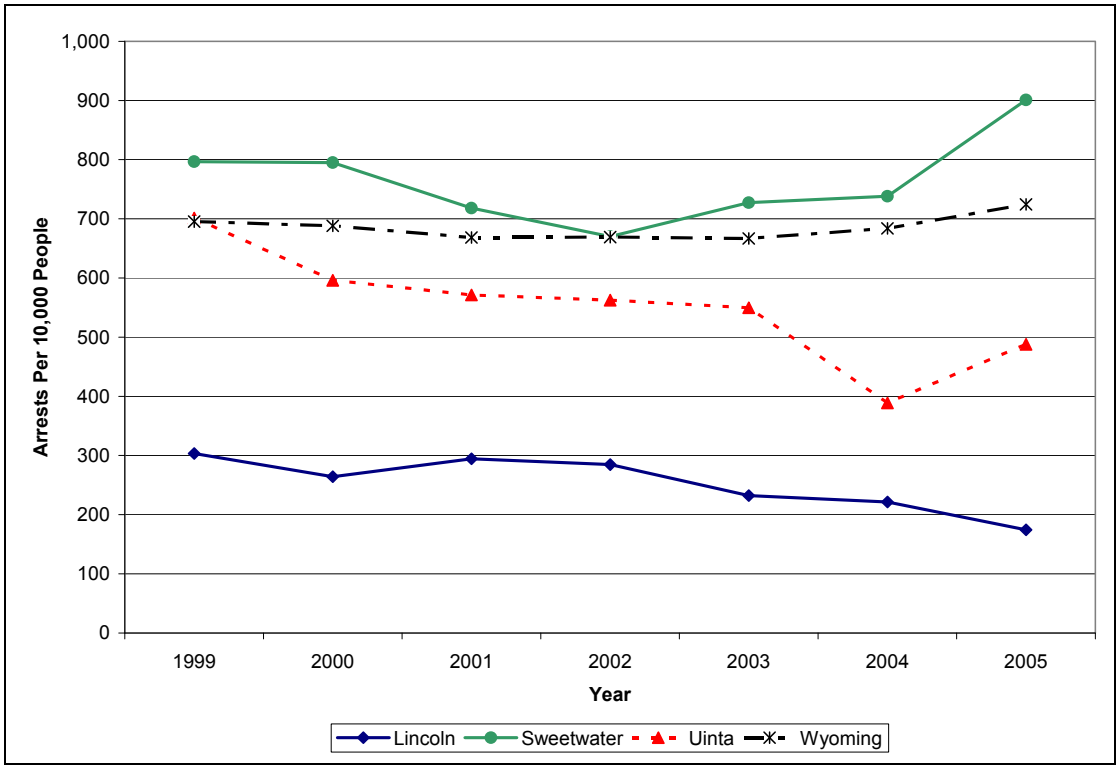


Source: Wyoming Economic Analysis Division 2006e

Public Safety

In communities that are experiencing the current energy boom and have experienced other boom and bust cycles in the past, current residents have expressed some concern about social effects, including public safety issues such as crime rates and traffic. This section presents recent trends in crime rates and vehicle traffic in the study area. Figure 3-9 provides a visual summary of arrests per 10,000 people for each of the counties in the study area and for the state. On a per-person basis, arrests have declined steadily in Lincoln County since 1999 and declined in Uinta County from 1999 to 2004, but increased again in 2005. In Sweetwater County, arrests per 10,000 people declined from 1999 to 2002 but have risen since 2002, particularly from 2004 to 2005. Note that the rate of arrests per 10,000 persons is lower for Lincoln or Uinta County than for the state as a whole; arrests per person are, however, higher in Sweetwater County than for the state.

Figure 3-9. Arrests Per 10,000 Persons in the Study Area, 1999-2005



Source: Wyoming Division of Criminal Investigation 2000, Wyoming Division of Criminal Investigation 2001, Wyoming Division of Criminal Investigation 2002, Wyoming Division of Criminal Investigation 2003, Wyoming Division of Criminal Investigation 2004, Wyoming Division of Criminal Investigation 2005, Wyoming Division of Criminal Investigation 2006.

Table 3-41 shows more detail on arrests, including arrests for crimes of different types. Drug-related crimes, including sale, manufacture and possession, increased significantly since 1999 in all three counties, more than doubling in Sweetwater County, and outpaced population growth substantially. However, the timing of the increase in drug-related crimes differs for the three counties. The largest jump for Sweetwater County occurred from 2004 to 2005, but for Lincoln and Uinta Counties, the increase in drug-related crimes generally occurred between 2001 and 2002 (except for the dip in drug-related crime in Uinta County in 2004, which then picked back up in 2005). All three counties saw decreases in index crimes (i.e., homicide, rape, robbery, aggravated assault, burglary, larceny-theft, and motor vehicle theft) since 1999. Driving under the influence increased since 1999 in Sweetwater County, but has decreased steadily in Lincoln and Uinta counties, except for an increase in Uinta County from 2004 to 2005.

Table 3-41. Arrests by Type in the Study Area and for Wyoming, 1999-2005

Area	Arrests by Year								% Change in Population 1999-2005
	1999	2000	2001	2002	2003	2004	2005	% Change 1999-2005	
Lincoln County									
Total Arrests	435	385	434	425	354	347	279	-35.9%	+11.6%
Index Crimes[1]	46	76	71	54	42	59	42	-8.7%	
Drug Crimes[2]	37	37	43	69	52	55	58	+56.8%	
DUI[3]	153	127	160	175	135	112	98	-35.9%	
All Other Crimes	199	145	160	127	125	121	81	-59.3%	

Table 3-41. Arrests by Type in the Study Area and for Wyoming, 1999-2005 *(Continued)*

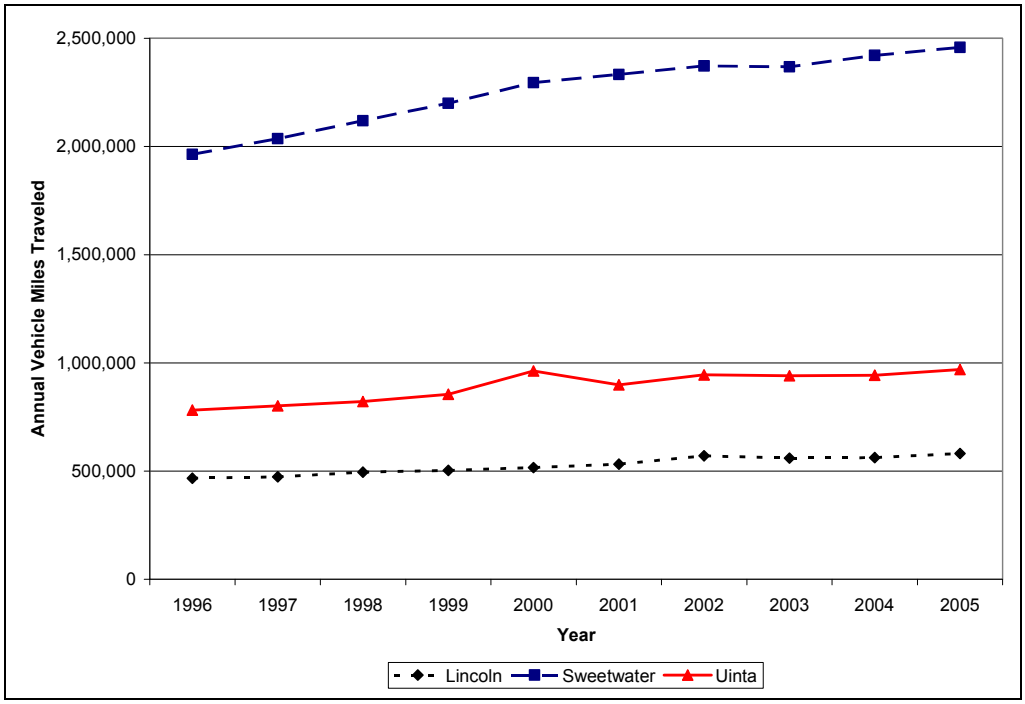
Area	Arrests by Year								% Change in Population 1999-2005
	1999	2000	2001	2002	2003	2004	2005	% Change 1999-2005	
Sweetwater County									
Total Arrests	3,039	2,990	2,640	2,499	2,698	2,773	3,421	+12.6%	-0.4%
Index Crimes[1]	617	447	290	331	341	387	344	-44.2%	
Drug Crimes[2]	191	181	202	223	295	336	484	+153.4%	
DUI[3]	320	313	369	306	317	364	527	+64.7%	
All Other Crimes	1,911	2,049	1,779	1,639	1,745	1,686	2,066	+8.1%	
Uinta County									
Total Arrests	1,396	1,177	1,116	1,112	1,086	769	973	-30.3%	+0.2%
Index Crimes[1]	169	93	83	95	91	58	78	-53.8%	
Drug Crimes[2]	104	121	105	148	146	77	125	+20.2%	
DUI[3]	264	256	257	218	218	155	205	-22.3%	
All Other Crimes	859	707	671	651	631	479	565	-34.2%	
Wyoming									
Total Arrests	34,204	33,981	33,016	33,396	33,459	34,592	36,898	+7.9%	+3.6%
Index Crimes[1]	3,748	3,496	3,191	3,190	3,077	2,972	3,225	-14.0%	
Drug Crimes[2]	2,321	2,307	2,566	2,675	2,624	2,906	3,234	+39.3%	
DUI[3]	4,258	4,466	4,438	4,232	4,278	4,548	5,011	+17.7%	
All Other Crimes	23,877	23,712	22,821	23,299	23,480	24,166	25,428	+6.5%	

Source: Wyoming Division of Criminal Investigation 2000, Wyoming Division of Criminal Investigation 2001, Wyoming Division of Criminal Investigation 2002, Wyoming Division of Criminal Investigation 2003, Wyoming Division of Criminal Investigation 2004, Wyoming Division of Criminal Investigation 2005, Wyoming Division of Criminal Investigation 2006.
[1]Index crimes include homicide, rape, robbery, aggravated assault, burglary, larceny-theft, and motor vehicle theft.
[2]Drug crimes include sale, possession, and manufacture.
[3]DUI = Driving Under the Influence.

Figure 3-10 provides trend data on vehicular traffic on roads in each of the three counties. The data in the figure refers to vehicle miles per year; vehicle miles represent the product of the number of vehicles and the number of miles. Thus, increasing vehicle miles may be due to a larger number of vehicles, more miles driven per vehicle, or both. As the figure shows, vehicular traffic in all three counties has increased steadily over the last ten years. In all three counties, vehicular traffic has increased more than population since 1996. For example, vehicle miles traveled increased 24 percent in Lincoln and Uinta and 25 percent in Sweetwater between 1996 and 2005. Over the same ten years, population increased 13 percent in Lincoln, stayed virtually constant in Uinta, and decreased by three percent in Sweetwater.

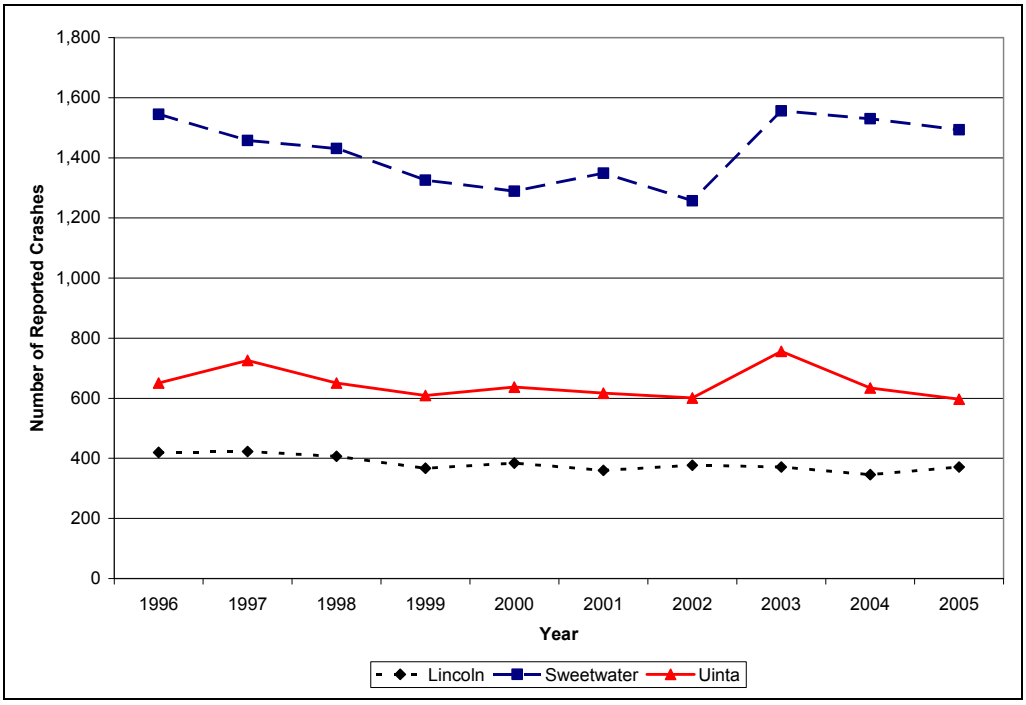
Figure 3-11 provides data on the number of reported vehicle crashes since 1996. Despite the increase in vehicle miles traveled shown above, the number of crashes has declined in the last ten years, with a 12 percent drop in Lincoln County, a three percent drop in Sweetwater and an eight percent drop in Uinta County.

Figure 3-10. Annual Vehicle Miles Traveled Per County in the Study Area, 1996-2005



Source: WYDOT 2006a

Figure 3-11. Reported Vehicle Crashes Per County in the Study Area, 1996-2005



Source: WYDOT 2006b. Reported crashes include those that result in injury, death, or property damage of at least $500 (prior to June 1999) or at least $1,000 (since June 1999).

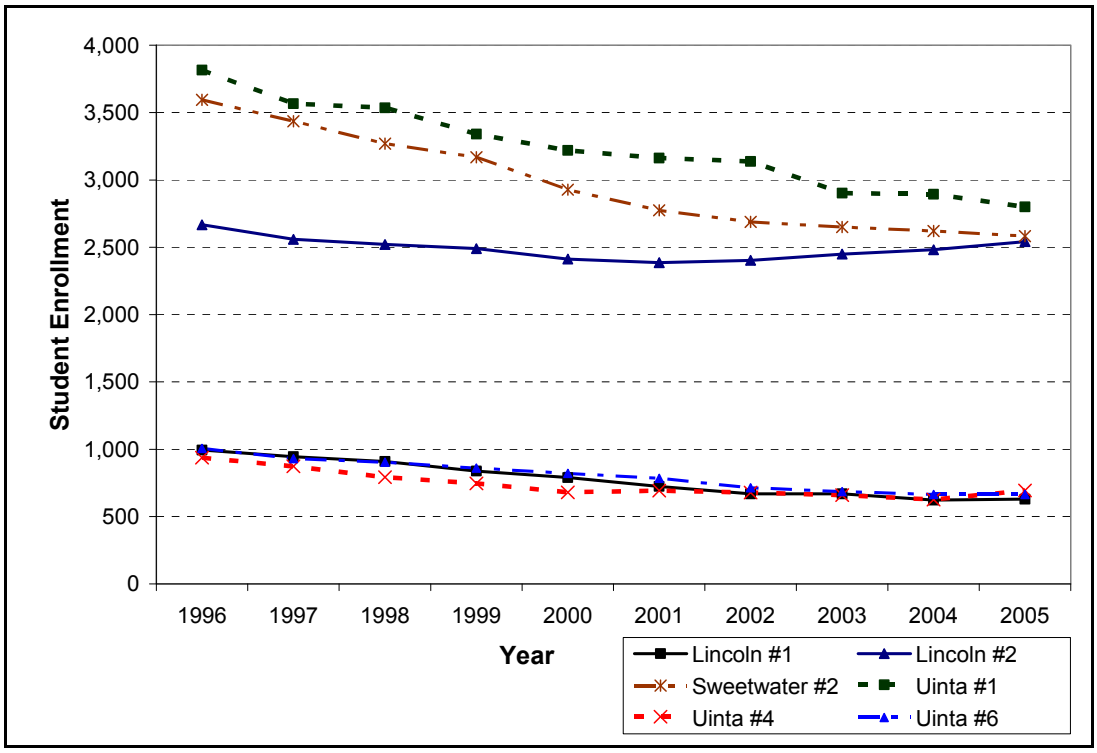
Educational Services

BLM management of public lands, as well as factors outside of the BLM's control, such as energy prices and technological development, could impact the ability of local communities to provide essential services, including education. Recent trends in county and school district budgets provide a useful point of reference for evaluating the potential for BLM management actions to impact the future.

The study area encompasses three school districts in Uinta County (District #1, Evanston; District #4, Mountain View; and District #6, Lyman), two districts in Lincoln County (District #1, Kemmerer/ Diamondville; and District #2, Afton), and one school district in Sweetwater County (District #2, Green River). Figure 3-12 shows historical school enrollment trends in these six districts based on data compiled by the Wyoming Department of Education (Wyoming Department of Education 2006a). Consistent with the population trends shown previously in Figure 3-6, Figure 3-12 shows steady declines in school enrollment from 1996 through 2004 in five of the six school districts in the study area: Kemmerer/Diamondville, Green River, Evanston, Mountain View, and Lyman.

Enrollment in 2005 increased compared to 2004 for Mountain View, but decreased or stayed approximately the same in the other four districts. Only Lincoln County School District #2 (Afton) has seen steady enrollment increases since 2001. The data shown graphically in the Figure 3-12 are shown in tabular form in Table 3-42.

Figure 3-12. School Enrollment Trends by District in Lincoln, Sweetwater, and Uinta Counties, Wyoming, 1996-2005



Source: Wyoming Department of Education 2005
Note: Enrollment figures are those measured on October 1 of each year.
Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

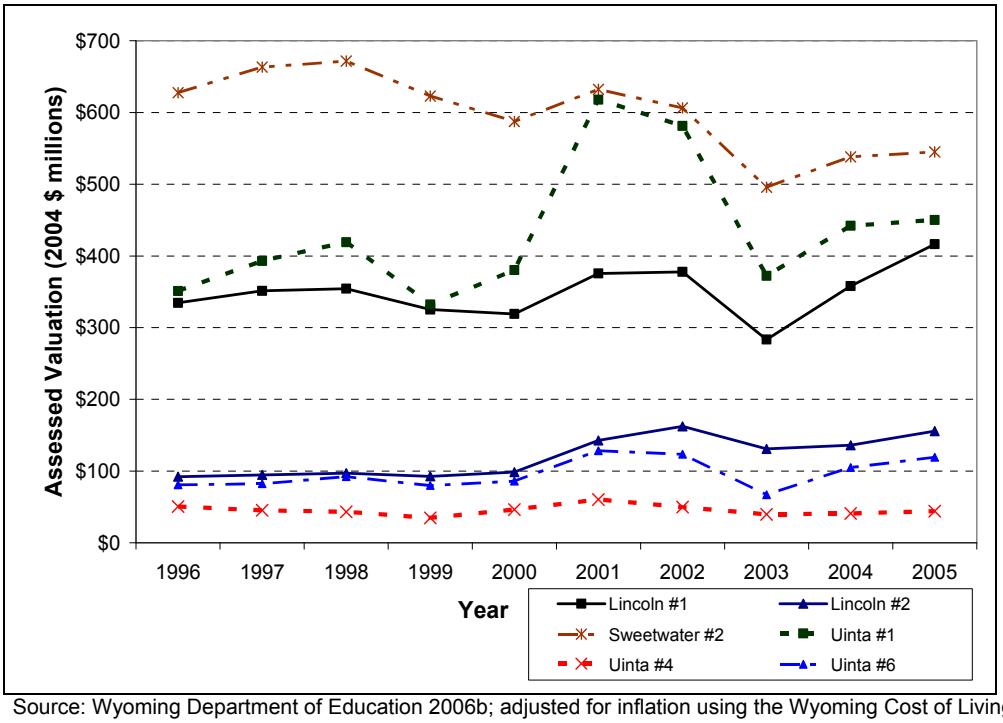
Table 3-42. School Enrollment Trends in the Study Area

District	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Lincoln #1	993	945	909	837	789	724	668	669	622	629
Lincoln #2	2,667	2,559	2,521	2,490	2,412	2,386	2,403	2,449	2,482	2,542
Sweetwater #2	3,595	3,436	3,269	3,168	2,928	2,774	2,688	2,650	2,620	2,582
Uinta #1	3,815	3,567	3,535	3,340	3,219	3,162	3,137	2,902	2,894	2,799
Uinta #4	937	872	793	746	680	692	678	659	626	694
Uinta #6	1,006	930	904	860	820	784	714	686	665	665

Source: Wyoming Department of Education 2006a.
Note: Enrollment is for October 1 of each year.
Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

Since school districts are funded primarily through local and state funding with some federal assistance, local assessed property valuation represents a key driver of the capacity of school districts to generate revenue to fund education. Locally generated revenues may be augmented by funds from the state under a statewide education funding equalization program. Figure 3-13 shows recent trends in assessed property valuation by school district, based on inflation-adjusted 2004 dollars. As the figure shows, assessed property valuation has fluctuated in recent years, but has generally increased since 1996 (except in Green River and Mountain View), and in all districts except Mountain View (where it has remained steady) valuation has increased since 2003 (Wyoming Department of Education 2006b).

Figure 3-13. Assessed Property Valuation Trends by School District in Lincoln, Sweetwater, and Uinta Counties, Wyoming, 1996-2005



Source: Wyoming Department of Education 2006b; adjusted for inflation using the Wyoming Cost of Living Index for southwest Wyoming (Wyoming Economic Analysis Division 2006e).

Lincoln #1 Kemmerer/Diamondville
Lincoln #2 Afton
Sweetwater #2 Green River
Uinta #1 Evanston
Uinta #4 Mountain View
Uinta #6 Lyman

Because people have different values with respect to changes in demographics and communities, residents of the communities may have different opinions and values with respect to the decline in school enrollments and corresponding demographic changes (e.g., the shrinking proportion of people aged 15 and under). From the perspective of local planners, the demographic change may be problematic if it eventually leads to a decreased ability of the communities to fund social services or pay debts that have been incurred to build infrastructure. However, the recent increase in assessed property valuation for each school district may help to alleviate this possibility. Part of BLM's mission is to work with local governments to ensure that its management decisions support local goals and plans, community values, and the needs of residents.

3.8.2 Economic Conditions

Economic conditions relate to the analyses of production, distribution, and consumption of goods and services. Economic conditions describe how individuals and communities participate in the exchange of goods and services by earning a living and consuming products and services they need and want. The BLM has the capacity, through its decision-making responsibilities, to manage resource development within the Kemmerer Field Office planning area and thereby influence the economy of the wider region. As for social conditions, the study area for economic conditions is comprised of all of Uinta, Lincoln and Sweetwater counties. This section provides a summary of demographic and economic information, including trends and current conditions. It also identifies and describes major economic sectors in the study area that could be impacted by the BLM management actions.

Economic Activity and Output

Industries most affected by BLM land management policies and programs in the study area are mining (including oil and gas), tourism and recreation, and agriculture production. Some harvesting of forest products occurs in the study area, but, at present, the harvest meets local demands only; no known regional or national demand exists for timber products from public lands in the study area (see the Vegetation – Forests, Woodlands, and Forest Products section).

Mining and Mineral Production

Mining and mineral production, including oil and gas exploration and development, constitutes the majority of economic activity in the study area. Table 3-43 provides a summary of the quantity and value of mineral production in the counties in the study area and the State of Wyoming. Economically, the largest contributors to mining activity are oil and gas exploration and development in all three counties, particularly in Sweetwater; coal mining in Lincoln and Sweetwater counties; and trona mining in Sweetwater County. The Mineral Resources section contains additional information about mineral resources that are produced in the study area.

Figures 3-14 through 3-17 show the trends in the value of mineral production over recent years for the study area counties for oil, gas, coal, and trona production. The assessed valuation in the figures is adjusted for inflation using the Wyoming Cost of Living Index for the southwestern region as defined by the Wyoming Economic Analysis Division (2006e) (i.e., Lincoln, Uinta, Sweetwater, and Sublette counties). The trend for the same time period of this index is illustrated in Figure 3-8. As Figure 3-14 shows, oil production value has generally risen since 2002 (Lincoln and Sweetwater) or 2003 (Uinta), but the largest rise has been in Sweetwater County. Gas production value has also risen dramatically in all three counties since 2002; however, gas production value fell in 2002 for all three counties, and has recovered to the 2001 level only recently (2005) in Lincoln and is still lower than the 2001 level in Uinta. Coal production value (adjusted for inflation) has fluctuated over the last ten years; while it has grown in Lincoln County in recent years, the 2005 level is still lower than the levels prior to 2000. Trona production value, adjusted for inflation, declined from 1997 through 2004, but rose in 2005.

Table 3-43. Estimated Mineral Production and Value by County in the Study Area, Production Year 2005

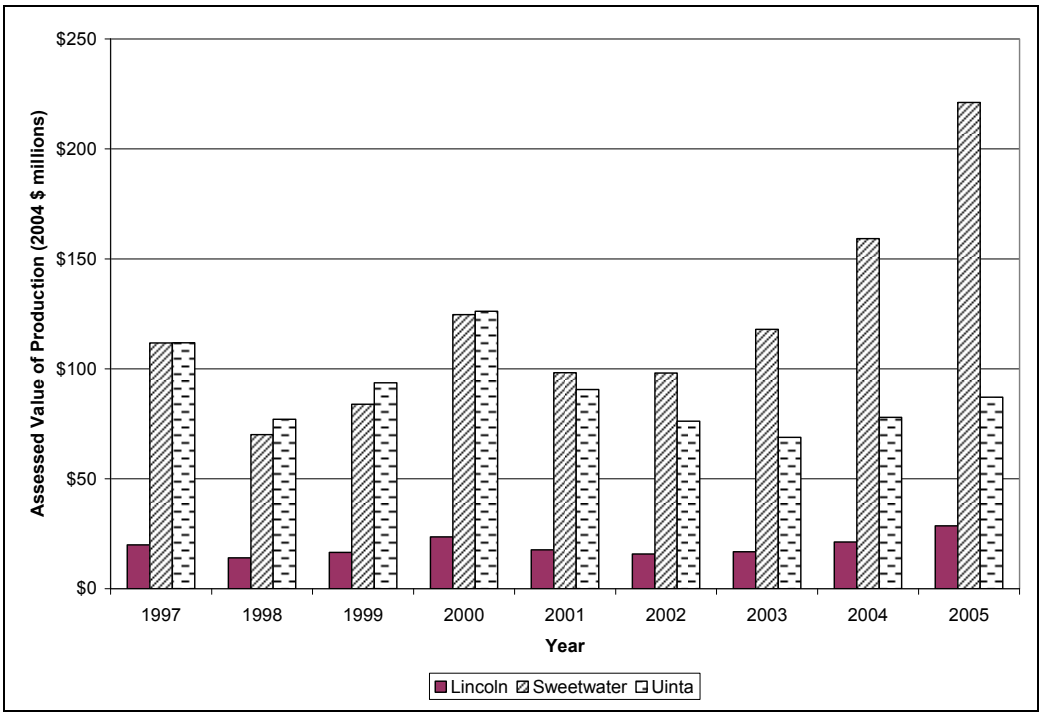
Mineral	Lincoln	Sweetwater	Uinta	Wyoming
Production or Sales (units)				
Oil (bbls sold)	594,986	4,537,736	1,737,789	50,032,004
Gas (mcf sold)	81,332,318	187,801,960	139,699,597	1,943,093,879
Coal (tons produced)	4,616,597	9,412,918	0	404,212,586
Trona (tons produced)	0	19,508,616	0	19,508,616
Sand and Gravel (tons)	484,045	1,212,279	257,018	13,028,452
Clay (tons)	0	0	58,706	58,706
Uranium (lbs)	0	0	0	1,345,257
Decorative Stone (tons)	2,196	0	0	2,262
Taxable Valuation ($ millions)				
Oil	$30	$236	$93	$2,153
Gas	$534	$1,232	$454	$10,134
Coal	$84	$116	$0	$2,280
Trona	$0	$255	$0	$255
Sand and Gravel	$0.7	$1.8	$0.4	$18
Clay	$0	$0	$0.2	$0.2
Uranium	$0	$0	$0	$12
Decorative Stone	$0.1	$0	$0	$0.1

Source: Production and valuation are for July 1, 2005, through June 30, 2006, from Wyoming DOR (2006). Valuation is not adjusted from the values indicated in the report; thus, it is generally in January 2006 dollars (based on the reporting dates).

Notes: Taxable valuation may differ from market or sales value because it excludes certain costs of production. This table includes all minerals for which Wyoming DOR (2006) provides data on production from the counties in the study area.

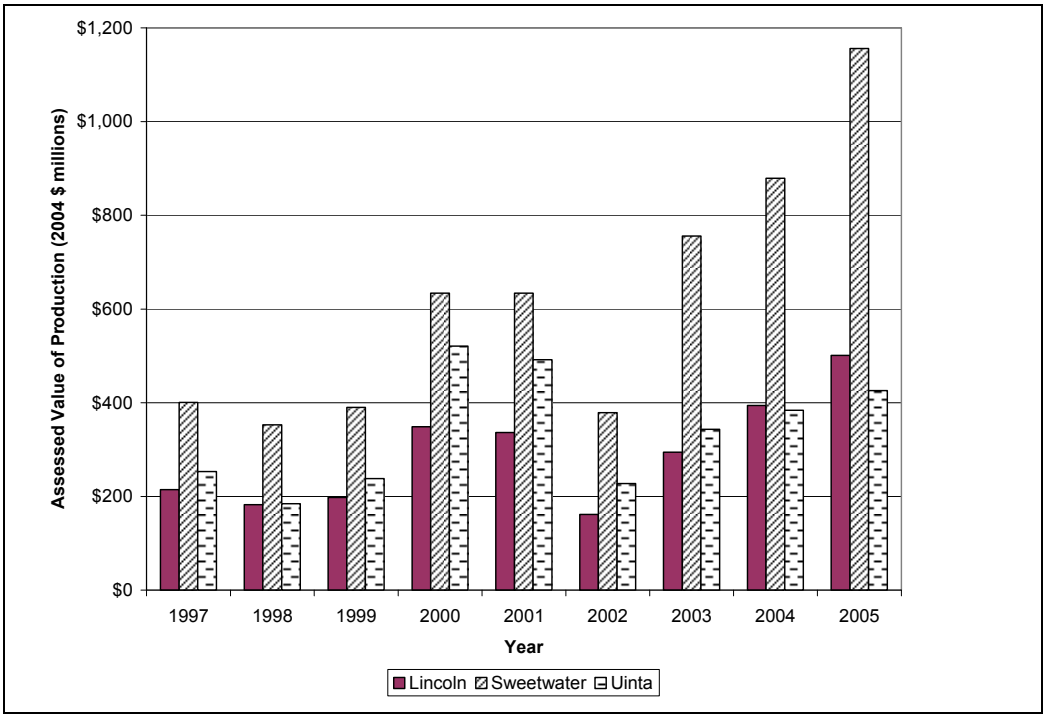
$ dollar DOR Department of Revenue mcf thousand cubic feet
bbls barrels lbs pounds

Figure 3-14. Assessed Valuation of Oil Production by County in the Study Area



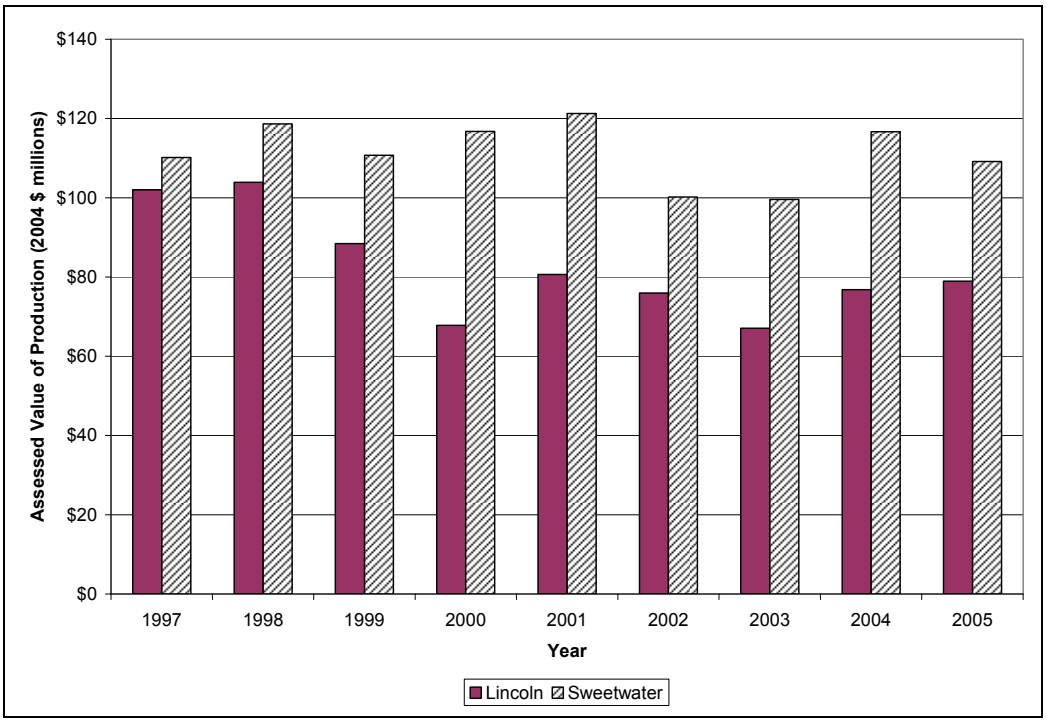
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, and Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-15. Assessed Valuation of Gas Production by County in the Study Area



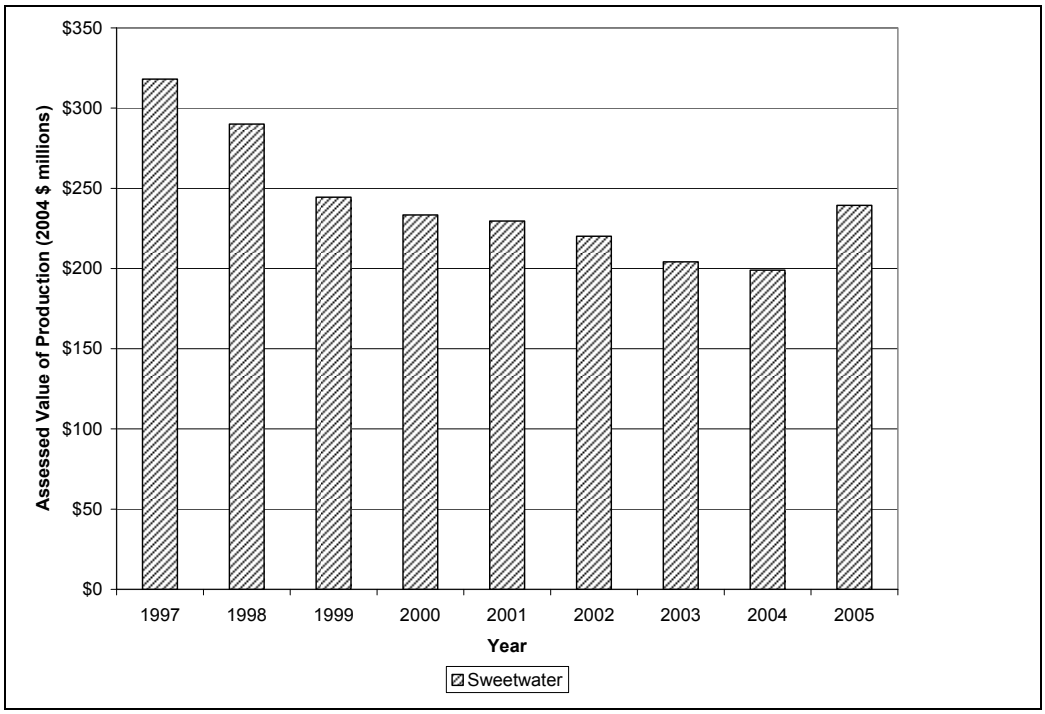
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-16. Assessed Valuation of Coal Production by County in the Study Area



Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Figure 3-17. Assessed Valuation of Trona Production in the Study Area



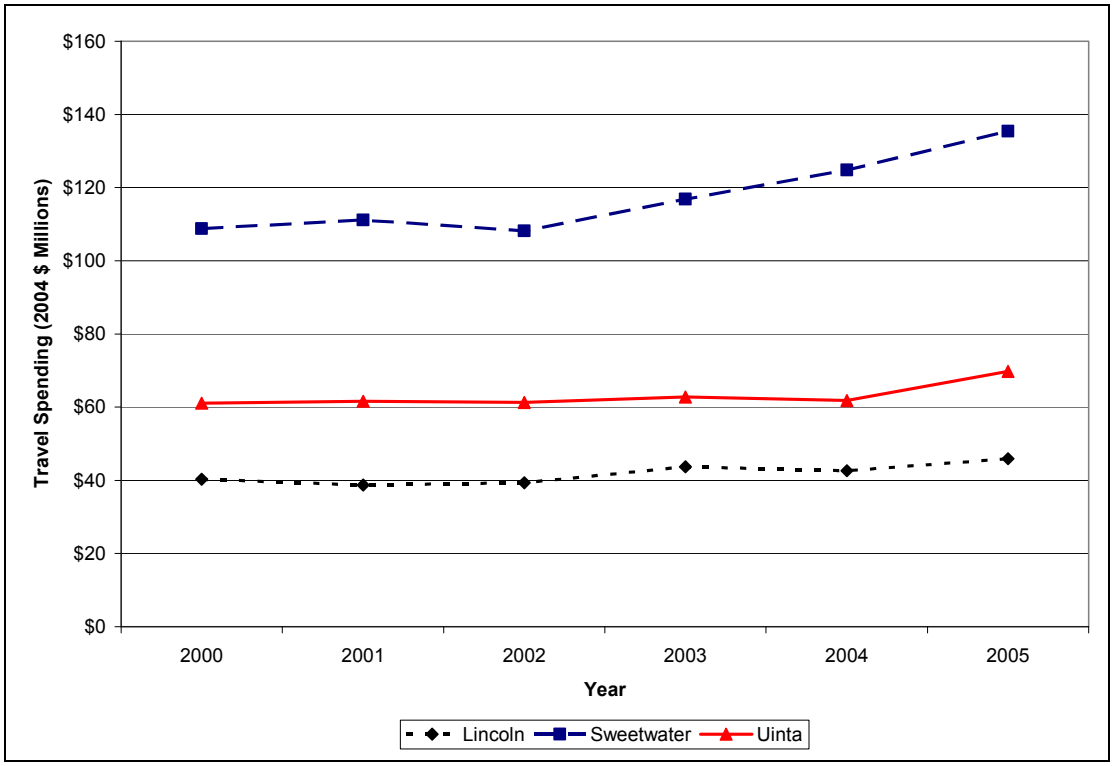
Source: Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Recreation

Recreation activities also contribute to the region's economy. In 2003, the WGFD found that direct expenditures from hunting, fishing, and wildlife watching in the counties in the study area totaled $34.3 million (WGFD 2003b). About $14.1 million of these expenditures were attributable to activities on surface area managed by the BLM in the Kemmerer Field Office planning area (WGFD 2003b). Direct expenditures include visitor spending on lodging, food and groceries, gasoline, motor vehicle repairs and service, outfitters and guides, access fees, entertainment, souvenirs, equipment, and other categories.

The WGFD has not undertaken a more recent survey of expenditures from hunting, fishing, and wildlife watching by BLM planning area (Burkett 2006). However, trend data for 2000-2005 (Figure 3-18) shows that travel and tourism spending generally (i.e., including recreation as well as other travel-related spending), adjusted for inflation, has increased recently in all three counties. The figure shows that inflation-adjusted spending has increased recently in Lincoln and Uinta counties after being virtually constant from 2000-2004; spending has increased in Sweetwater County steadily since 2002.

Figure 3-18. Travel and Tourism Spending in the Study Area, 2000-2005



Source: Dean Runyan Associates 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Note that travel and tourism spending includes all travel to the counties, except for commuting and other routine travel; thus, trips for non-recreational purposes are also included. The Wyoming State Office of Travel and Tourism (2006) reported that 90 percent of all trips to Wyoming were for pleasure; this percentage may differ for specific counties, however.

Livestock Grazing

The Kemmerer Field Office manages lands for livestock grazing in all three counties in the study area. The 224 grazing allotments range in size from 7 acres to 470,680 acres. Authorized and actual grazing use is about 157,249 AUMs (BLM 2003a). While the majority of AUMs are used by cattle (about 61.8

percent), sheep and horses also are grazed on BLM lands, accounting for about 37.8 percent and about 0.4 percent of authorized AUMs (BLM 2003a).

Grazing allotments occur throughout the study area (BLM 2003a). BLM-administered lands are important to local ranch operations in all three counties. BLM-administered grazing allotments are leased at lower fees on average than state or private lands: federal grazing fees in Wyoming were $1.35 per AUM in 2003 and $1.43 per AUM in 2004 (BLM 2004k). For comparison, grazing fees on state land were $4.04 per AUM in 2003 and $4.13 per AUM in 2004 (Thorson 2004). The average grazing rate on privately owned nonirrigated land in Wyoming was $13.40 per AUM in 2003 (USDA, NASS-WY 2004).

However, the lower lease fees correspond to potentially greater use restrictions and responsibilities for the lessee. For instance, federal grazing leases typically restrict the number and species of animals that may be grazed, while on private leases, there is normally no penalty for grazing more animals than agreed upon (USFS and BLM 1992). However, if running more animals on a private lease results in overgrazing, the landowner may not be willing to renew the lease, since if the lessee fails to maintain the condition of the property the agreement may be terminated (USFS and BLM 1992). Federal leases also tend to be less flexible than private leases with respect to adjusting turnout and roundup dates (USFS and BLM 1992). In addition, differences exist in terms of construction and maintenance of rangeland improvements, such as fences and water facilities, although a perfect comparison is not possible because there are different specifications that vary for specific private leases. On federal leases, construction of improvements can be done in a variety of ways, and expenses other than materials may be the responsibility of the lessee; the lessee also is generally responsible for maintaining the improvements. On private leases, the landowner typically bears a substantial part of the cost of major range improvements and typically pays for revegetation (USFS and BLM 1992).

The number of farms and ranches statewide increased slightly from the late 1980s to the early 1990s and has remained at 9,200 from 1992 to 2002. Land for farms and ranches also has been constant from 1992 to 2002, at 34.6 million acres (USDA, NASS-WY 2004). In the counties in the study area, the total number of farms and ranches has increased between 1992 and 2002, but the total land in farms and ranches has decreased. In 2002, there were 1,000 farms and ranches totaling more than 2.7 million acres, compared to 930 farms and ranches on nearly 3.2 million acres in 1992 (USDA 2004; USDA, NASS 1997). Cattle inventories in the counties in the study area declined steadily from 1997 to 2003 and rose slightly in 2004; overall, the number has decreased from 127,000 in 1997 to 96,000 in 2004. An extended multi-year drought across much of the Rocky Mountain west was a contributing factor to the declines. Breeding-sheep inventories have risen and fallen between 1997 and 2004, with an overall decrease from 91,000 in 1997 to 86,000 in 2004 (USDA, NASS-WY 2004). A 1991 study by economists at the University of Wyoming revealed that agriculture is an important source of export income for the state's economy, since many agricultural products produced within the state are sold outside the state. The study also showed that the great majority of inputs to agricultural production come from within the state, and that profits and other income from agricultural production tend to stay within the state. Taken together, these findings indicate that agricultural production is an important contributor to the state's economy (Moline et al. 1991). In a 2000 study, economists at the University of Wyoming compared the income provided to county governments and public schools to the financial demands on community services by agricultural and residential developments. The study shows that on average in Wyoming, ranching activity generates nearly twice as much income for community services as it requires in expenditures on community services, whereas residential development generates about half as much income as it requires in expenditures (Taylor and Coupal 2000). These findings underscore the importance of agricultural production in terms of its contribution to local economies.

Income

Per capita personal income in 2004 was greatest in Sweetwater County; residents of Sweetwater County had an average income of $34,656, including wages, salaries, income from investments and rent, and

transfer payments such as social security. Per capita personal income was $27,384 in Lincoln County and $29,677 in Uinta County; the state average was $34,279. From 1996 to 2004, per capita personal income grew in real terms (i.e., accounting for inflation) in all three counties; the gain was largest in Uinta County (27 percent), was 22 percent in Lincoln County, and was 18 percent in Sweetwater County (BEA 2006; Wyoming Economic Analysis Division 2006e).

Table 3-44 provides a summary of the sources of personal income by county in the year 2004. Among the sectors for which data are available, government, mining, and construction are substantial contributors to income in all three counties. Although mining was likely a large contributor in Sweetwater County, Bureau of Economic Analysis (BEA) did not disclose the data for confidentiality reasons; however, Sonoran Institute (2004b) estimates mining contributed 29 percent of income in Sweetwater County in 2000. Manufacturing is also a substantial contributor in Sweetwater County.

Table 3-44. Personal Income by Source of Income in Study Area Counties for the Year 2004 (Percentage of Total)

Source	Personal Income		
	Lincoln	Sweetwater	Uinta
Farm Earnings	0.8	-0.02	0.4
Forestry, Fishing, and Other	0.3	N/A	0.3
Mining	13.1	N/A	11.1
Utilities	N/A	N/A	1.0
Construction	13.1	6.9	8.7
Manufacturing	2.3	8.3	3.3
Wholesale Trade	N/A	N/A	2.0
Retail Trade	3.7	4.9	5.5
Transportation and Warehousing	2.0	5.3	4.7
Information	1.1	0.6	2.2
Finance and Insurance	1.5	1.5	1.0
Real Estate and Rental and Leasing	2.7	2.4	1.9
Professional and Technical Services	1.6	2.3	2.5
Management of Companies and Enterprises	N/A	0.5	N/A
Administrative and Waste Services	N/A	1.5	N/A
Educational Services	0.02	0.1	N/A
Health Care and Social Assistance	N/A	2.9	N/A
Arts, Entertainment, and Recreation	0.8	0.3	0.3
Accommodation and Food Services	1.2	2.5	1.5
Other Services, Except Public Administration	1.4	1.7	1.5
Government and Government Enterprises	14.4	13.2	13.9
Categories for which Data were Not Disclosed	8.4	35.2	7.6
Non-Labor Income[1]	26.3	17.3	15.9
Residence Adjustment [2]	5.3	-7.3	14.6
Total Personal Income ($ millions)	429	1,302	587

Source: BEA 2006.

N/A = Not available (data were not disclosed due to confidentiality reasons; BEA does not report data when there are three or fewer employers in a sector). The line item "Categories for which Data were Not Disclosed" shows the total income attributable to these categories for each county.

[1]Non-labor income includes dividend, interest, and rental income, as well as net transfer payments (retirement, disability, insurance, Medicare, and welfare, less contributions for government social insurance, which are included in earnings for each sector but not included in total personal income). See the text for detail.

[2]Residence adjustment represents the net inflow of the earnings of inter-area commuters (here, expressed as a percentage of total personal income). A positive number indicates that on balance, county residents tend to commute outside the county to find jobs; a negative number indicates that on balance, people from other counties tend to commute in to find jobs. See the text for detail.

The farming, ranching, and agricultural/forestry services sector is most important in Lincoln County, (contributing 1.1 percent of personal income in 2004), but also contributes some income to Sweetwater and Uinta Counties (contributing 0.7 percent of personal income in Uinta County; the data for agricultural and forestry services in Sweetwater County were unavailable due to BEA confidentiality rules) (BEA 2006). The majority (81 percent) of farming and ranching income in Lincoln County is from livestock and livestock products, while about 10 percent is from crops; the remainder is from government payments, rent, and in-kind income such as food grown on the farm (Sonoran Institute 2004a).

The Census County Business Patterns (U.S. Census Bureau 2005) provides additional data on mining related earnings and employment. Table 3-45 shows mining-related earnings and employment for the counties in the study area from this source.

Table 3-45. Earnings and Employment for Mining Activities in Study Area Counties for 2004

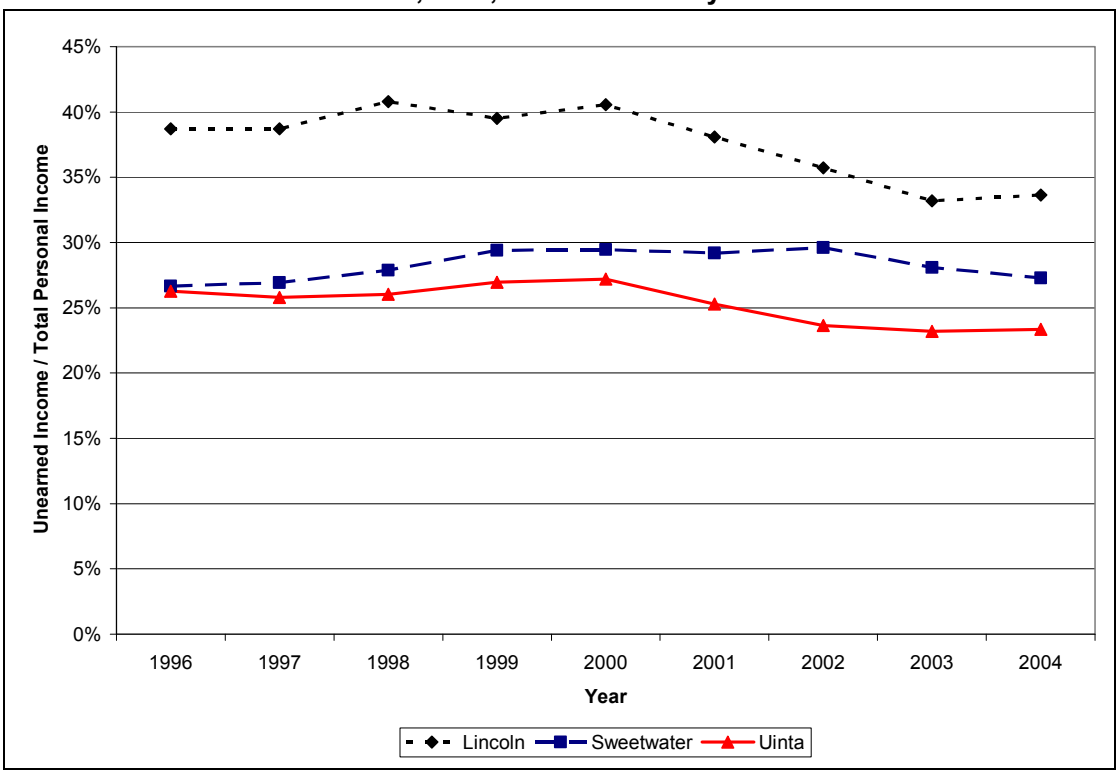
Source	Lincoln		Sweetwater		Uinta	
	Payroll ($)	Employees[1]	Payroll ($)	Employees[1]	Payroll ($)	Employees[1]
Mining	$32,646,000	613	$92,751,000	1,710	$52,721,000	1015
Oil and Gas Extraction	N/A[2]	20-99	N/A[2]	100-249	$20,705,000	264
Mining (Except Oil and Gas)	N/A[2]	250-499	N/A[2]	500-999	0	0
Coal Mining	N/A[2]	250-499	N/A[2]	250-499	0	0
Metal Ore Mining	0	0	0	0	0	0
Nonmetallic Mineral Mining and Quarrying	N/A[2]	20-99	$20,010,000	468	0	0
Mining Support Activities	$12,119,000	245	$25,509,000	516	$32,016,000	751
Drilling Oil and Gas Wells	0	0	N/A[2]	20-99	0	0
Oil and Gas Operations Support Activities	N/A[2]	100-249	$22,749,000	470	$32,016,000	751
Support Activities for Coal Mining	N/A[2]	0-19	0	0	0	0
Support Activities for Metal Mining	0	0	0	0	0	0
Nonmetallic Minerals Support Activity (Except Fuels)	0	0	N/A[2]	0-19	0	0

Source: U.S. Census Bureau 2006. Number of employees is for week ending March 12, 2004. Payroll data are for the entire year.
[1]For some sectors and subsectors, the data source reveals only a range for the number of employees so as not to disclose confidential business information (there are very few employers in the sector).
[2]The data source does not reveal data on payrolls for this subsector due to confidentiality requirements (there are relatively few employers in the sector).
N/A Not Available

Although the U.S. Census Bureau (2006) does not make available all data on employee counts and payrolls due to confidentiality requirements, the data that are provided help to show the economic importance of mineral commodities. Table 3-46 shows that oil and gas extraction and operations support activities contribute substantially to mining-related earnings in all three counties. Oil and gas extraction and operations support contributes at least 120 jobs in Lincoln County (at least 20 percent of mining-related jobs), at least 590 jobs in Sweetwater County (at least 35 percent of mining-related jobs), and all of the 1,015 mining-related jobs in Uinta County (100%). Coal mining contributes at least 250 of the mining-related jobs in Lincoln County (41%) and at least 250 of the 1,809 mining-related jobs in Sweetwater County (15%). In Sweetwater County, nonmetallic mineral (e.g., trona) mining and quarrying contributes 468 direct jobs—that is, about 27 percent of mining jobs in that county. As reported in the Social Conditions section, the total number of jobs in Sweetwater County in trona mining, processing, and related industries is about six times this figure (2,800).

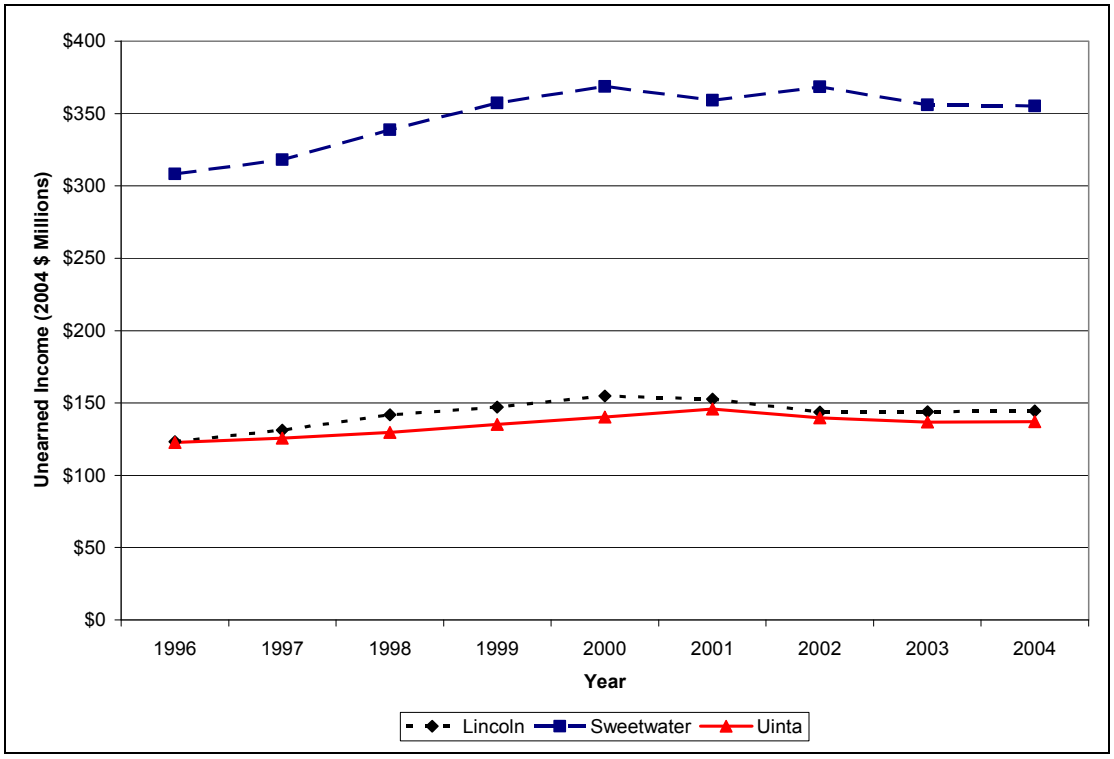
Transfer payments such as Social Security, disability, insurance, Medicare, and welfare, as well as income from dividends, interest, and rent, make up a substantial portion of income in all three counties. Figure 3-19 shows the trend in percentage of income from these sources over time. As the figure indicates, the share of total income from unearned income has decreased over the last ten years in Lincoln and Uinta counties. In Sweetwater County, the percentage of total income from unearned income rose from 1996 to 2002, then declined in 2002 to 2004 and as of 2004, was about the same as the 1996 level. Note, however, that the absolute amount of unearned income has increased (Figure 3-20).

Figure 3-19. Percent of Total Personal Income from Dividends, Interest, Rent, and Transfer Payments



Source: Calculated from data in BEA 2006.

Figure 3-20. Amount of Dividends, Interest, Rent, and Transfer Payments



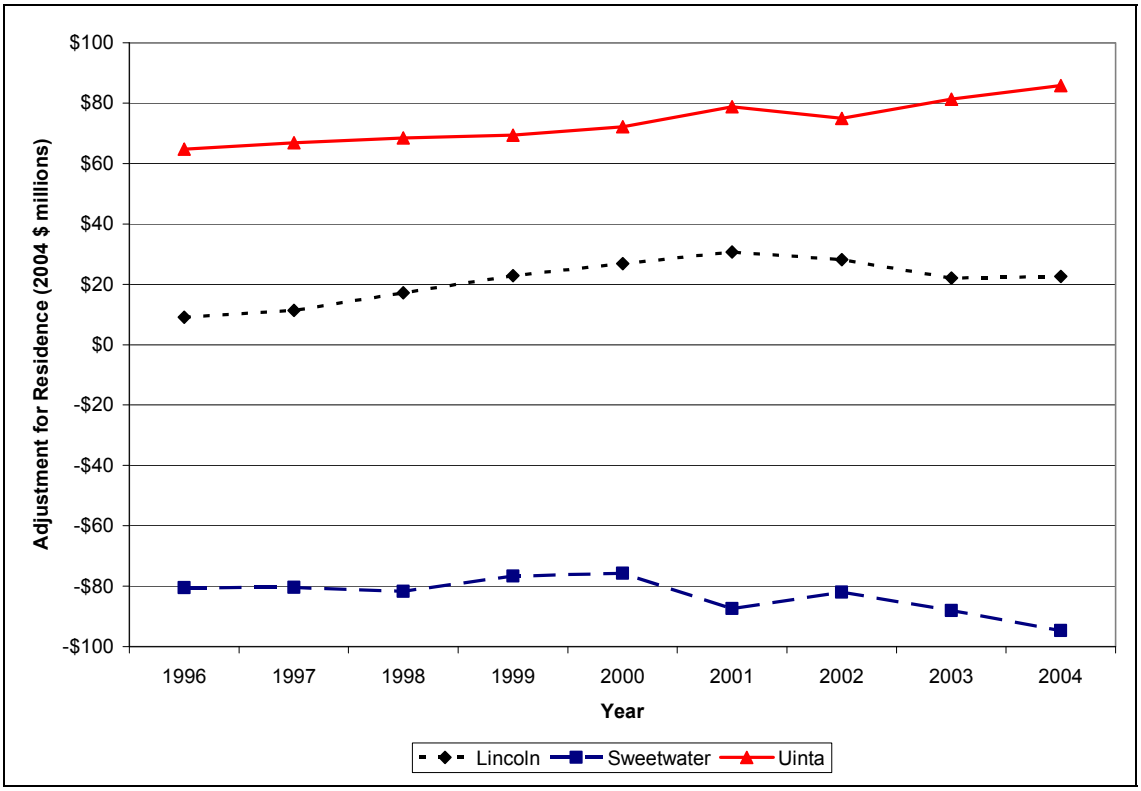
Source: BEA 2006. Adjusted for inflation using the Wyoming Cost of Living Index for the southwest region (Lincoln, Uinta, Sweetwater, and Sublette Counties) (Wyoming Economic Analysis Division 2006e).

Another indicator of income is the residence adjustment, which measures cross-county flows of income and earnings. While many people live and work in the same county, other people work outside the county in which they live (i.e., they commute across county boundaries). For each county, the net residence adjustment represents the net inflow of earnings due to cross-county income flows, or the difference between the income of those who reside in the county and those who work in the county. Thus, a residence adjustment greater than zero indicates that on balance, the flow of income due to inter-county commuting is positive; that is, people tend to commute outside the county to find jobs. Similarly, a county with a residence adjustment less than zero indicates that people from other counties tend to commute in to find jobs. Figure 3-21 shows the residence adjustment factors for each of the three counties, in real terms (adjusted for inflation). As the figure shows, the residence adjustment in Lincoln and Uinta counties is positive and has increased slightly from 1996 to 2004. The residence adjustment in Sweetwater County is negative, indicating that on balance people who reside outside the county tend to commute into Sweetwater County for work, and has steadily increased in magnitude since 2002.

Employment

The breakout of employment by industry shows a pattern similar to that of the personal income statistics, highlighting the importance of the mining, government, construction, and services in all three counties. Table 3-46 provides a summary of total employment by sector for the counties in the study area. Again, note that the data for some sectors (including the mining sector in Sweetwater County) due to BEA non-disclosure requirements. Note that data on employment for a finer breakout of the mining sector are shown above in Table 3-46.

Figure 3-21. Residence Adjustment Over Time



Source: BEA 2006; adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Table 3-46. Employment by Industry in Study Area Counties for the Year 2004 (Percentage of Total)

Industry	Lincoln	Sweetwater	Uinta
Farm Employment	7.2	0.7	3.3
Forestry, Fishing, and Other	0.9	N/A	0.7
Mining	7.4	N/A	6.0
Utilities	N/A	N/A	0.6
Construction	15.2	7.8	9.1
Manufacturing	3.9	4.5	2.9
Wholesale Trade	N/A	N/A	2.0
Retail Trade	11.0	11.7	13.7
Transportation and Warehousing	2.3	5.0	3.8
Information	1.9	1.0	2.4
Finance and Insurance	2.7	2.2	1.8
Real Estate and Rental and Leasing	4.1	2.9	3.7
Professional and Technical Services	3.2	2.6	4.1
Management of Companies and Enterprises	N/A	0.4	N/A
Administrative and Waste Services	N/A	3.4	N/A
Educational Services	0.4	0.4	N/A
Health Care and Social Assistance	N/A	5.0	N/A

Table 3-46. Employment by Industry in Study Area Counties for the Year 2004 (Percentage of Total) *(Continued)*

Industry	Lincoln	Sweetwater	Uinta
Arts, Entertainment, and Recreation	1.5	1.3	1.5
Accommodation and Food Services	6.3	8.8	6.4
Other Services, Except Public Administration	4.5	4.2	4.5
Government and Government Enterprises	17.6	16.2	18.0
Categories for which Data were Not Disclosed	10.0	21.8	15.6
Total Employment (2004)	9,292	26,033	12,089

Source: BEA 2006.

N/A = Not available (data were not disclosed due to confidentiality reasons; BEA does not report data when there are three or fewer employers in a sector and to preclude identification of information for a specific establishment in cases where there is a dominant establishment). The line item "Categories for which Data were Not Disclosed" shows the total income attributable to these categories for each county.

Average earnings per job in 2004 were lower than the national and state average in Lincoln and Uinta counties, and higher than the national and state average in Sweetwater County. Table 3-47 shows the average earnings per job by county.

Table 3-47. Average Earnings Per Job for Study Area Counties, Wyoming, and U.S. in 2004

Locality	Average Earnings Per Job
Lincoln County	$31,600
Sweetwater County	$45,012
Uinta County	$33,745
Wyoming	$35,584
United States	$44,503

Source: BEA 2005 (Table CA30).

It is important to consider how different average wages can affect the ability of different employers to attract workers. For example, a study in nearby Sublette County (Jacquet 2006) found that wages for jobs in gas development and exploration are higher than in any other sector and are high for both unskilled and skilled workers. Depending on the need for labor in relatively high-paying sectors, this could have adverse effects on the ability of other employers (in relatively low-paying sectors) to attract workers. Table 3-48 provides recent data (from the first 3 months of 2006) on relative earnings by sector, as well as total employees, for the three counties. As the table shows, the mining sector (including oil and gas development) has the highest average weekly wage of any sector, although in Lincoln County the utilities sector has a comparable weekly wage.

Table 3-48. First-Quarter 2006 Average Monthly Employment and Average Weekly Wage

Sector	Lincoln		Sweetwater		Uinta	
	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage
Agriculture, Forestry, Fishing, and Hunting	20	$543	N/A[1]	N/A[1]	20	$389
Mining	632	$1,469	5,214	$1,367	747	$1,686
Oil and Gas Extraction	203	$1,608	485	$1,787	N/A[1]	N/A[1]
Mining, Except Oil and Gas	295	$1,479	2,130	$1,539	N/A[1]	N/A[1]
Support Activities for Mining	134	$1,235	2,599	$1,148	N/A[1]	N/A[1]

Table 3-48. First-Quarter 2006 Average Monthly Employment and Average Weekly Wage *(Continued)*

Sector	Lincoln		Sweetwater		Uinta	
	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage	Average Monthly Employment	Average Weekly Wage
Utilities	201	$1,423	N/A[1]	N/A[1]	N/A[1]	N/A[1]
Construction	725	$694	1,619	$802	994	$934
Manufacturing	259	$464	1,196	$1,328	317	$503
Wholesale Trade	57	$604	619	$931	231	$1,080
Retail Trade	698	$321	2,488	$444	1,201	$333
Transportation and Warehousing	150	$772	1,077	$901	260	$830
Information	153	$594	211	$508	346	$706
Finance and Insurance	124	$519	383	$797	148	$606
Real Estate and Rental and Leasing	39	$133	406	$821	198	$757
Administrative and Waste Services	81	$345	505	$624	180	$385
Health Care and Social Assistance	217	$336	880	$505	1,059	$420
Arts, Entertainment, and Recreation	27	$148	128	$144	57	$224
Accommodation and Food Services	450	$128	2,150	$242	655	$184
Other Services, Except Public Administration	89	$458	599	$640	162	$372
Total Government	1,651	$593	3,973	$643	2,041	$582
All Private Sectors (Non-Government)	4,107	$657	18,475	$875	6,968	$673
All Sectors	5,758	$638	22,448	$834	9,009	$652

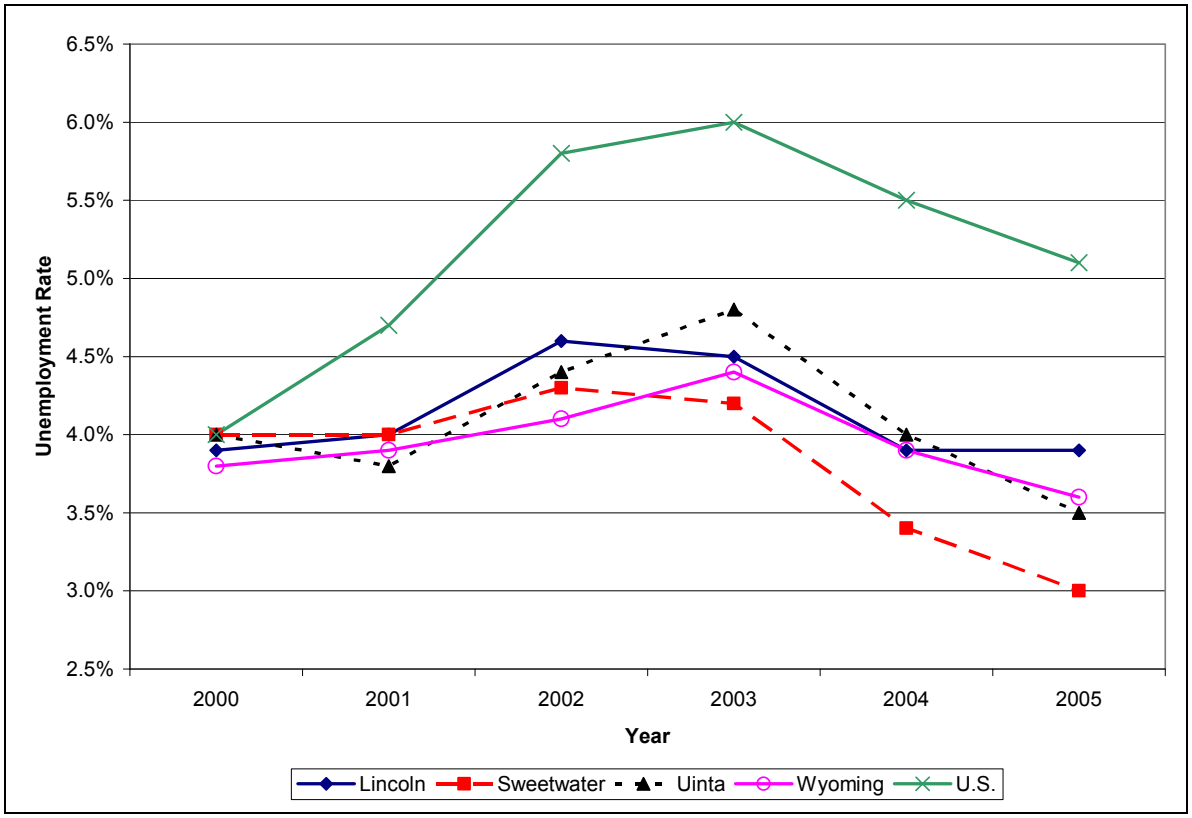
Source: Wyoming Department of Employment 2006.

[1]For some sectors and subsectors, the data source reveals only a range for the number of employees so as not to disclose confidential business information (there are very few employers, or a large dominant establishment, in a sector).

N/A Not Available

All three counties in the study area had lower unemployment in 2005 than the national average of 5.1 percent. Lincoln County had an unemployment rate of 3.9 percent, Sweetwater County had a rate of 3.0 percent, and Uinta County had 3.5 percent unemployment. Wyoming had 3.6 percent unemployment overall in 2005 (BLS 2006a; BLS 2006b). Figure 3-22 shows unemployment rates in recent years for the three counties, Wyoming, and the U.S. As the figure shows, unemployment in the study area has been lower than the national rate since 2001, and has been decreasing since 2003 in all three counties (and since 2002 in Sweetwater and Lincoln counties).

Figure 3-22. Unemployment Rates, 2000 to 2005



Source: BLS 2006a, BLS 2006b

Tax Revenues

Economic activities on BLM-administered land and mineral estate contribute to the fiscal well-being of local governments, as well as to state and federal governments. BLM management actions have the potential to affect tax revenues from mining and mineral production; travel, tourism, and recreation; and livestock grazing and ranching.

Mining, Including Oil and Gas

The mining industry contributes substantially to state and local tax revenues. This may in part explain why Wyoming has no personal or corporate income tax. For example, the Wyoming State Auditor (2006) reported that state mineral severance taxes and federal mineral royalties returned to the state represented 40 percent of total state revenues in Fiscal Year 2005—a total of $1.45 billion. This does not include state sales and use taxes related to mining and mineral production; sales and use taxes represented another 12 percent of total state revenues (Wyoming State Auditor 2006). The Wyoming Legislative Service Office (WLSO 2003) indicated that the mining sector paid about $806 million in state and local tax revenues in Fiscal Year 2002. This represents 54 percent of total state and local tax revenues from major tax sources (severance, *ad valorem*, sales and use, cigarette, gross receipts, liquor, and franchise taxes) for Fiscal Year 2002 (WLSO 2003).

Oil and gas production on federal lands in Wyoming is subject to state, federal, and local taxes, as described below. *Ad valorem* production and production equipment taxes are payable to the county where the production occurs. Since oil and gas are produced from all three study area counties, *ad valorem* production and production equipment taxes are important for all three counties.

State severance taxes are levied on current production at the rate of 6 percent of the taxable value of crude oil and natural gas, and at 7 percent of taxable value for surface coal, 4 percent for trona, and 2 percent for most other minerals produced in the study area (e.g., sand and gravel, decorative stone, and clay). The taxable value is defined as the gross sales value minus certain allowable costs for royalties, transportation, and natural gas processing. Rates are lower for less productive stripper wells (Wyoming DOR 2006). Estimated state severance tax collections for minerals produced in the counties in the study area are shown below.

State and local taxes, including the *ad valorem* property tax, also apply for coal and trona mining. In past years, some coal producers, including some in southwest Wyoming, have paid lower state severance taxes due to a severance tax limitation under the state Coal Equity Act (Wyoming DOR 2004b). Using the data from Table 3-43, along with state severance tax rates, it is possible to estimate state severance tax collections for each county for the different mineral products. Table 3-49 shows estimated state severance tax collections for the counties for Production Year 2005.

Table 3-49. Estimated State Severance Tax Collections on Mineral Production in the Study Area Counties, Production Year 2005

Mineral	Lincoln	Sweetwater	Uinta
Crude Oil	$1,635,100	$14,012,300	$5,561,400
Stripper Oil	$129,400	$86,000	$5,200
Natural Gas	$32,038,500	$73,940,400	$27,230,700
Surface Coal	$5,891,500	$7,948,300	$0
Underground Coal	$0	$105,600	$0
Trona	$0	$10,208,700	$0
Sand and Gravel	$14,800	$35,700	$8,000
Clay	$0	$0	$4,200
Uranium	$0	$0	$0
Decorative Stone	$2,800	$0	$0
Total	$39,712,100	$106,337,000	$32,809,500

Source: Calculated from data in Wyoming DOR 2006.

Note: Estimated using state severance tax rates of 6 percent of taxable valuation for crude oil and natural gas, 4 percent for stripper oil and trona, and uranium, 7 percent for surface coal, 3.75 percent for underground coal, and 2 percent for all other minerals shown. Rounded to the nearest hundred dollars.

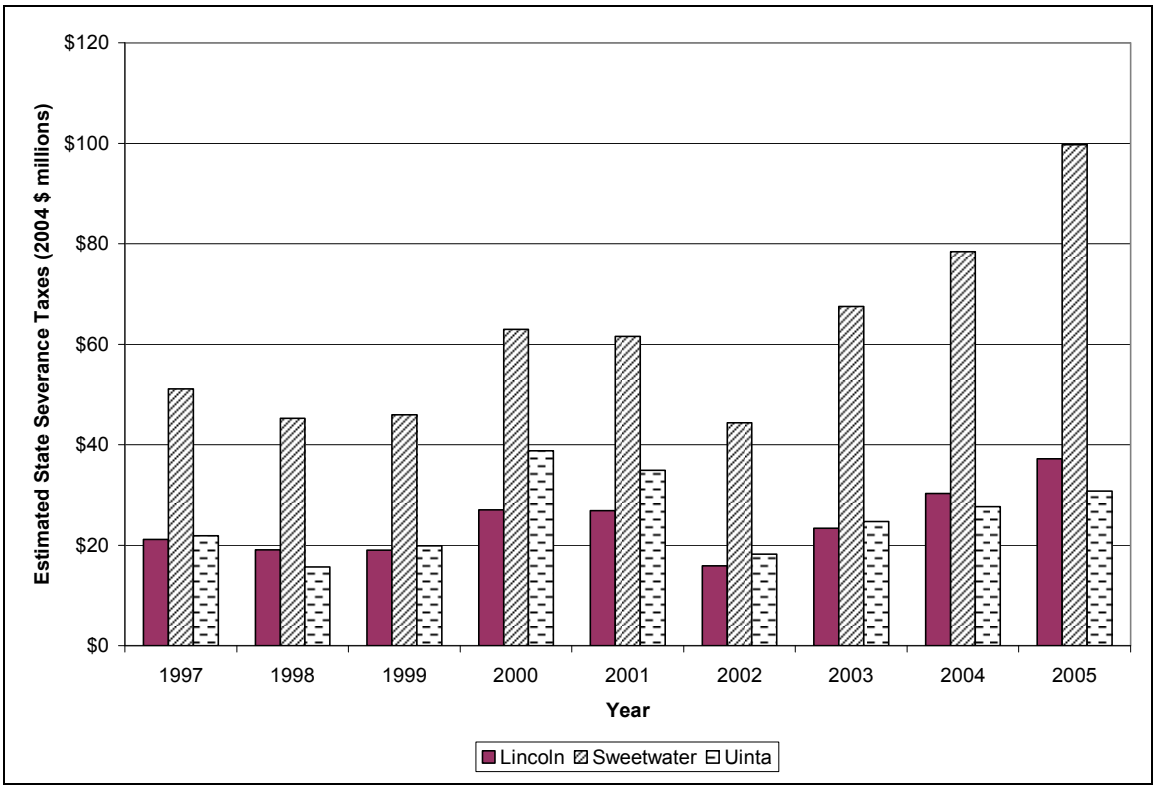
DOR Department of Revenue

As the table shows, state severance taxes based on production within the counties in the study area were greatest in Sweetwater County, which is consistent with the relative importance of mining for employment and earnings in the county. Natural gas was the largest contributor to state severance taxes within all three counties.

The table also shows the gas, oil, coal, and trona accounted for most of the state severance tax collections in the study area counties in 2005. Figure 3-23 shows historical trends in estimated state severance taxes based on production of these commodities within the counties in the study area (i.e., the data on assessed valuation shown in Figures 3-14 through 3-17). As the figure shows, estimated state severance tax revenues, adjusted for inflation using the CPI (BLS 2006a), generally fell in the late 1990s until 2000 and 2001, fell in 2002, and have been rising steadily in all three counties since 2002.

Severance taxes on natural gas, coal, trona and other minerals are then distributed according to a legislatively approved formula. The majority of the revenues are transferred to the state general fund, the state's budget reserve account, and the Permanent Wyoming Mineral Trust Fund. In recent years, less than 4 percent of the total has been distributed to cities, towns, and counties across the entire state.

Figure 3-23. Estimated State Severance Taxes, 1997-2005



Source: Calculated using data in Wyoming DOR 1998, Wyoming DOR 1999, Wyoming DOR 2000. Wyoming DOR 2001a, Wyoming DOR 2002, Wyoming DOR 2003, Wyoming DOR 2004a, Wyoming DOR 2005, Wyoming DOR 2006. Adjusted for inflation using Wyoming Economic Analysis Division 2006e.

Local *ad valorem* production taxes are levied on sales of oil and gas. *Ad valorem* production tax rates vary by county and within counties. In 2006, average tax rates on mineral production were about 6.2 percent in Lincoln County, 6.3 percent in Uinta County, and 6.4 percent in Sweetwater County (Wyoming DOR 2006). Based on these tax rates and the total taxable value of mineral production, it is possible to estimate *ad valorem* production tax assessments in the counties. According to Wyoming DOR (2006), total taxable value of mineral production for Production Year 2005 was $650 million in Lincoln County, $1,841 million in Sweetwater County, and $547 million in Uinta County. Thus, applying the 2006 tax rates to 2005 mineral production, Wyoming DOR (2006) calculated *ad valorem* mineral production tax assessments of $40.3 million in Lincoln County, $118.3 million in Sweetwater County, and $34.3 million in Uinta County. The relative importance of different minerals in the counties in contributing to these tax assessments is illustrated by the data in Table 3-43 shows taxable valuation for the different minerals within the counties.

Local *ad valorem* property taxes are levied on the taxable valuation of oil and gas equipment. Rates are the same as those for *ad valorem* production, but the taxable valuation of oil and gas equipment is 11.5 percent of the assessed value (Grenvik 2005; Wyoming DOR 2001b). County and special district (e.g., school district) property taxes fund schools, libraries, and other public services. Thus, the total assessed valuation provides the revenue base for these essential public services. The Social Conditions section contains information on current assessed property valuations and recent trends for the study area counties as well as school districts within the counties.

Federal mineral royalties on oil, gas, and coal production are levied at 12.5 percent of the value of production, after allowable deductions. Federal royalties on underground coal production (Bridger Mine in Sweetwater County) are 8 percent. Forty-eight percent of the royalties collected, net of a 1 percent

administrative processing fee, are returned to Wyoming and a small portion of the royalties received by the state are disbursed to cities and towns (State of Wyoming 2004). Federal mineral royalties are also collected on production of other minerals. The rate on trona production has been 6 percent since 1995, but in the fall of 2006 was reduced to 2 percent, which will be the effective rate for at least the next 5 years (Hardy 2006). According to the Wyoming Consensus Revenue Estimating Group, the portion of federal mineral royalties for production in the state that accrued to the state (i.e., 50 percent of total federal mineral royalties for production in Wyoming, net of the administrative processing fee) were $846 million in Fiscal Year 2005 and $1,068 million in Fiscal Year 2006 (CREG 2006). This includes royalties from oil, gas, coal, trona, and other minerals. Severance taxes on coal, natural gas, coal, trona and other minerals are then distributed according to a legislatively approved formula. The state sales tax applies to retail purchases of goods and some services in Wyoming, while the use tax applies to a retail purchase of goods outside Wyoming by firms in Wyoming. Thus, all purchases by firms doing business in Wyoming, as well as individual residents, are on an equal footing in terms of how they are taxed (Wyoming DOR 2006). In terms of the oil and gas industry, for instance, a firm with operations in Wyoming that purchases equipment from outside the state for use in the state would remit use taxes to the state of Wyoming for the purchase.

Travel, Tourism, and Recreation

BLM management actions also affect travel and tourism, both directly (through decisions that affect recreation access) and indirectly (e.g., through decisions that affect wildlife populations). The State Office of Travel and Tourism estimates that in 2005, travel and tourism accounted for $90.4 million in tax revenues, including $54.8 million (rounded figure) in state revenues and $35.6 million (rounded figure) in local revenues (2005 dollars), not including property tax collections related to recreation infrastructure (Wyoming State Office of Travel and Tourism 2006). Most trips (an estimated 90 percent) are due to tourism for pleasure (Wyoming State Office of Travel and Tourism 2006). Table 3-50 shows tax receipts for the counties in the study area.

Table 3-50. Local and State Tax Receipts Due to Travel and Tourism in Study Area Counties and Wyoming in 2005 ($ millions)[1]

County	Local Tax Receipts	State Tax Receipts
Lincoln	$0.3	$1.6
Sweetwater	$2.4	$4.0
Uinta	$0.9	$2.4
Wyoming	$35.6	$54.8

[1] County estimates based on all travel and tourism, not just on public lands.
Source: Wyoming State Office of Travel and Tourism 2006.

Livestock Grazing and Ranching

Livestock grazing and ranching, and agriculture more generally, contribute directly to local and state tax revenues from local *ad valorem* property taxes and local and state sales and use taxes. According to a 2003 report on state and local tax revenues, agriculture along with forestry, fishing, and hunting brought in $9.2 million in state and local tax revenues due to *ad valorem* property taxes, and $1.4 million due to sales and use taxes, for a total of over $10.6 million (WLSO 2003).

3.8.3 Health and Safety

Activities resulting in health and safety concerns in the Kemmerer planning area primarily encompass landslides, abandoned mine lands, and hazardous wastes and materials.

The BLM is required to address hazards that create safety risks to visitors to BLM-administered lands. BLM's Hazard Management and Resource Restoration Program (HMRRP) is designed to manage hazards on public lands to reduce risks to visitors and employees, restore contaminated lands, and carry out emergency response activities.

Landslides

Landslides and earth flows are common in the Overthrust Belt where steep slopes, relatively high moisture, and clayey impermeable subsoils occur. The contact between the Green River and Wasatch formations is particularly susceptible to slumping, and the Wasatch Formation itself is prone to swelling and failure due to presence of bentonite clay (Rubey et al. 1975). A massive earth flow of approximately 50 acres occurred in the Wasatch Formation inside Fossil Butte National Monument west of Kemmerer. This movement caused major damage to a rail line, requiring extensive earthwork to restore service. The rest of the planning area has low to moderate landslide potential, although certain formations have higher potential, including the Bear River, Gannet Group, Stump, Ankareh, Darby, and Amsden formations. Damages caused by landslides include soil loss, road embankment damage, and sedimentation of streams and reservoirs (BLM 2003a).

Landslides can be started by human activities, as well as natural processes such as earthquakes. Some rockslides near the Rock Creek Fault probably resulted from earthquakes (Rubey et al. 1975). Human disturbance through vegetation removal and road building in high landslide potential areas can trigger landslide movement.

Abandoned Mine Lands

The BLM's Abandoned Mine Land (AML) program addresses the environmental and safety hazards associated with AML sites on public lands. Old mine workings are found throughout Wyoming and lands administered by the BLM. The Kemmerer Field Office has been prioritizing and identifying the abandoned mine hazards in an ongoing effort in collaboration with the State of Wyoming DEQ, Abandoned Mine Land Division (DEQ AML). The abandoned mine sites are evaluated in terms of the nature of the hazards they present in relation to people, watersheds, wildlife habitats, and the environment.

The DEQ AML has a well-funded and very active AML reclamation program that includes BLM as a partner. The DEQ AML program works to correct known AML safety hazards on BLM lands through the state program. Funding of the program comes from reclamation fees collected under the Surface Mining Control and Reclamation Act (SMCRA) of 1977.

Cooperative Management and Abandoned Mine Land Divisions

In 1999, the BLM and the DEQ AML signed a cooperative agreement that further facilitated the reclamation of AML sites on BLM-administered lands. The state program, as required by the SMCRA, focuses on public safety hazards. In addition, the BLM has received some funding within its Watershed Management Program to address environmental hazards and watershed concerns associated with abandoned mines on a site-specific basis. By combining available funding, safety hazards and environmental impacts to water quality and watershed function can continue to be addressed in a more comprehensive fashion at priority AML sites. In this collaborative approach, the BLM and the DEQ AML are undertaking several AML reclamation projects on public lands within the planning area.

Extreme physical hazards are common at abandoned mine sites. For the visitor enjoying outdoor recreation, the hazards are not always apparent. Abandoned mine sites have proved to be a tempting and sometimes life-threatening hazard for both children and adults. Serious injury or death may occur at these sites. Common hazards include open vertical shafts; unstable overhead rock and decayed support structures; deadly gases and lack of oxygen; remnant explosives and toxic chemicals; becoming lost and disoriented while underground; and, at abandoned surface mines, high walls, open pits, and open drill holes.

Additional hazards occur in relation to abandoned coal mines. Mine and coal outcrop fires can start due to lightning strikes or other factors. These fires can be very difficult to control. The Kemmerer Field Office coordinates with the AML to eliminate the hazards associated with these fires.

Abandoned mines in the planning area mostly comprise coal and phosphate mining and prospecting areas. Map E shows the locations of many of the abandoned mines. The Kemmerer Field Office has cooperated with the State Abandoned Mine Land Division to reclaim the abandoned phosphate mining sites at Top of the World and Leefe mines.

Hazardous Materials and Wastes

Multiple uses of public land administrated by the BLM include a variety of permitted activities that can lead to the release of hazardous materials and wastes. In addition, releases may result from accidental spills, illegal dumping and disposal activities, or through illegal drug manufacturing. Such releases can result in adverse health and environmental impacts within the planning area. Biological hazards are a new source of concern for the BLM. These hazards include, but are limited to, anthrax, bubonic plague, Hantavirus, and foot and mouth disease.

Cooperative Management and Hazardous Materials and Wastes

The Wyoming DEQ is responsible for regulating hazardous wastes within the State of Wyoming. However, as mentioned earlier, the BLM's HMRRP implements management practices on hazardous wastes to reduce risks to visitors and employees, restore contaminated lands, and carry out emergency response activities.

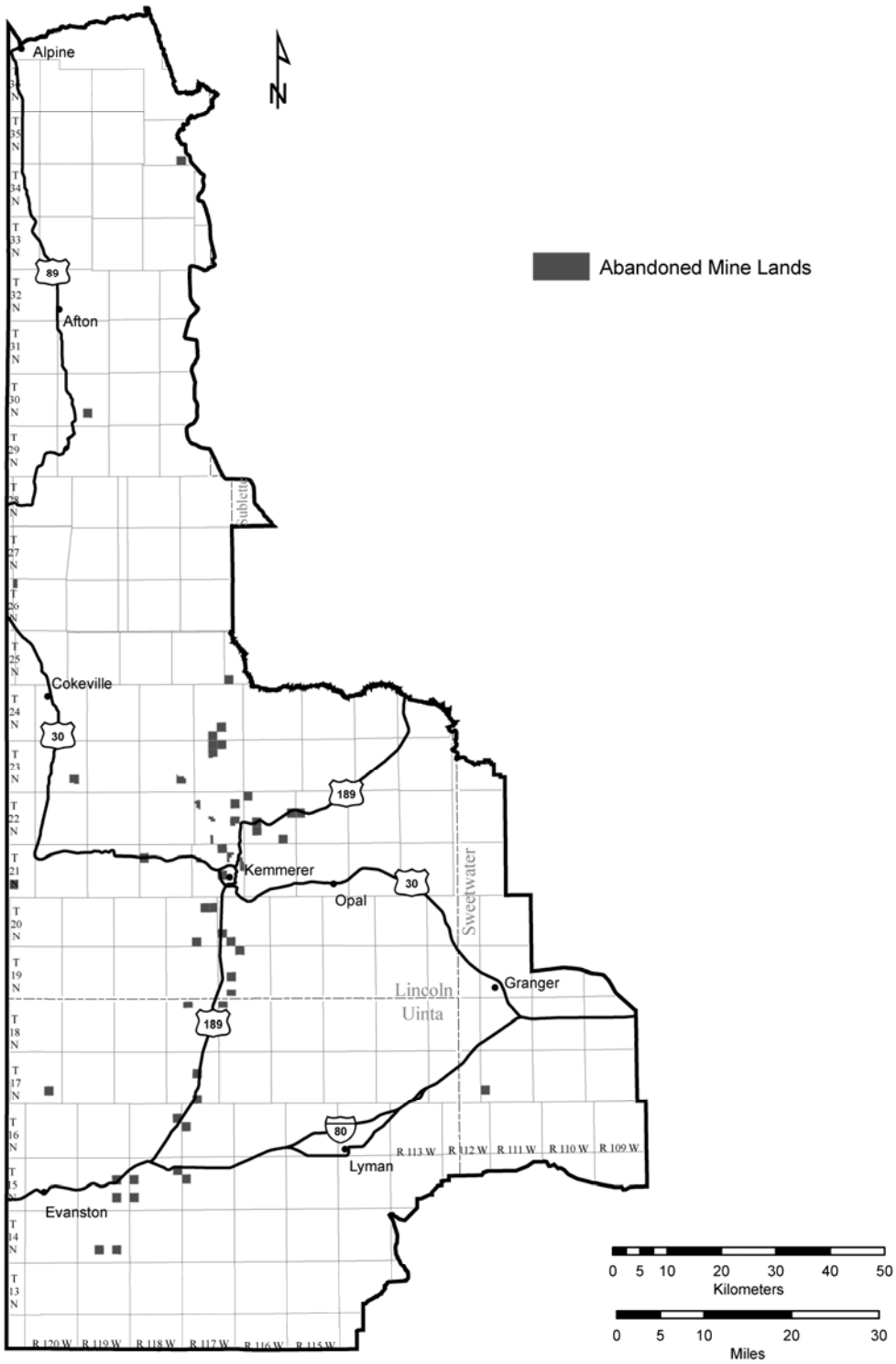
Management actions for health and safety hazards generally address reducing health and safety risks to visitors and employees, educating the public about the risks, and identifying potential hazards. Chapter 2 provides management actions and alternatives in more detail.

3.8.4 Environmental Justice

Environmental justice pertains to fair treatment and meaningful involvement of minority and low-income populations. Where the impacts of a proposed federal action may involve such populations, an analysis of the potential for disproportionate impacts and meaningful community outreach and public involvement is required.

BLM does not manage environmental justice resources; rather, it manages public lands and the resources and uses that occur on them. Analysis of environmental justice impacts and meaningful involvement of minority and low-income populations in the planning process are required by federal regulations and policies. No specific management issues or concerns have been identified to date, including during the scoping process.

Map E. Abandoned Mine Lands



Minority Populations

BLM IM 2002-164, "Guidance to Address Environmental Justice in Land Use Plans and Related NEPA Documents," provides policy and guidance for addressing environmental justice in BLM land use planning (BLM 2002f). IM 2002-164 defines minority persons as "Black/African American, Hispanic, Asian, Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons." Furthermore, IM 2002-164 indicates that an area should be considered to contain a minority population where either the minority population of the affected area exceeds 50 percent, or the percentage of minority population in the affected area is meaningfully greater than the percentage in the general population.

Populations of all three counties in the planning area are predominantly non-Hispanic white. Only Sweetwater County has a smaller proportion of non-Hispanic white residents than the state, about two percentage points lower. Sweetwater also has a higher proportion of Hispanic/Latino residents than Wyoming as a whole. Table 3-51 provides a summary of population by race and ethnicity in 2000.

Table 3-51. Racial and Ethnic Groups for Planning Area Counties, and Wyoming (Percent of Population in 2000)

Race or Ethnicity	Lincoln	Sweetwater	Uinta	Wyoming
Non-Hispanic, White	96.1	86.9	92.2	88.9
Non-Hispanic, Black	0.1	0.7	0.1	0.7
Non-Hispanic, American Indian/Alaska Native	0.5	0.8	0.8	2.1
Non-Hispanic, Asian, Native Hawaiian, or Pacific Islander	0.3	0.7	0.3	0.6
Non-Hispanic, some other race	0.0	0.1	0.1	0.1
Non-Hispanic, two or more races	0.9	1.5	1.1	1.2
Hispanic or Latino (of any race)[1]	2.2	9.4	5.3	6.4

Source: U.S. Census Bureau 2002

Note: Detail may not add up to 100 percent due to rounding.

[1]Hispanic/Latino breakout is separate because Hispanics/Latinos can be of any race.

As Table 3-51 shows, in no county does the percent of minority residents exceed 50 percent. In addition, the percent of minority residents exceeds the proportion for Wyoming only in Sweetwater County, and only by a small margin. This suggests that none of the counties contains a minority population that is "meaningfully greater" than the general population.

Although there are no Native American reservations in the planning area, the Wind River Indian Reservation is about 60 miles east of the eastern boundary of the planning area. There are neither Indian trust lands nor tribal properties known to occur in the planning area. The Tribal Treaty Rights and Trust Responsibilities section describes American Indian treaty rights and BLM trust responsibilities.

Low-Income Populations

With respect to low-income populations, IM 2002-164 indicates that low-income populations can be identified according to poverty thresholds published by the U.S. Census Bureau. In addition, the IM notes that "when considering these definitions, it is important to recognize that some low-income and minority populations may comprise transitory users of the public lands and thus not associated with a particular geographic area."

CEQ guidance for environmental justice analysis under NEPA defines a "low-income population" as "either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect" (CEQ 1997). Although CEQ guidance does not provide a quantitative

threshold (e.g., a limit on the percent of persons in poverty) for determining whether a population should be considered a low-income population, typically the percent of persons in poverty in the study area is compared to that in a comparison area such as the state. Quantitative criteria for what constitutes a low-income population are not specified in BLM, CEQ, or EPA guidance.

In 1999, 11.4 percent of the people living in Wyoming had incomes below the poverty level. This compares to 9 percent in Lincoln County, 7.8 percent in Sweetwater County, and 9.9 percent in Uinta County (U.S. Census Bureau 2002). The fact that none of the counties has a percentage of people in poverty that exceeds the state average suggests that there are no substantial concentrations of people living in poverty in the planning area.

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