3.0 AFFECTED ENVIRONMENT

This chapter presents the existing or baseline environment for the Moab Resource Management Plan (RMP). This chapter focuses on specific areas where there is new information or analysis relevant to the decision to be made. As such, it addresses environmental conditions that may have changed since the last RMP was completed as well as key findings and new information identified in the Analysis of Management Situation for the Moab Field Office (MFO; 2004d).

3.1 PROJECT AREA OVERVIEW

3.1.1 GEOGRAPHIC SETTING

The Moab planning area (MPA) is located in the Colorado Plateau physiographic province (BLM 2002a), which is located in southeastern Utah, and is bounded by the East Tavaputs Plateau and Book Cliffs to the north, the Colorado border to the east, Harts Draw and Lisbon Valley to the south, and the Green River to the west. Elevations within the MPA range from 3,871 near the confluence of the Green and Colorado Rivers to 12,721 feet at the summit of Mount Peale (located in the Manti LaSal National Forest).

3.1.2 CLIMATE

Like most of the MPA, the southeastern section experiences wide temperature variations between seasons and climate varies widely with altitude (World Climate 2003). The average annual precipitation is 13.9 inches. In the higher elevations, precipitation comes in the form of snow, with large accumulations in the late fall and winter. Snowmelt in the higher elevations is generally complete by mid to late June. Afternoon thunderstorms, often resulting in flash flooding, are common from late spring through early fall. Summer high temperatures in the upper elevations often reach 85 °F, with lows in the 50s. Lower elevation high temperatures can reach over 100 °F. Winters are cold, with highs averaging 30 °F to 50 °F, and lows averaging 0 °F to 20 °F.

The average annual precipitation of the northern section of the MPA is 9.2 inches, most of which comes in the form of late spring rains and fall thunderstorms. Dry air, high elevations (4,000 to 6,000 feet), and winter snowfall combine to create a cold desert climate. Maximum summer temperatures hover in the high 90s, cooling off to the low 60s at night. Winter high temperatures are generally in the high 30s, with nighttime temperatures dipping into the low teens.

The western section of the MPA receives an average of 9.2 inches of precipitation a year. Most of this moisture comes in the form of melting winter snows. Dry air, high elevations (4,000 to 6,000 feet) and winter snowfall combine to create a cold desert climate. Most precipitation falls in late summer and early autumn thunderstorms. Maximum summer temperatures in the higher elevations range from 85 °F to 90 °F; low elevation maximum summer temperatures can reach over 100 °F. Winters are cold and relatively dry, with highs around 40 °F and lows in the low to mid teens.

The middle section of the MPA (near Moab) receives an average of 9.0 inches of precipitation per year, most of which comes in the form of late spring rains and fall and winter snows. Maximum summer temperatures average 95 °F. Winter high temperatures average 50 °F, and lows average 21 °F.

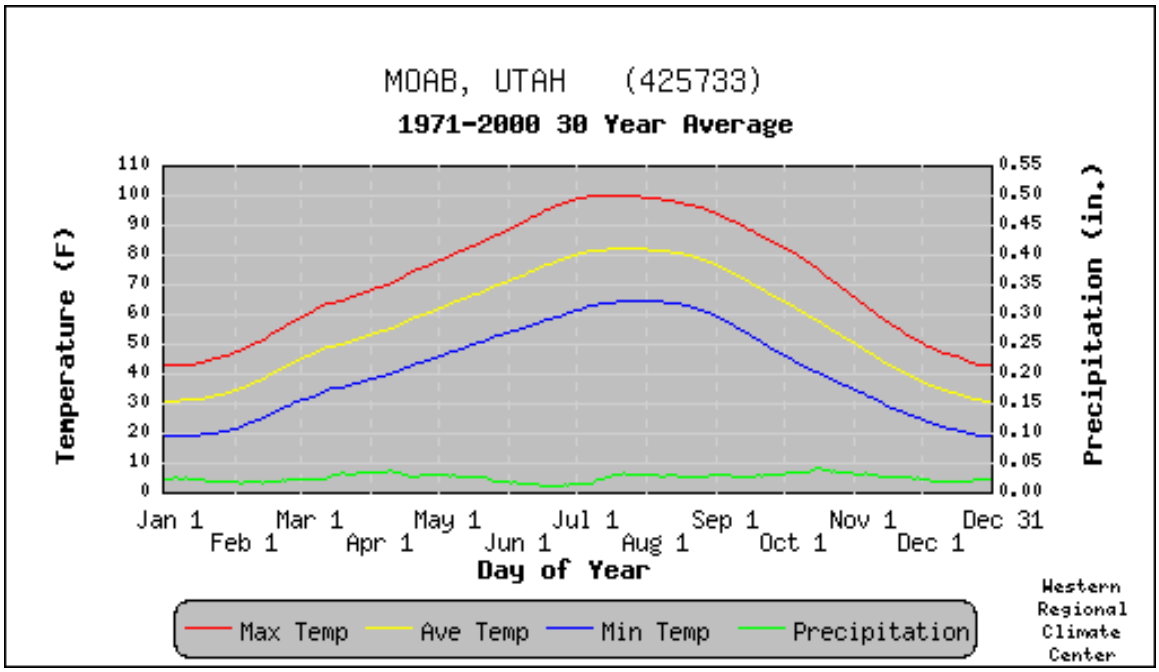
Across the planning area, summer precipitation is often in the form of short, intermittent thunderstorms, while winter precipitation results in accumulated snow pack that infiltrates the soil and recharges the aquifers. Air temperature and precipitation data collected from 1889 through 2003 for three locations in the MPA are displayed in Table 3.1 and Figure 3.1 (WRCC 2004). Peak elevation temperature and precipitation information was not available.

The planning area has been experiencing drought for much of the last five years, with extreme low water conditions occurring during the summer of 2002, when the Palmer Drought Severity Index (PDSI) reached near-record severity based on the last 100 years of instrumental data (NCDC 2004). The low water conditions have resulted in an increase of wind-blown dust and associated particulates in the MPA and adjacent areas. The effects of the drought on the affected environment are discussed in Section 3.2 – Air Quality and Section 3.17 – Vegetation.

Table 3.1. Temperature and Precipitation Data Available for Three Locations in the Moab Planning Area (MPA; WRCC 2004)

Temperature (°F)								
Station	**General Location**	**Elevation (feet)**	**Summer Means**		**Winter Means**		**Extremes**	
			High	**Low**	**High**	**Low**	**High**	**Low**
Thompson	Northern	6,100	90.1	60.8	41.0	18.3	108.0	-23.0
Moab	Middle	4,025	95.3	59.9	45.9	20.9	114.0	-24.0
La Sal	Southern	7,125	83.5	51.1	38.5	14.4	101.0	-25.0

Precipitation (inches)							
Station	**Mean**				**Annual**		
	Winter	**Spring**	**Summer**	**Fall**	**Mean**	**High**	**Low**
Thompson	1.9	2.5	2.1	2.7	9.2	14.8	2.0
Moab	2.0	2.4	2.1	2.6	9.0	16.4	4.3
La Sal	2.5	3.0	3.8	4.7	13.9	20.1	6.5



- Max. Temp. is the average of all daily maximum temperatures recorded for the day of the year between the years 1971 and 2000.
- Ave. Temp. is the average of all daily average temperatures recorded for the day of the year between the years 1971 and 2000.
- Min. Temp. is the average of all daily minimum temperatures recorded for the day of the year between the years 1971 and 2000.
- Precipitation is the average of all daily total precipitation recorded for the day of the year between the years 1971 and 2000.

Figure 3.1. Thirty-year precipitation and air temperature plots for Moab, Utah (WRCC 2004).

3.2 Air Quality

3.2.1 Introduction

Meteorological and topographical characteristics within the MPA and the surrounding lands affect the transport, deposition and dispersion of emissions within the planning area and region. The effects of both emissions and management decisions within the area influences air quality throughout the area, not just within the boundaries of the planning area.

The MPA has been experiencing drought for much of the last five years, with extreme low water conditions manifest during the summer of 2002, when the Palmer Drought Severity Index (PDSI) reached near-record severity based on the last 100 years of instrumental data (NCDC 2004). The low water conditions have resulted in an increase of wind-blown dust and associated particulates in the MPA and adjacent areas.

When the air temperature near the ground is lower than the air temperature above, a phenomenon called an inversion occurs. Inversions may occur in winter when snow accumulation on the ground combines with short daylight hours to impede the sun's ability to warm the lower atmosphere. In most areas of the planning area, inversions are a fairly typical winter occurrence,

but usually inversions dissipate rapidly when early morning sunlight warms the air near the ground surface. In areas where the local topography acts to pool and trap cold air (deep valleys surrounded by steep mountains) however, cold temperatures associated with stationary or slow moving high pressure systems can last for days or (rarely) even weeks and create inversions that result in poor air quality due to a lack of circulation.

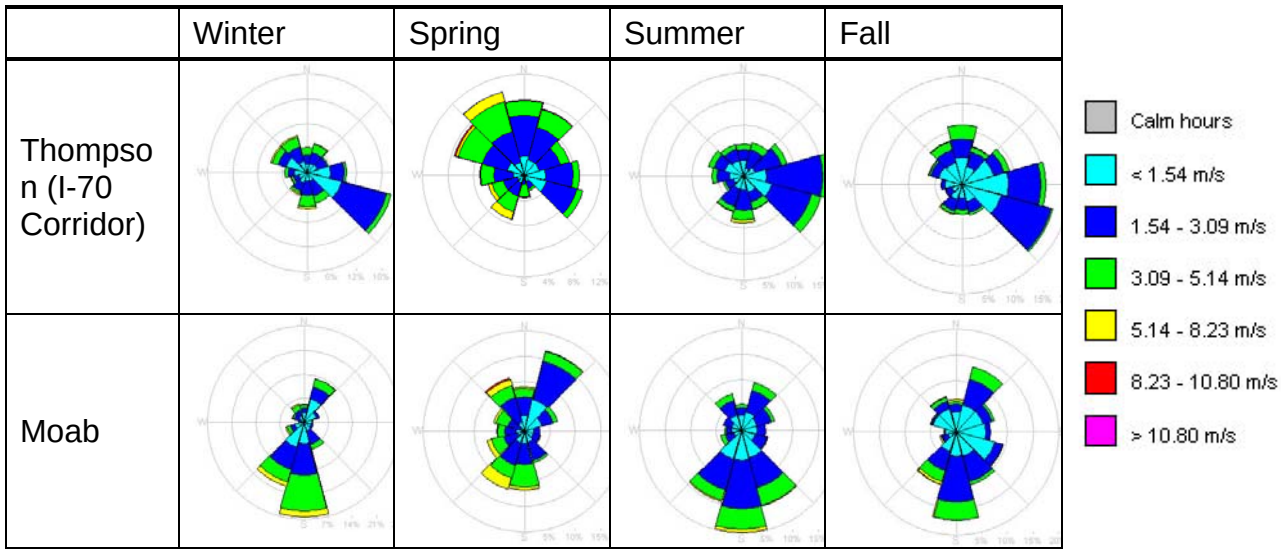
Inversions can hinder air pollutant dispersion by preventing emissions from mixing with the ambient air in the vertical direction. The mixing height of the atmosphere is the height above the surface through which free vertical mixing occurs. Mixing height is often bounded by an inversion layer in the atmosphere. The dispersion of air pollutants is generally confined within the mixing height of the atmosphere. High mixing heights promote emissions dispersion and result in low ground level pollutant concentration. On the other hand, low mixing heights often trap emissions and result in high ground level concentrations. Areas such as Moab (located in a lower valley) can experience inversions during the winter season.

Air pollutant dispersion is also dependent on the wind. The pollutant path is determined by the wind direction, and the speed of transport is determined by the wind speed. Wind direction in the MPA is highly influenced by the local terrain. For example, the winds along the Interstate 70 (I-70) corridor in Grand County tend to blow from the west and the northwest in the spring and blow from the east and the southeast in other seasons (1996 mesoscale model [MM5] data as processed in the CALMET model, Trinity and Nicholls 2006). The city of Moab is located on the flanks of the La Sal Mountains. The winds in Moab predominately blow from the south or southwest.

Figure 3.2 presents the windroses for two cities in the planning area. Windroses are graphical representations of wind magnitude, frequency, and direction for a given location. As can be seen from the seasonal windroses, the wind patterns in the area vary widely by seasons and local terrain. Therefore, dispersion and transport of pollutants are also variable in this region depending on the locations.

3.2.1.1 Existing Air Quality

The Code of Federal Regulations (CFR) sets National Ambient Air Quality Standards (NAAQS) in Title 40 of CFR, Part 50 (40 CFR 50). The purpose of primary NAAQS is to protect the welfare of the most sensitive people such as elderly and asthmatic individuals (with a margin of safety), while the purpose of secondary NAAQS is to protect vegetation, soil, etc. An area that does not meet the NAAQS is designated as a non-attainment area on a pollutant-by-pollutant basis. The MPA is located in an area designated as attainment or unclassified for all pollutants (EPA 2003a). Table 3.2 presents the existing ambient air quality in the MPA (EPA 2003b). The NAAQS apply to six pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), ozone (O3), and particulates whose diameter are smaller than 10 µm (microns; PM10) or smaller than 2.5 µm (PM2.5).



Data Source: 1996 Mesoscale Model (MM5) data processed using the CALMET meteorological model. The observed data from various meteorological stations are used to generate the CALMET windfield. Meteorological stations include Grand Junction, Montrose County Airport, Price/Carbon, etc.

Figure 3.2. Seasonal windroses in the MPA.

Table 3.2. Ambient Air Quality Data for the MPA

Pollutant	Averaging Period [a]	NAAQS	Monitored Concentration	Monitored Location (City, County, State)
CO	1-hour	35.0 ppm [b]	2.8 ppm [n]	Grand Junction, Mesa Co., CO
	8-hour	9.00 ppm [b]	1.8 ppm [n]	Grand Junction, Mesa Co., CO
NO_2	Annual	0.053 ppm	0.003 ppm [k]	La Plata Co., CO
			0.016 ppm [k]	Bloomfield, San Juan Co., NM
SO_2	3-hour	0.50 ppm [b,c]	0.082 ppm [i]	Shiprock, San Juan Co., NM
	24-hour	0.14 ppm [b]	0.013 ppm [i]	Shiprock, San Juan Co., NM
	Annual	0.03 ppm [b]	0.002 ppm [k]	Shiprock, San Juan Co., NM
Ozone	1-hour	0.12 ppm [d]	0.086 ppm [i]	La Plata County, CO
			0.077 ppm [i]	Mesa Verde NP, Montezuma Co., CO
			0.082 ppm [i]	Island-in-the-Sky, Canyonlands NP, UT

Table 3.2. Ambient Air Quality Data for the MPA

Pollutant	Averaging Period [a]	NAAQS	Monitored Concentration	Monitored Location (City, County, State)
	8-hour	0.075 ppm [e]	0.055 ppm [j]	La Plata County, CO
			0.073 ppm [j]	Mesa Verde NP, Montezuma Co., CO
			0.070 ppm [j]	Island-in-the-Sky, Canyonlands NP, UT
PM_{10}	24-hour	150 µg/m³ [f]	118 µg/m³ [o]	Grand Junction, Mesa Co., CO
	Annual	50 µg/m³	37 µg/m³ [k]	Grand Junction, Mesa Co., CO
$PM_{2.5}$	24-hour	35 µg/m³ [g]	22 µg/m³ [m]	Grand Junction, Mesa Co., CO
	Annual	15 µg/m³ [h]	9.5 µg/m³ [k]	Grand Junction, Mesa Co., CO

[a] The concentration values listed in this table are based on the monitored concentrations in 2007 provided by the EPA AirData database (URL: http://www.epa.gov/oar/data/).

[b] Not to be exceeded more than once per year.

[c] SO_2 3-hour standard is a secondary NAAQS that sets limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

[d] The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1. As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

[e] The 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008)

[f] Not to be exceeded more than once per year on average over 3 years.

[g] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

[h] To attain this standard, the 3-year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.

[i] Concentration is the maximum values detected at the monitored location in 2007 according to the EPA AirData database.

[j] Concentration is the 3 year average of 4th maxima detected at the monitored location in 2005, 2006, and 2007 according to the EPA AirData database.

[k] Concentration is the arithmetic mean at the monitored location in 2007 according to the EPA AirData database.

[m] Concentration is the 3-year average of the 98th percentile of the 24-hour values collected in 2005, 2006, and 2007 according to the EPA AirData database.

[n] Concentration is the 2nd maximum value detected at the monitored location in 2007 according to the EPA AirData database.

[o] Concentration is the 3-year average of the 2nd maxima detected at the monitored location in 2005, 2006 and 2007 according to the EPA AirData database.

Applicable air quality criteria also include the criteria for prevention of significant deterioration, known as PSD increments. A PSD increment is the maximum increase in ambient concentrations of a certain pollutant that is allowed to occur above a base-year concentration for that pollutant. Federal Mandatory Class I areas with pristine air quality, such as wilderness areas and national parks, are accorded the strictest protection. Only very small incremental increases in concentration are allowed to maintain the very clean air quality in these areas.

In Utah, five areas have been designated as PSD Class I areas; all are national parks and are under the administration of the National Park Service (NPS). These areas are Arches National Park, Bryce Canyon National Park, Canyonlands National Park, Capitol Reef National Park, and Zion National Park. PSD Class II areas are essentially all areas that are not designated Class I, and moderate incremental increases in concentration are allowed, although the concentrations are not allowed to reach the concentrations set by Federal standards (NAAQS). Air quality data for Class I areas within the planning area are also included, where available.

The data listed are the most recent available data for each pollutant. If there is no monitor located within the boundary of the MPA, the data from the nearest representative monitor(s) were chosen. Most of the available monitoring stations are located east or southeast of the planning area. As outlined in Table 3.2 of this chapter, the air quality in and near the MPA meets the NAAQS by a large margin with the exception of ozone which is just under the 8-hour NAAQS at Canyonlands National Park.

A recent assessment of air quality in National Parks around the country found that ozone concentrations and ammonium deposition increased significantly at Canyonlands National Park between 1995 and 2004 (GPRA 2005). The same report, however, found improvements in nitrate and sulfate deposition, although these improvements were not found to be statistically significant (GPRA 2005). In 2005, Canyonlands National Park did not meet a National Park Service internal air quality goal (called Ia3), which incorporates visibility, atmospheric deposition, and ozone concentration targets.

3.2.1.2 Global Climate Change

On-going scientific research has identified the potential impacts of climate changing pollutants on global climate. These pollutants are commonly called "greenhouse gases" and include carbon dioxide, CO_2; methane; nitrous oxide; water vapor; and several trace gas emissions. Through complex interactions on a regional and global scale, these emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although climate changing pollutant levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically referred to as global warming. 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). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Figure 3.3 demonstrates that northern latitudes (above 24° N) have 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. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of these "greenhouse gases" are likely to accelerate the rate of climate change.

The Intergovernmental Panel on Climate Change (IPCC) has recently completed a comprehensive report assessing the current state of knowledge on climate change, its potential

impacts, and options for adaptation and mitigation. At printing of this PRMP/FEIS, this assessment is available on the IPCC web site at http://www.ipcc.ch/. According to this report, global climate change may ultimately contribute to a rise in sea level, destruction of estuaries and coastal wetlands, and changes in regional temperature and rainfall patterns, with major implications to agricultural and coastal communities. The IPCC has suggested that the average global surface temperature could rise 1 to 4.5 degrees Fahrenheit (°F) in the next 50 years, with significant regional variation. The National Academy of Sciences (2006) has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer models indicate that such increases in temperature will not be equally distributed globally, but are likely to be accentuated at higher latitudes, such as in the Arctic, where the temperature increase may be more than double the global average (BLM 2007). Also, warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Vulnerabilities to climate change depend considerably on specific geographic and social contexts.

BLM recognizes the importance of climate change and the potential effects it may have on the natural environment. Several activities occur within the planning area that may generate emissions of climate changing pollutants. For example, oil and gas development, large fires, and recreation using combustion engines, can potentially generate CO_2 and methane. Wind erosion from disturbed areas and fugitive dust from roads along with entrained atmospheric dust has the potential to darken glacial surfaces and snow packs resulting in faster snowmelt. Other activities may help sequester carbon, such as managing vegetation to favor perennial grasses and increase vegetative cover, which may help build organic carbon in soils and function as "carbon sinks".

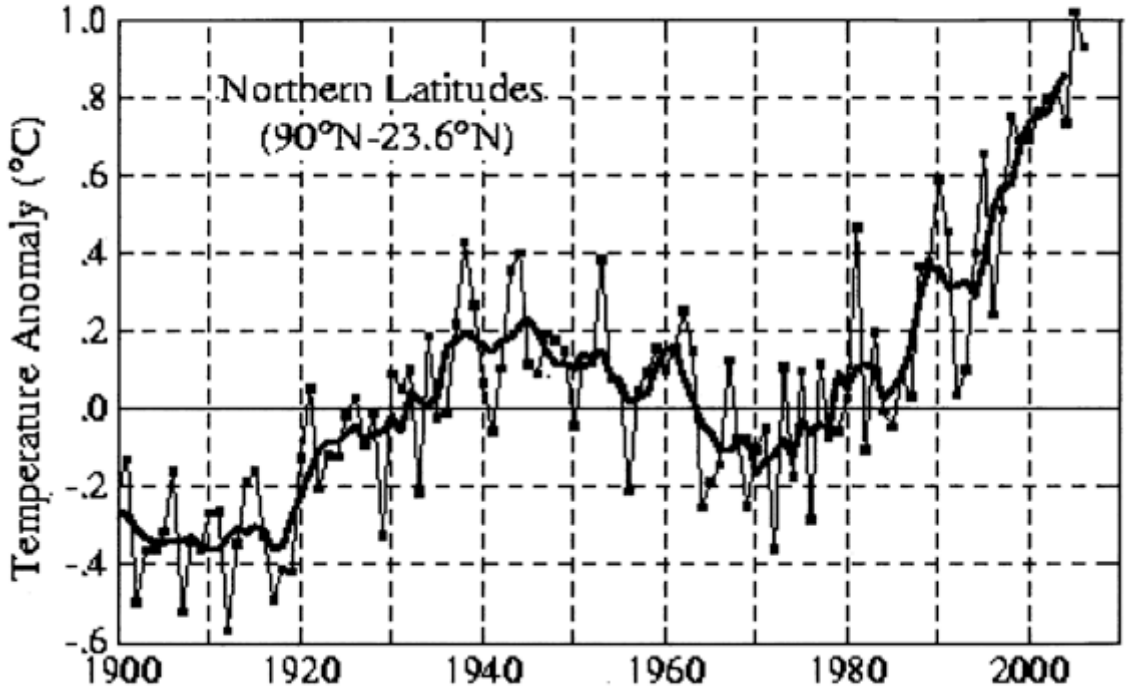


Figure 3.3. Annual Mean Temperature Change for Northern Latitudes (24–90° N).

3.2.1.3 VISIBILITY IN CLASS I AREAS

Visibility is "the clarity with which distant objects are perceived" (EPA 2001a) and is affected by pollutant concentrations, plume impairment, regional haze, relative humidity, sunlight, and cloud characteristics. A natural visual range without any man-made air pollutants would be 140 miles in the western states (EPA 2001a). Aerosols (small particles made of solid and/or liquid molecules dispersed in the air) are the pollutants that most often affect visibility in the Class I areas. Five key contributors to visibility impairments are sulfate, nitrate, organic carbon, elemental carbon, and crustal materials. Their contributions to visibility impacts in the Canyonlands National Park, a Class I area within the MPA, are summarized in Table 3.3 (EPA 2001a).

The 1977 Clean Air Act (CAA) included legislation to prevent future and remedy existing visibility impairment in Class I areas. In 1985, the United States Environmental Protection Agency (EPA) established a collaborative monitoring program called the Interagency Monitoring of Protected Visual Environments (IMPROVE) to monitor visibility in Class I areas. The IMPROVE network has operated a monitor in the Canyonlands National Park, located near the western boundary of the MPA since 1988. The most-impaired days in Canyonlands National Park exhibit visual distances between 61 and 80 miles and show improvements over the decade of 1988 to 1997 of approximately 35%. The mid-range days have visual distances of 78 to 109 miles and show no significant change. The least-impaired days have visibility ranges from 107 to 144 and also demonstrate improvements over the decade of approximately 25% (EPA 2003c). The visibility trend from 1990 to 2004 in the Canyonlands National Park is summarized in Figure 3.4. A more recent assessment of visibility in the Canyonlands National Park indicates that the improvement trend in visibility has continued through 2004, although the trend was measured in different units and was not found to be statistically significant (GPRA 2005).

Table 3.3. Summary of Visibility Impairment Pollutants Measured in the Canyonlands National Park [a]

Pollutant	Contribution [b]	Emission Sources
Sulfate	34%	Fossil fuel combustion and forest fires.
Crustal Material	27%	Fugitive dust from roads, agricultural and forestry operations, and wind erosion.
Organic Carbon	22%	Wood burning, open burning, vehicle exhaust, and wildfires and prescribed burning.
Elemental Carbon	10%	Vehicle exhaust, wood burning, and wildfires and prescribed burning.
Nitrate	7%	Motor vehicle exhaust. Secondary sources include fossil fuel combustion and prescribed burning.

[a] Data source: U.S. EPA. 2001a. Visibility in Mandatory Federal Class I Areas (1994-1998)- A Report to Congress. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

[b] Contributions are calculated by pollutant concentrations regularly measured in the Canyonlands National Park. Light extinction coefficients and visibility indices are then calculated from these values.

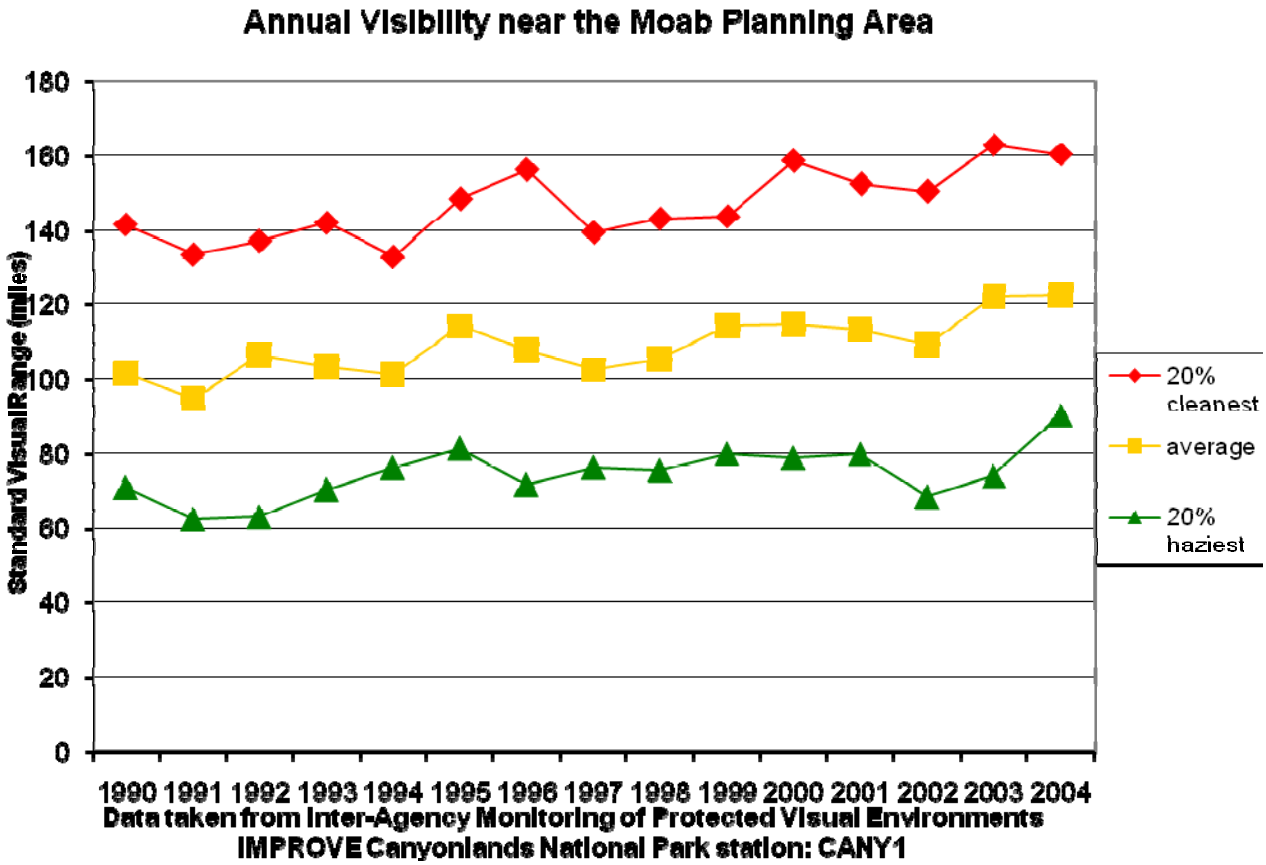


Figure 3.4. Trend in air pollution impacts on visibility observed in Canyonlands National Park, Utah, 1990 through 2004 (EPA 2003c).

3.2.2 Status of Emissions

The MPA encompasses all of Grand County and the northern portion of San Juan County. These lands are included in the MPA boundary. Currently, emission sources within the MPA consist mostly of oil and gas development facilities and some mineral processing facilities as identified in Table 3.4.

Table 3.4. 2005 Emissions Inventory for Grand and San Juan Counties, Utah.

County	Source	2005 Emissions (tpy)						
		CO	NOx[b]	PM_{10}	$PM_{2.5}$	SOx[c]	VOC[d]	HAPs[e]
Grand County	Area source	206.1	15.6	429.7	87.6	3	285.3	
	Non-road mobile	2,962.00	175.7	36.6	30	7.6	904.5	

Table 3.4. 2005 Emissions Inventory for Grand and San Juan Counties, Utah.

County	Source	2005 Emissions (tpy)						
		CO	NOx[b]	PM_{10}	$PM_{2.5}$	SOx[c]	VOC[d]	HAPs[e]
	On-road mobile	8,118.10	1,042.00	380.8	78.2	16.4	572.1	
	Point source	224.5	377.8	4.2	4.2	0.3	68.7	
	Biogenics	6,596.10	-	-	-	-	34,972.80	
	Total Grand County	18,106.80	1,611.20	851.3	199.9	27.3	36,803.40	18.8
San Juan County	Area source	517.2	35.4	1,108.60	223.9	34.7	516.8	
	Non-road mobile	1,868.30	59.2	21.3	19.6	11	546.1	
	On-road mobile	6,656.80	1,057.90	398.7	88.9	21.3	470.4	
	Total San Juan County	9,042.20	1,152.50	1,528.60	332.4	67	1,533.30	9.9
Regional Total		**27,149.10**	**2,763.70**	**2,379.80**	**532.3**	**94.3**	**38,336.70**	**28.7**

[a] Emission inventory data from 2005 State Summary of Emissions by Source. URL: www.airquality.utah.gov/Planning/Emission-Inventory/2005_State/05/State_List.htm
[b] Nitrogen oxides - one of the main ingredients involved in the formation of ground-level ozone.
[c] Sulfur oxides - contribute to respiratory illness, atmospheric deposition, and the formation of atmospheric particles that can cause visibility impairment.
[d] VOC (volatile organic compounds) refers to any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate that participates in atmospheric photochemical reactions. Also a precursor to ozone.
[e] HAPs (hazardous air pollutants) are generally defined as those pollutants that are known or suspected to cause serious health problems. Section 112(b) of the Clean Air Act identifies a list of 188 pollutants as HAPs. The emissions inventory for HAPs available from the State of Utah only includes those reported by stationary industrial sources.

The 2005 emissions inventory available from the Utah Department of Environmental Quality, Division of Air Quality (UDAQ) was used to characterize base-year emissions in San Juan and Grand County. Emissions are summarized by source type for criteria pollutants including area source, non-road mobile, on-road mobile, point sources, and biogenics. The emission inventory for hazardous air pollutants only includes emissions from stationary industrial sources.

3.2.2.1 Additional Sources Of Emissions

The seasonal windroses presented in Figure 3.2 for the I-70 corridor and Moab (in the MPA) show that prevailing wind speeds rarely exceed 5 m per sec., and vary seasonally in direction. Due to prevailing wind direction in the planning area, emission sources located in Price, Utah represent a very minor potential for air quality impacts to the northern portion of the planning

area in the spring only; emission sources in Page, Arizona, and Las Vegas, Nevada represent essentially no potential for air quality impacts to the planning area as they are located downwind nearly year-round.

As stated previously, current air quality in the MPA is, with the exception of ozone, consistently below the NAAQS by a large margin, as shown in Table 3.2. Observed ozone concentrations in the vicinity of the MPA are less than, but near the NAAQS. The UDEQ indicated that ozone concentrations in Class I areas of the western states have shown significant increases in the past decade and are approaching the NAAQS level (Personal communication between Brock LeBaron, UDEQ, and Trinity Consultants, August 8, 2003). Although the exact sources contributing to the high ozone concentrations have not been verified at this time, studies indicate that oil and gas development activities contribute to the rise in ozone concentrations in production areas (Katzenstein et al. 2003).

Additional, short-term air quality impacts have been observed over the last two years along I-70 and U.S. Highway 191 (U.S. 191) in southeastern Utah due to severe wind blown dust ("blowout") conditions. Blowout refers to the dusty conditions due to wind picking up dust in significant quantities, creating the brown-out conditions along the roadways for stretches of up to several miles long. There have been increasing numbers of highway closures and accidents related to the blowout from the Mancos Shale landscapes adjacent to I-70 and U.S. 191. The dust problem has resulted in multiple car pile-ups and will likely result in fatalities in the future (Jackson 2003). A preliminary study conducted by BLM indicated that possible causes of the increasing blowout conditions are: loss of vegetation; wind erosion; natural sand particles; topography; and human disturbance related activities such as road construction, off highway recreational vehicles, pipeline and power transmission development, livestock concentration areas, fires, and arroyo cutting (Jackson 2003). BLM has initiated a process to identify areas of concern and determine appropriate management actions.

Additional concerns focus on mobile source emissions specific to visitation and traffic within the MPA. Current Easter weekend visitation in the Moab area is greater than 20,000 visitors. Most recreational visitors engage in motorized activities that represent emission sources in addition to the highway vehicles utilized for transportation. There are more than two million visitors annually to the planning area.

Prescribed fire and naturally caused fires also present a concern to air quality. Prescribed burning is a useful tool for resource management and may be used to achieve a variety of objectives such as restoring a fire-dependent ecosystem, enhancing forage for cattle, improving wildlife habitat, preparing sites for reforestation, or reducing hazardous fuel loads. Fire, for any of these reasons, will produce smoke and other air pollutants. Some short-term air pollutant releases are necessary to achieve the many benefits of prescribed burning. Short-term effects on air quality from prescribed burns include a general increase in particulate matter, CO2 and ozone precursor emissions. Land managers recognize that smoke management is critical to avoid air quality intrusions over sensitive areas or visibility problems. Vegetation management is an active part of fire management techniques and long-term effects of prescribed burning include a reduction in particulate matter, CO2 and ozone precursor emissions specific to wildfire in unmanaged areas.

As a result of careful management, there is usually less smoke from a prescribed fire than from a wildfire burning over the same area.

3.3 Cultural Resources

3.3.1 Introduction

Cultural resources are defined as those fragile and nonrenewable remains of human activity, occupation, or endeavor (including both prehistoric and historic remains) representing a part of the continuum of events from the earliest evidence of people to the present day. These resources consist of 1) physical human-made artifacts, features, structures and sites; 2) areas where significant events occurred (although evidence of the event may no longer remain); and 3) the environment immediately surrounding the actual resource.

The MPA has a wide variety of environmental settings and resources and has long been used by humans. The planning area encompasses a large and diverse assemblage of prehistoric archaeological sites, historic archaeological sites and localities, and locations of traditional religious and cultural importance to various Indian tribes. For BLM management purposes, these remains take the form of sites, artifacts, buildings, structures, ruins, features, and natural landscapes with particular cultural importance. With a few exceptions, these remains must be at least 50 years old. In the case of natural landscapes, the period of traditional use of that landscape must also be at least 50 years old.

Because cultural resources have intrinsic values (e.g., scientific, traditional, or public interpretation values) that must be managed, planning and implementing management practices related to cultural resources involves a multiple resources approach. NEPA, NHPA (as amended), and other Federal legislation require that the BLM assess the impacts of a proposed action to cultural resources. In compliance with Section 106 of the NHPA, this review includes Records Searches and Class III inventories.

In the MPA, records searches, reviewing contractor generated cultural resource inventory reports and site forms, and conducting in-house Class III cultural resource inventories compose the vast majority of the workload. Records searches, which focus on compiling all known cultural resource management information about certain parcels of land, are completed for all projects. Class II and III inventories are completed for any proposals that have the potential to disturb surface soils. These two inventories have provided the majority of information regarding cultural resources present in the planning area.

3.3.2 Resource Overview

3.3.2.1 Culture History of the Moab Planning Area

Occupation of southeastern Utah is divided into several distinct and temporally bounded time periods. The creation of distinct time periods has, in large part, been driven by differences in artifact assemblages through time. In many instances, this type of fine-scale division is informative. As new sites and artifacts are routinely being discovered, however, these divisions

are susceptible to significant revision. The dates provided here serve only as general time-frame markers; any new dating technology advances or new discoveries will likely alter these date ranges. Nevertheless, five broad time periods will serve as temporal foundations for explaining human behavior in this area. An outline of these five periods and their associated behavioral trends is detailed below. These periods are defined temporally, behaviorally, and technologically. For additional information, a detailed overview of the prehistory and history of the region included in the MPA is presented in *Grand Resource Area Class I Cultural Resource Inventory* (Horn et al. 1994).

The basic periods include the Paleoindian, Archaic, Formative, and Late Prehistoric Stages, and the Historic period. The Historic period is further subdivided into Indian/White Interaction, Spanish Exploration, Fur Trade and Early Indian Trade, U.S. Government Exploration and Survey Expeditions, Initial Euroamerican Settlements, Ranching, Farming, Transportation, Communication, Towns and Settlements, Mining, Water Control, Speculative Ventures, Civilian Conservation Corps, Military, Federal Land Management, Antisocial Activities, and Ethnic Diversity themes.

3.3.2.1.1 PREHISTORIC CULTURE HISTORY

3.3.2.1.1.1 Paleoindian Stage

The Paleoindian Stage (ca. 10,000 to 7,800 B.C.) is the earliest stage of culture history evident in the region and represents the adaptation to late Pleistocene environments. It is characterized by small groups of relatively mobile hunting and gathering peoples who used most sites only briefly. The Paleoindian tool kit typically included large, lanceolate (Clovis, Folsom, and Plano) projectile points (Schroedl 1991), spurred end scrapers, gravers and borers, and crescents (Frison 1978:78; Schroedl 1991). This stage is further split into three traditions including the Clovis (10,000 to 9,000 B.C.), Folsom (9,000 to 8,300 B.C.), and Plano (8,300 to 7,800 B.C.).

3.3.2.1.1.2 Archaic Stage

Late in the Pleistocene Epoch, the climate became warmer and drier which resulted in the expansion of desert vegetation zones and a concurrent retreat of cooler and moister vegetation zones to higher elevations. Changes in the climate caused a reduction in the distribution of Pleistocene wildlife, in some cases to the extinction of animals that were typically adapted to the cooler, moist climates. With changing climates came the expansion and modification of artifact assemblages as people adapted to a wider, more dispersed wildlife and plant resource base. The artifact assemblage associated with the Archaic Stage (7,800 B.C. to 500 B.C.) is typified as including large projectile points with side and corner notching and stemmed points (Humboldt Concave Base, Pinto series, McKean, Northern Side-notched, Sudden Side-notched, Mallory Side-notched, Gatecliff Contracting-stem, and possibly San Rafael Stemmed varieties) (Holmer 1978), as well as basketry, cordage, netting, matting, fur clothing, tumplines as carrying devices, sandals, and atlatl darts.

3.3.2.1.1.3 Formative Stage

The Formative Stage (500 B.C. to ca. A.D. 1200) is characterized by the reliance on domesticated corn and squash, an increasing tendency for people to establish long-term village sites rather than continually moving about the landscape, substantial habitation structures, ceramics, and bow and arrow technology in the latter traditions. Two major traditions occur in the region: the Fremont tradition north of the Colorado River, the Anasazi tradition to the south of the Colorado River. A third—the Gateway Tradition—has been used by a few archaeologists to identify archaeological sites that contain both Fremont and Anasazi manifestations (Horn et al. 1994:123).

The Fremont adapted to the changing environment by using hunting and gathering subsistence styles of survival along with some horticultural farming. The variability of Fremont sites have caused archaeologists to classify Fremont manifestations as regional variants characterized by differing settlement and subsistence strategies. Those variants associated with the MPA include the Uinta Basin and San Rafael. Generally, the artifact assemblage associated with the Fremont includes gray, coiled pottery types distinguished by specific temper materials and decorative styles (Madsen 1977), one-rod-and-bundle basketry, leather moccasins constructed from the hock of a deer or mountain sheep, and ornate clay figurines with trapezoidal bodies (Horn et al. 1994:213).

The Anasazi people, whose homeland centered in the Four Corners area of the American Southwest, have been identified as a sedentary, horticultural based group whose focus on corn, beans, and squash encompassed the later period. The Anasazi tradition has been subdivided into periods (from earliest to most recent): Basketmaker II, Basketmaker III, Pueblo I, Pueblo II, and Pueblo III. The Basketmaker II period marked the transition from a hunting and gathering lifestyle to a more sedentary occupation of regional areas. In the MPA, sites associated with the Basketmaker II tradition have been documented as well as sites linked to the Puebloan traditions. Numerous storage cists, masonry structures, pit structures with storage features, and lookout structures have been recorded plus a range of pottery types indicative of the Anasazi time period; however, the documented artifacts do not provide a continuous spectrum of use. The lack of artifact assemblage continuity and lack of documented kilns, may be more indicative of trading networks than of actual occupation by Anasazi groups.

3.3.2.1.1.4 Late Prehistoric Stage

During the Late Prehistoric Stage, it is commonly believed that the Utes were the primary occupants of eastern Utah and western Colorado (Horn et al. 1994:130). Linguistic and archaeological evidence (especially ceramics) indicate that the Utes immigrated to the region by approximately A.D. 1100. Other evidence characteristic of Ute occupation includes sparse lithic scatters with low quantities of crude brownware ceramics, rock art, and occasional wickiups. In addition to the fingertip-impressed brownware ceramics, other diagnostic artifacts include locally designated Uncompahgre Brown Water and Desert Side-notched and Cottonwood triangular projectile points (Buckles 1971). As Utes interacted more with local Europeans during the late seventeenth and eighteenth centuries, varying quantities of Euroamerican artifacts such as sheet metal cone tinklers, tin cans, metal and glass projectile points, weaponry, and equestrian tack

become part of the artifact assemblage. Sites containing diagnostic Ute artifacts have been reported in all parts of the MPA.

The Navajo homeland is located south of the MPA, in the southeastern corner of Utah, northeastern Arizona, and in northwestern New Mexico (Brugge 1983). Although the Navajo homeland lies south of the planning area, historic records mention Navajo inhabitants farming parts of Spanish Valley in 1855. Based on additional references, these farmers may have resided in Spanish Valley until the 1870s.

The Hopi Tribe also claims traditional affiliation with the planning area. Small amounts of yellow ware pottery have been found at three sites in the planning area. In addition to ceramics, Hopi elders have identified rock art panels that contain Puebloan motifs. Although there is a paucity of Hopi-related ceramics, the tribe maintains ancestral ties to the planning area.

3.3.2.1.2 Historic Culture History to ca. 1950

Historic cultural resources in the MPA can be classified into one or more themes: Indian/White Interactions, Spanish Exploration, Fur Trade and Early Indian Themes, U.S. Government Exploration and Survey Expeditions, Initial Euroamerican Settlement, Ranching, Farming, Transportation/Railroads, Communication, Towns and Settlements, Mining, Mineral Exploration, Mineral Processing, Water Control, Speculative Ventures, Civilian Conservation Corps, Military, Federal Land Management, Antisocial Activities, and Ethnic Diversity (Horn et al. 1994). For a comprehensive discussion of the historic period in the region, see Horn et al. (1994).

Numic-speaking Utes primarily occupied the MPA during the time of European contact. Contacts with Spaniards increased during the late 1700s and the early 1800s. Use of the Old Spanish Trail started decades before this as Indian thoroughfares and the Spanish capitalized on this existing route. The Old Spanish Trail connected missions in southern California to the New Mexico trade centers of Taos and Santa Fe on the east. As cultural interactions with traders and travelers increased, changes occurred with Native American populations. The influx of Euroamericans into the MPA eventually fostered conflicts with long-time Indian inhabitants that resulted in the creation of reservations and the movement of traditional peoples off their ancestral lands. Nonetheless, seasonal aboriginal uses of what are now Federal lands continued through the 1930s as groups continued to exploit resources in the canyons and adjacent mountains. Many sites that are Native American in origin may include various historic artifacts, in particular food cans. A thorough investigation of the artifacts and their use/reuse may provide insights as to who left the artifacts.

Exploration of the MPA is first mentioned in the 1765 accounts of Juan Maria Antonio de Rivera who led an expedition through what is now Grand County. Although traders and early travelers probably traversed through the MPA, very few left lasting records and the Robidoux and Denis Julien inscriptions remain the only lasting links between modern times and the fur trapper/trader era. U.S. government-sponsored exploration and survey expeditions in the middle to late nineteenth century and continued use of the Old Spanish Trail eventually resulted in Euroamerican settlement of the area by Mormon settlers in 1855. As population increased,

homesteads occupied locations where perennial springs promised consistent water for crops, livestock, and household uses. Camps, homestead remains, corrals, cellars, dugouts, privies and transportation routes in the form of trails may provide insights into early occupation and use of the land encompassed by the planning area.

Euroamericans, dependent upon ranching and farming, continued to expand and settle in various places in the planning area. Numerous towns sprang up throughout the planning area. Physical remains dating from early town-building and isolated settlement activities dot the landscape and provide the planning area with a rich historical archaeological record.

The economic backbone of the planning area in the mid-nineteenth century focused on livestock ranching with cattle dominating the industry until the 1890s when sheep became a viable option. The remains of sheep camps, line camps, and stock driveways all indicate the pervasiveness of the livestock industry in Grand County.

The naturally warm climate fostered the growth of fruit orchards, and by 1910, Moab was renowned for its fruit, especially peaches. The need to control water—the essential component of survival in southeastern Utah—became critical. The pleas to protect farm lands from seasonal floods were addressed during the 1930s when the Civilian Conservation Corps (CCC) spent many man-hours building flood control contour dams throughout the Grand and Spanish valleys. Remnants of CCC camps, and numerous water control structures as well as farmer-constructed irrigation systems can be found throughout the MPA.

In addition to ranching, mining has continued to have significant impacts to the region and its landscape as the twentieth century dawned, oil exploration created quite a stir. Likewise, the coal industry boomed briefly in the Book Cliffs region during the early 1900s, causing the construction of a narrow-gauge spur that connected the town and mill at Sego to the Denver and Rio Grande railroad at Thompson Springs.

The search for minerals has left a legacy of exploratory mines as well as two-tracks and roads that support and foster recreational use of Federal lands. By the twenty-first century, mining generated routes added several thousand miles to the transportation network covering the MPA. In between the boom and bust cycles of the mining industry, ranching and farming sustained those who weathered the extractive industrial rollercoaster.

3.3.2.2 Literature Review and Description of Typical Resources

For a detailed description of available sources, see the Analysis of Management Situation for the Moab Field Office (BLM 2004d).

3.3.2.3 National Register Listed Cultural Resources

Generally, formal listing on the National Register of Historic Places (NRHP) occurs for a small portion of the total sites in any given state or county. Table 3.5 summarizes these sites for the MPA, and is based on the data that was collected. Of the known sites within the planning area, three are listed on the NRHP as either individual sites or part of a larger archaeological district (www.historicdistricts.com/UT.html).

Table 3.5. National Register-listed Sites, Buildings, and Districts Located on BLM Lands within the MPA

Year	Name	Trinomial	Type	Vicinity	County	NR #
1968	Desolation Canyon	NA	Site	Green River	Grand	68000057
1980	Thompson Wash Rock Art District (Sego Canyon)	42GR275-277	District	Thompson	Grand	80003909
1991	Julien, Denis: Inscription	42GR0111	Site	Mouth of Hell Roaring Canyon	Grand	91000617

3.3.2.4 Places of Traditional Native American Cultural Importance

Places that may be of traditional cultural importance to Native American people include, but are not limited to:

- locations associated with the traditional beliefs concerning tribal origins, cultural history, or the nature of the world;
- locations where religious practitioners go, either in the past or the present, to perform ceremonial activities based on traditional cultural rules of practice;
- ancestral habitation sites;
- trails;
- burial sites;
- springs, perennial water sources; and
- places from which plants, animals, minerals, and waters possessing healing powers or used for other subsistence purposes, may be taken (Ferguson et al. 1993:30; Hopi Cultural Preservation Office 1995:2; Parker and King 1989:1).

Additionally, some of these locations may be considered sacred (as opposed to "traditional") to particular Native American individuals or tribes. Under the auspices of the NHPA of 1966, as amended; American Indian Religious Freedom Act of 1978 (AIRFA); Executive Order 13007–Indian Sacred Sites, dated May 24, 1996; and the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), as amended, the BLM must take into account the effects of Federally linked projects or land uses on these types of locations.

3.3.2.4.1 Tribal Consultation List

The MFO has historically consulted with Ute, Navajo, and Puebloan groups concerning cultural resource issues, including the identification of Traditional Cultural Properties (TCPs) (Table 3.6).

Table 3.6. Native American Organizations Historically Consulted by the MFO

Uintah and Ouray Ute Indian Tribe
Southern Ute Tribe
White Mesa Utes
Pueblo of Acoma
Ute Mountain Ute Tribe
Navajo Nation
Navajo Utah Commission
Hopi Tribe
Pueblo of Zuni
Pueblo of Santa Clara
Pueblo of Laguna
Paiute Indian Tribe of Utah

3.3.2.4.2 Potential Traditional Cultural Properties (TCPs)

As mentioned earlier, there are several site types, both archaeological and non-archaeological, that could potentially be identified by Native American groups as TCPs. An ethnographic study is currently being prepared for the MFO that will focus on the ethnographic, ethnohistoric, and archaeological record to determine which groups ascribe cultural values to lands managed by the MFO and to identify existing and potential TCPs within the planning area. Meetings, field visits, and oral interviews with tribal elders may also be included as part of this study. The following is a general discussion about some of the archaeological and non-archaeological site types that may be identified as TCPs on lands managed by the MFO.

3.3.2.4.2.1 Archaeological Sites

Many Native American groups claim affiliation with prehistoric archaeological sites such as rock art, burials, and village sites. The Hopi Tribe, for example, claims that often the exact locations of some of these places, such as ancestral archaeological sites and burials, are unknown to tribes until these sites are identified by Hopi cultural experts during ethnographic or ethnohistoric investigations, or by archaeologists during archaeological investigations of a given study area. Not only do the Hopi consider these sites to be TCPs, they also believe that they are historic properties eligible to the National Register under Criteria A, B, C, and D for the following reasons (Ferguson 1997; Hopi Cultural Preservation Office 1995):

- Criterion A because they are associated with the Hopi clan migrations, which have made a significant contribution to the broad patterns of Hopi history.
- Criterion B because they are "associated directly with Ma'saw and the Hopis' covenant to leave their footprints across the land."
- Criterion C because "ancestral archaeological sites, that may be individually anonymous, are identified as part of the great clan migration that are central to all that is Hopi."

- Criterion D because they have yielded or have the potential to yield information important to Hopi prehistory.

Other tribes also consider ancient Native American archaeological sites as places of traditional importance. For example, the Zuni have identified all "ancestral" archaeological sites as places of traditional importance, as well as being eligible to the National Register (Anyon 1995; Hart 1993:40). They say that these sites meet Criteria A and B (as outlined in National Register Bulletin 15) because of their association with the Zuni ancestors and their oral migration histories. The Utes also consider some of these sites to be culturally significant and sacred and maintain that the spirit of their ancestors dwell at archaeological sites and will remain as long as the sites are not disturbed (Newton 1999; Perlman 1998). Recently, a spiritual leader of the Uintah and Ouray Ute Tribe has stated that the disturbance of significant archaeological sites is leading to the destruction of Ute religion and diminishing the power of the spirits that remain at these sites (Molenaar 2003a).

3.3.2.4.2.2 Rock Art Sites

Many tribes have strong spiritual convictions regarding petroglyphs and pictographs and usually request that these sites not be disturbed, especially if the site was created with the intention of connecting with a spiritual or natural power. Many Ute and Puebloan groups also believe that rock art created by their ancestors retains the spirits of their ancestors. The Hopi Cultural Preservation Office has ascribed cultural values to Fremont rock art panels as far north as Nine Mile and Desolation Canyons (Molenaar 2003b; Blaine Miller personal communication 2003).

Rock art panels are also seen by tribes as physical evidence for Native American land use indicating territorial boundaries, hunting and camping sites, and trail or migration markers. Some panels depict tribal stories and legends, but can only be interpreted by those with the specialized knowledge to understand their meaning. In the past, Utes have derived spiritual powers and authority from special petroglyph panels for their Bear Dances (Spangler 1995:775). The Uintah and Ouray Ute Tribes often request one-half mile buffers around rock art panels, if possible, during Section 106 consultations (Molenaar 2003b).

3.3.2.4.2.3 Rock Shelters

Rock shelters and cave sites located within the planning area can potentially be identified as TCPs. These locations include overhangs, crevices and cave sites and are significant to Native Americans as ancestral dwellings. These site types are also potential ancestral grave sites for the Ute Tribe (Pettit 1990). These sites may also be identified as places where Native Americans communicated with the supernatural world by means of prayers, offerings, and vision quest sites (Molenaar 2003a).

3.3.2.4.2.4 Non-Archaeological Site Types

Non-archaeological site types are distinguished from archaeological site types in order to discuss places that are not necessarily associated with prehistoric or historic artifact assemblages and collections. These sites are typically identified by tribal representatives during the government-

to-government consultation process that is required of Federal agencies. Some common site types are lakes and springs, land features, and traditional gathering or collection areas.

Lakes, Rivers, Perennial Streams, and Springs

Native Americans often claim places of water as places of traditional importance and have traditional stories about mythical beings, or water spirits that live in lakes, springs, and rivers. The Colorado River and its tributaries have sacred significance to the Navajo. The Colorado, Green and Price Rivers have been identified as sacred to the Navajo because they come from natural spring water. According to the Navajo, when the Green River is impacted, the cultural integrity of the spring water is affected, which in turn affects traditional procurement use values (Molenaar 2003c).

Traditional Gathering or Collection Areas

Traditional plant or other resource gathering areas may be places of traditional importance to Native American groups. These areas are generally places where Native Americans go to collect resources such as medicinal plants used and minerals to be used in ceremonies and are often in current use when identified.

Land Features

Large geographic regions, such as deserts, mountain ranges, and valleys are often identified as TCPs but few have been formally documented as such. Examples in the vicinity of the planning area include Sleeping Ute, the Henry Mountains, and Rainbow Bridge (listed on the National Register as a TCP).

3.3.2.5 Cultural Resource Distribution in the MPA

The number, nature, and location of cultural resources present within any given area of the MFO varies depending on numerous factors. Through extensive study of archaeological sites throughout the West, archaeologists have identified several key factors that influence site locations and types including such factors as elevation, slope, aspect, distance to permanent and/or intermittent water, and presence or absence of resources of interest (e.g., food or medicinal resources, valuable minerals, etc.).

The degree to which these factors influence the type and density of cultural resource sites in a given area also varies depending on the time period (prehistoric or historic) considered. For instance, technological advances during the historic period made it possible for people to live and work in areas that would have been less desirable during the prehistoric period. Long-term settlements or habitation sites, particularly during the prehistoric period, were typically located in areas with permanent water sources, so long as the area is at an appropriate elevation that doesn't experience too harsh of a winter or that contains or is close proximity to other areas that contain needed subsistence resources. Short-term camps, on the other hand, could be located in all types of environments and were typically focused on the exploitation of a specific resource during a specific time of year. Thus, in the high desert environment of the MPA, which experiences snow at higher elevations, short-term camps to gather plant or animal resources tend to be located on

the higher plateaus and upper slopes of mountain ranges, and long-term settlements tend to be located at lower elevations, along permanent rivers and streams. As archaeological sites, short-term camps tend to have small numbers of artifacts, such as projectile points for hunting, that are typically associated with acquiring a specific resource and they generally lack permanent features such as living or storage structures. Long-term settlements frequently contain large numbers of artifacts and a wider diversity of artifact types, including items for processing rather than simply obtaining resources, and at least some evidence of structures. Many of these longer term sites in the MPA are associated with caves, alcoves, and rock shelters. Rock art sites, a common site type in the MPA, may be found in association with any environmental location, so long as rock appropriate for pecking, grinding, or painting exists.

A limited percentage of lands within the MPA have been physically inspected for the presence of cultural resources, and such an effort is cost-prohibitive as part of preparing the RMP. Therefore, the relative site density potential for areas within the MFO was estimated using environmental factors known to influence site location and type. All area of the MFO were then ranked as having either high, medium, or low potential for containing cultural sites. Table 3.7 summarizes the acreage of the three site probability categories estimated within the MPA. A detailed description of the factors considered and methodology used to assess site probability is provided in Section 4.3.2.1.

Table 3.7. Estimated Acreage within the MFO with High, Medium, and Low Probability to Contain Cultural Resource Sites

Site Probability	Estimated Acreage	% of Lands in the MFO
High	302,914	17%
Medium	625,903	34%
Low	895,450	49%

3.3.2.5.1 ADVERSE IMPACTS TO CULTURAL RESOURCES

Impacts to archaeological sites from recreational uses (especially off-road travel) and energy-related exploration and development activities have increased dramatically in the last ten years. Many cultural resource sites may be "at-risk" and their NRHP eligibility threatened. Inventory and evaluation will provide BLM with a better understanding about the extent of individual at-risk resources and their NRHP eligibility. Site monitoring will reveal changes to at-risk condition over time.

In order to protect the integrity of cultural resource sites, activities that contribute to site degradation may have to be limited. Limitations will diminish adverse effects to "at-risk" sites but will also curtail some peoples' recreational and transportation pursuits. Activities that would be restricted from locations of at-risk resources, on a case-by-case basis, may include but not be limited to use of mechanized and motorized vehicles, rock climbing, horseback riding, dispersed camping, target shooting, and livestock grazing.

Cultural resources are being adversely impacted by various uses ranging from recreational, energy-related exploration and development, and range-related activities. The BLM must be better able to quantify these impacts from various uses in order to develop adequate mitigation measures that protect eligible cultural resource sites. Once the BLM has a better understanding of exactly what the cost of the various land uses is in terms of data loss or cultural distress (for Native American tribes and other heritage groups), it can better effect solutions to either preventing the impacts or focusing the impacts in specific locations. As a result of these measurements, certain areas may be deemed too vulnerable to allow full access but they may be appropriate for restricted use.

Conflicting policies applicable to cultural resource management with regards to the issuance of OHV permits and construction of single-tracks are in direct conflict with each other. Under the revised federal NHPA regulations, issuance of OHV permits by the BLM is considered an undertaking and is subject to review under Section 106 process, thus it is necessary for the BLM to formally take into account the effect that issuing OHV permits will have on cultural resources within the Moab FO. However, the statewide protocol established between BLM and the Utah SHPO, as well as existing Utah BLM handbooks, indicate that issuance of permits is exempt from Section 106 review. This discrepancy provides unclear direction to Moab FO resource specialists in the practical application of their management prescriptions. OHV use in open areas are adversely impacting cultural resources—surface use stipulations for ground disturbing activities are needed to prevent adverse impacts from occurring. Designating routes and preventative fencing would help address the current user impacts to cultural resources. Potential areas of high site density or significant site types may need to be closed to vehicular travel.

3.4 Fire Management

3.4.1 Introduction and Resource Overview

The Moab Fire District consists of approximately 6.5 million acres of public land in the Price, Moab and Monticello field offices interspersed with state, private, and other Federally regulated lands within Carbon, Emery, Grand, and San Juan Counties. The divergent elevations throughout the area support a wide range of vegetation and soil types including riparian areas, forested high mountain watersheds, grasslands and shrublands, and sparse, arid desert sands. During a normal fire year the district averages 100 wildfires resulting in 10,000 to 16,000 acres each year of disturbed and potentially damaged land. Most fire activity occurs in the eastern half of the district, although fires can occur in almost all areas of each field office. In the twenty-five year period between 1980 and 2005, approximately 74% of wildland fires occurring in the Moab Fire

District were lightning-caused. Prior to 1995, an average of 100 fires per year burned an average of 10,000 acres per year. The past decade has shown a trend of increasing wildland fire, with an average of 130 fires each year burning an average of 16,000 acres each year.

The occurrence of wildland fire varies from year-to-year depending on weather, climatic, and other conditions. Fire occurrence and size can depend on a range of factors including elevation, vegetative community, fuel moisture, precipitation and/or a lack of precipitation, the ability of fire to carry in specific types of vegetation, and other climate dynamics such as dry summer weather following a wet spring or extended periods of drought. Human-caused fires in the MPA commonly occur near roads, from vehicle and railroad ignitions along I-70, as well as those associated with illegal camping outside designated campgrounds, especially along the Colorado River. Resource values threatened by fire include recreation sites, oil/gas sites, cultural sites, and wildland-urban interface areas. High intensity fires that cover large acreages have occurred in almost all areas, although ninety percent of the wildland fires in the Moab Fire District are less than ten acres. Depending on climatic conditions, a typical fire season stretches from March through October with the peak occurring in the lightning-prone period from mid-June to mid-August.

The Moab Fire District has a wide variety of types including grassland mixes, sagebrush and sage/grass, brushland/grass, pinyon/juniper, ponderosa pine, mountain brush, mixed conifer, and invasive species such as cheatgrass, tamarisk and others. The effects of wildland fire or the absence of fire in these vegetative communities is closely tied to other public lands resources such as watersheds, soils, wildlife, and livestock grazing. Fire has historically been an essential part of ecosystem health, providing the needed regeneration of some species and promoting diversity of other species in riparian areas, grasslands, shrublands, woodlands, and forests. The exclusion of fire and fire suppression over the past century has compromised the health of many vegetative communities. Two of the predominant issues in the MPA are the loss of shrubland and grassland communities to pinyon/juniper encroachment, and the proliferation of invasive species.

Communities surrounded by these compromised ecosystems are becoming increasingly susceptible to wildland fire with an accompanying threat to lives and property. Communities in need of management action to reduce the threat from wildland fire on adjacent public lands are identified as wildland-urban interface areas (WUIs). WUIs presently recognized within the MPA include the communities of Brown's Hole, Castle Valley, Dewey, La Sal and Old La Sal, Moab/Spanish Valley, Pack Creek, Thompson Springs, Willow Basin, and Wilson Arch.

Current fire management direction encourages use of wildland fire as well as both fire and non-fire fuel reduction treatments to restore natural fire regimes and to promote the overall ecological health of public lands. The operational role of the Moab Fire District is multi-faceted and comprises wildland fire control and suppression activities, hazardous fuels reduction, wildland fire prevention and education, and collaboration with other agencies in suppression activities as well as in both WUI and non-WUI fuels reduction projects. The MFO Manager authorizes management response to wildland fires within the MPA, approves decisions for prescribed fire and non-fire fuels reduction treatments, and issues restrictions and closures within the planning area during periods of high fire activity.

3.4.2 FIRE MANAGEMENT PLAN

The Moab Fire District Fire Management Plan (FMP) acts as the primary strategic document for fire management in the MPA. The FMP integrates RMP direction, goals and objectives for resources influenced by wildland fire, suppression actions, fuels treatment activities, and emergency stabilization and rehabilitation (ESR). The overlying goal of the FMP is to describe specific actions authorized on the public lands within the Moab Fire District to protect life and ensure public safety, target resource goals and objectives, reduce fuel loads, and to achieve and maintain healthy, functioning ecosystems.

3.4.3 DESIRED WILDLAND FIRE CONDITION (DWFC)

DWFC, as described in the Utah Land-use Plan Amendment for Fire and Fuels Management, incorporates both condition class and fire regime in the development of fire management strategies. The condition class of a vegetative community is defined in terms of its departure from the historic fire regime; determined by current vegetative composition including alterations and disturbances, and also by the length of fire return intervals within that particular community. Along with one of three possible condition classes, five combinations of fire frequency intervals or "fire regimes" are considered in assigning attributes to categorize a vegetative community's current condition. The combination of both of these measurements gives a vegetative community a fire regime/condition class rating or "FRCC." As the FRCC is an index of ecosystem at-risk conditions, DWFC is the description of the desired condition of a vegetative community as it relates to susceptibility from severe fire effects (e.g., the loss of key ecosystem components - soil, vegetation structure, species; or alteration of key ecosystem processes - nutrient cycles, hydrologic regimes). For example, a healthy ecosystem at low risk of losing key ecosystem components following wildland fire would be considered at optimum DWFC. A lengthy description of fire regime, condition class analyses and historic fire return intervals can be found in Appendix D of the Utah Land-use Plan Amendment for Fire and Fuels Management.

3.4.4 LANDSCAPE LEVEL MANAGEMENT

Fire management actions authorized for wildland fire activities, prescribed fire and non-fire fuel treatments, and ESR are based on DWFC. The Utah Land-use Plan Amendment for Fire and Fuels Management addresses specific fire management objectives for each major vegetation group, designed to result in progress toward DWFC of public lands under the jurisdiction of the BLM. Specific actions designed to meet DWFC are detailed in Table 2.1 of the Utah Land-use Plan Amendment for Fire and Fuels Management. Vegetation groups and fire management objectives are briefly summarized below.

3.4.4.1 SALT DESERT SCRUB

Salt desert scrub occurs over approximately 500,000 acres in the MPA. DWFC for this community is native, open salt desert scrub with little invasive species and fire exclusion because of the historical infrequent fire return interval. Management objectives include wildland fire suppression; no wildland fire use; a wide array of fuels treatments; aggressive seeding in ESR treatments.

3.4.4.2 Pinyon and Juniper Woodland

Pinyon/juniper woodlands cover a large portion of the MPA, with estimates averaging over 820,000 acres. Objectives are separated between those areas where pinyon and juniper did and did not occur historically. DWFC in historic pinyon/juniper areas is open stands with grass and shrub understory. These areas historically experienced a 15-50 year fire return interval, which prevented movement of pinyon/juniper into other vegetative communities. DWFC in non-historic pinyon/juniper areas is the restoration of the vegetative community previous to pinyon/juniper encroachment. Management objectives include minimal suppression where possible to mimic natural fire return interval; wildland fire use where feasible; a wide array of fuel treatments including biomass utilization; and aggressive seeding in ESR treatments.

3.4.4.3 Sagebrush

Healthy sagebrush stands have declined throughout the MPA, with an estimated 140,000 acres remaining. DWFC is diverse age class with grass and forbs understory. Management objectives involve a balance between invasive species concerns, wildlife habitat, and restoration of historic fire return interval. Objectives include wildland fire use when appropriate; full spectrum fuel treatment; aggressive seeding in ESR.

3.4.4.4 Grassland

Grasslands occur over approximately 50,000 acres of the MPA. In historic native grassland areas, DWFC is native grass/forbs community. Dependent upon other resource objectives, DWFC in non-native grasslands is native grassland or shrub community. Management objectives consider historic fire return interval of 15-50 years and may include wildland fire use; prescribed fire, mechanical and chemical fuel treatments to reduce invasive grasses and encroachment by other trees/shrubs; aggressively seed following wildland fire.

3.4.4.5 Blackbrush

Blackbrush communities in Utah are thought to have poor regeneration following wildland fire. These communities cover approximately 185,000 acres of the MPA, and management objectives exclude wildland fire and most prescribed fire and non-fire fuels treatments.

3.4.4.6 Mountain Shrub

In the MPA, mountain shrub areas cover approximately 45,000 acres. DWFC in mountain shrub would be differing age classes in mosaic patterns with the exception of WUI areas. When possible, management objectives allow wildland fire to mimic historic fire return intervals. Fuels treatment of all types is encouraged to decrease the potential for high-severity fire.

3.4.4.7 Mixed Conifer/Douglas Fir/Aspen

Mixed conifer/Douglas fir and aspen woodlands cover approximately 38,000 acres in specific areas within the MPA. Healthy forests would include a grass/brush understory as well as differing age classes of trees. To achieve this, management objectives include allowing wildland fire where it is possible without high-severity fire. Management objectives encourage fuels

treatments (including biomass utilization) to retain age diversity, remove ladder fuels, and to reduce fuels where WUI values are at risk. Preferred ESR treatments include tree planting to promote forest regeneration.

3.4.4.8 Ponderosa Pine

There are approximately 800 acres of ponderosa pine forest in the MPA, most of which is considered condition class three in need of treatment. The DWFC of a healthy ponderosa stand would be open stands with grass/forb understory and a diversity of age classes. Management objectives include allowing fire to play a natural role when possible, restoring fire, conducting mechanical fuels treatments, and consideration of seeding in ESR treatments.

3.4.4.9 Riparian Wetland

Although this vegetative type covers less than one percent of the total acreage in the MPA, it is a vital component of the overall region. DWFC of riparian wetland focuses on the reduction of invasives and the retention or restoration of the historic vegetative composition appropriate to the site. Management objectives allow low-intensity fire in most riparian areas and encourage prescribed fire and mechanical treatment to restore native riparian and wetland species. Active as opposed to passive restoration would be the primary focus of ESR treatments in riparian wetland areas.

3.4.5 Fire Management Priorities

Protection of human life, including the lives of firefighters committed to an incident, is the mandated priority for fire management activities. This priority overrides other strategies, actions, and RMP resource goals and objectives. The protection of human communities and infrastructure, other property and improvements, and natural and cultural resources is based on human health and safety, the values to be protected, and the costs of protection. Balancing priorities in fire management decisions consider the protection of WUI areas, the maintenance of existing healthy ecosystems, the protection of high priority sub-basins or watersheds (HUC 4 or HUC 5), special status species, and/or cultural resources and landscapes.

3.4.6 Fire Management Activities to Meet DWFC

All BLM field offices were given national direction to establish general landscape level goals and objectives for fire management. Landscape level management goals incorporated into the Utah Land-use Plan Amendment for Fire and Fuels Management that apply to the MPA include:

1. Establishing firefighter and public safety as the primary goal in all fire management decisions and actions.
2. Using wildland fire to protect, maintain, and enhance resources and when possible allowing fire to assume a natural ecological role.
3. Reducing hazardous fuels to protect human, natural and cultural resources as well as to restore ecosystems and protect communities.
4. Suppressing fires according to resource objectives and with consideration for firefighter/public safety and other benefits and values to be protected.

5. Providing a consistent, safe, and cost-effective fire management program through appropriate management of planning, staffing, training, and equipment.
6. Establishing fire management units (FMUs) for acreages with burnable vegetation on all BLM-administered lands.
7. Providing emergency stabilization, rehabilitation and restoration to protect and sustain resources, and to safeguard public health and safety as well as community infrastructure.
8. Working with partners and other affected groups to reduce risks to communities and to restore healthy ecosystems.

More specific resource objectives are incorporated in Fire Management Plans for individual field offices. To ascertain the most effective methods for achieving DWFC goals in each of the vegetative communities in Utah, fire management activities listed below were discussed and authorized in the decision record for the Utah Land-use Plan Amendment for Fire and Fuels Management.

3.4.6.1 Suppression

A wildland fire requires an appropriate management response (AMR). The AMR can range from full suppression to managing fire for resource benefit (wildland fire use). AMR is guided by the resource strategies, goals and objectives of the RMP with an emphasis on firefighter and public safety, benefits and values to be protected, and suppression costs. FMU objectives as described in the FMP would provide further guidance for an AMR.

3.4.6.2 Wildland Fire Use for Resource Benefit

Wildland fire use may be an AMR to a naturally ignited wildland fire to accomplish specific resource management objectives in predefined designated areas. Operational management of wildland fire use for resource benefit is detailed in a Wildland Fire Implementation Plan (WFIP). Due to resource condition (FRCC) and proximity to values at risk, wildland fire for resource benefits is not acceptable on all BLM lands within the MPA. As the DWFC of resources move from a higher FRCC to a lower FRCC, wildland fire use for resource benefits in some FMUs may become more practicable. FMUs will be periodically reassessed by fire and fuels staff as well as by resource staff to ascertain changes in vegetation and potential for wildland fire use as a resource tool.

3.4.6.3 Prescribed Fire and Non-fire Fuels Treatments

Prescribed fire and non-fire treatments are utilized for hazardous fuels reduction and for community protection from wildland fire. Treatments are also implemented to accomplish resource goals and objectives such as wildlife and range improvements. Treatment projects and acreages are determined through RMP goals and objectives.

Approximately 90% of all non-fire treatment acres are mechanical and/or seedings. Chemical and biological treatments comprise less than 10% of the total non-fire treatment acreages. Limitations in applying prescribed fire to meet fuels reduction targets include the condition of vegetation (i.e., aggressive non-native species invasion, or extended periods of drought), air

quality restrictions, budget allocations, personnel capabilities, risk, policy and guidance, and social acceptability.

3.4.6.4 Emergency Stabilization and Rehabilitation

Emergency stabilization and rehabilitation (ESR) actions following wildland fire may be implemented to protect and sustain resources, and to safeguard public health and safety as well as community infrastructure. All ESR activities following wildland fire in the MPA would be implemented following BLM ESR Handbook H-1742-1 and treatments would be designed according to the Normal Year Fire Stabilization and Rehabilitation Plan (NFRP) for the Moab Fire District.

3.4.6.5 Monitoring

Monitoring actions would quantify results from fire management decisions and activities. Monitoring conclusions could be used to determine the need for additional or different activities, revisions to the FMP and/or NFRP, or amendments to the RMP.

3.4.7 Summary

National fire management policy has changed and advanced over the past several years in response to increased fatalities, property loss, local economic disruptions and the risk to ecosystems associated with severe wildland fire seasons and increasing WUI conflicts. Because it was imperative to immediately incorporate national and interagency direction into BLM fire management, the Utah BLM amended several BLM land-use plans to include fire management direction and current scientific understanding regarding the nature of fire in the ecosystem. The Utah Land-use Plan Amendment for Fire and Fuels is a lengthy document with an accompanying biological opinion from the USFWS. Although it remains a separate document, fire and fuels management direction contained within the amendment is considered to be included in this RMP in its entirety, along with all appendices, tables, and attachments. Also incorporated into this RMP are the resource protection measures (RPMs) identified through the LUP Amendment process that were determined necessary to protect natural or cultural resource values in the implementation of fire management practices.

Fire management direction, activities, and objectives that affect the resources within the MPA are summarized above. Specific goals and objectives for resources within the planning area that are determined in this RMP and that may alter or augment the current direction of fire and fuels management as dictated by the Utah Land-use Plan Amendment for Fire and Fuels Management will be analyzed in Chapter 4 of this document.

3.5 Health and Safety

3.5.1 Introduction

A major priority in land management for the MFO is ensuring health and human safety on its public lands. The BLM's goals are to effectively manage hazardous materials and safety hazards

on the public lands to protect the health and safety of public land uses protect the natural and environmental resources, minimize future hazardous and related risks, costs and liabilities, and to mitigate physical hazards in compliance with all applicable laws, regulations, and policies. The BLM follows its national, state, and local contingency plans as they apply to emergency responses. These plans are also consistent with Federal and state laws and regulations.

3.5.2 HAZARDOUS MATERIALS

Hazardous materials are generally defined as a usable product or substance that may cause harm to humans, natural resources, or the environment when spilled, released, or contacted. Hazardous materials are used in every day activities and may be in the form of a solid, liquid, or gas. Regardless of their physical state, hazardous materials may be toxic, flammable, combustible, reactive, and/or corrosive. These can include, but are not limited to, abandoned mine sites, abandoned structures, dams, discarded chemicals, chemical spills, discarded wasted, etc. Hazardous materials problems within the MPA can result from programs conducted by state and local governments, by local businesses and industries, and/or by illegal dumping of hazardous materials on lands administered by the BLM. There are no approved hazardous materials dumps or repositories within the MPA.

3.5.2.1 POTENTIAL HAZARDS

The various producers of hazardous waste pose a potential impact to the health and safety of area residents, visitors, and to the physical environment itself. Both commercial and illegal activities can lead to the creation of hazardous waste sites. Spills, illegal dumping, and the discovery of abandoned hazardous materials are likely to occur within the MPA. Contaminants from these sites can pose an imminent threat to public safety and negatively impact the environment by impacting soils, ground water flows, air, and water quality. Potential hazardous material generators within the MPA include the following: oil and gas drilling operations, natural gas pipelines, mining operations, uranium tailings, storage tanks, landfills, illegal dumps, and the Utah Launch Complex of the White Sands Missile Range near Green River, Utah.

3.5.2.2 HAZARDOUS MATERIALS MANAGEMENT

The MFO Hazardous Materials Program is responsible for hazardous materials handling, storage, transport, and emergency response. Several state and Federal mandates, authorities, and handbooks provide the BLM with management guidelines, objectives and actions pertaining to hazardous materials management. The Federal and state prescribed mandates ensure MFO's compliance with applicable laws and regulations.

3.5.3 ABANDONED MINES

The early mining practices in Grand County were subject to minimal environmental regulations and in mining districts throughout the West. During this time, Federal land management agencies had no requirements for reclamation of abandoned mines on public lands. Mine closures were often inadequate or non-existent. While many abandoned mines are small and their waste is inert, some abandoned mines are a threat to human health and the environment. Public safety hazards associated with abandoned mines can also be a concern on public lands.

The BLM, the U.S. Forest Service (USFS), and the National Park Service (NPS) have conducted inventories of abandoned mine sites and some remediation, such as stabilizing sites, closing mine openings, and/or reclaiming mine-related land disturbances. In the MPA, the highest concentrations of mine sites that have been inventoried but not yet reclaimed are on the mesas and plateaus that surround the LaSal Mountains. Areas where abandoned mine inventories have not yet been conducted are predominantly on BLM and USFS administered public lands. The Utah Division of Oil, Gas and Mining (UDOGM) Abandoned Mine Reclamation Program (AMRP) has identified Lisbon Valley as a high priority area for abandoned mine hazards inventory (UDOGM 2002). Additionally, the MFO has identified the Browns Hole, Klondike, and Sevenmile areas as priority areas for abandoned mine hazards inventory and remediation.

3.5.3.1 Potential Hazards

Abandoned mine sites may pose hazards to human health, the environment, and physical safety. Threats to health and the environment include: acid drainage, heavy metal contamination, metal contaminated tailings impoundments, stored chemicals, and leaking containers. Changes in the chemical composition or soil loss near AML sites can result in alterations or loss of natural habitat for native wildlife. Abandoned mines may also impact ground water flows and water quality. The impacts to water quality are generally the result of contaminated sediments or metal salts that can affect human health, fisheries, wildlife, and vegetation. Air pollution from contaminated dust can occur on tailings impoundments and waste rock piles near abandoned mill sites. There may also be releases or potential releases of hazardous substances from waste materials and acid drainage beyond AML sites.

Open mines are unstable; mine adits (horizontal openings or tunnels) may collapse, internal supports may fail, and mine shafts (vertical openings) and winzes (vertical connections between adits) may be obstructed or unseen. Oxygen can be at lethally low concentrations and toxic gases can be at high concentrations or capable of displacing oxygen. Exposure to radiation in the mine atmosphere, particularly radon gas, can be a hazard, especially in abandoned uranium mines. Many abandoned mines in southern Utah are potential sources of radiation.

Water can be a hazard in flooded mines; shallow water can conceal winzes and sharp objects. Hazardous wastes, such as boxes or containers of explosives, and chemicals used in milling or drilling operations could be present. Illegal dumping of hazardous wastes within abandoned mines is also a possibility.

3.5.3.2 Abandoned Mine Management/Reclamation Activities

BLM has recently developed the Abandoned Mine Lands program (AML) that addresses the environmental and safety hazards associated with AML sites on public lands. Once the site are identified, they are prioritized, and appropriate actions are taken on those historic mine sites that pose health and safety risks. The BLM's priority for reclamation of environmentally contaminated sites is based on risk assessments that address threats to human health and the environment. For example, abandoned mine land sites that impact water quality are usually a greater concern and receive a higher priority for reclamation than those that do not impact water quality. See the Chapter 2 Alternative Matrix for AML program priorities.

3.6 LANDS AND REALTY

3.6.1 RESOURCE OVERVIEW

As provided by the Federal Land Policy and Management Act (FLPMA), the BLM has the responsibility to plan for and manage public lands. As defined by FLPMA, public lands are those Federally owned lands, and any interest in lands (e.g., Federally owned mineral estate and easements across non-Federal lands), that are administered by the Secretary of the Interior, specifically through the BLM. The land surface and mineral ownerships within the MPA are varied and intermingled. The MPA contains approximately 2.75 million acres, of which approximately 1.82 million acres, or 66%, are public lands managed by the BLM (See Map 1-1, Moab Planning Area 1.1). Generally, the lands are located in large, contiguous tracts that provide for effective and efficient management. In addition, the BLM MFO manages the subsurface of 29,678 acres of split estate lands, and 141,241 acres of National Forest lands.

3.6.2 MFO LANDS AND REALTY PROGRAM

Management of ownership and access to lands within the MPA falls under a variety of categories related to whether the BLM is retaining lands, acquiring lands or interests in lands, relinquishing control of lands (e.g., sales, exchanges, etc.), granting rights-of-way, easements, or other access, withdrawing lands for certain uses, or otherwise determining the disposition of specific tracts of land. The various categories of lands and realty management within the planning area are discussed in the following sections.

The overall goals of the BLM lands and realty program are to:

- Manage the public lands to support goals and objectives of other resource programs;
- Respond to public requests or applications for land-use authorizations; and
- Acquire administrative and public access where necessary to enhance the resource management objectives of the BLM.
- Throughout much of Utah, the state owns and manages four isolated sections in each 36-section township. These are generally sections 2, 16, 32, and 36, and are ordinarily one mile square (640 acres). They are primarily administered by the Utah School and Institutional Trust Lands Administration (SITLA) for the purpose of economic support of the state's public schools and institutional trust funds. Activities on state land generally are not substantially different from those on the surrounding land administered by BLM. Many of the SITLA lands generate funds through grazing permits, right-of-way easements and permits, and hydrocarbon or other mineral leases.
- Many BLM lands with management restrictions, such as WSAs, have state lands that are adjacent to or within their boundaries. State lands that are completely or almost entirely surrounded by BLM lands with management restrictions, or are in conjunction with administratively endorsed National Park Service lands, are termed state inholdings.
- Existing access to inheld state lands varies. Some of the parcels have direct access through cherry-stemmed or boundary roads of WSAs. Inheld parcels may or may not currently have access, depending upon whether or not existing vehicle routes lead to them. BLM policy, as

required by the Cotter decision, is that "the state must be allowed access to the state school trust lands so that those lands can be developed in a manner that will provide funds for the common school..." This decision confined the issue of access to situations directly involving economic revenues generated for the school trust. For example, if a holder of a state oil and gas lease on a parcel of state land that is completely surrounded by a WSA requires access to develop that lease, BLM must grant the leaseholder reasonable access with consideration given to minimize impacts to wilderness character.

3.6.2.1 Land Tenure Adjustments

As mandated by Section 102(a)(1) of FLPMA (43 U.S.C. 1701), public lands are retained in Federal ownership, the exception being those public lands that have future potential for disposal (i.e., sale and exchange), as described under Section 203(a) and Section 206 of FLPMA (43 U.S.C. 1713; 1716). Public lands have potential for disposal when they are isolated, difficult to manage, or are needed to fulfill state selections. Lands identified for disposal must meet public objectives, such as community expansion and economic development. The preferred method of disposal is land exchange (discussed in Section 3.6.2.3). Other lands can be considered for disposal on a case-by-case basis. Disposal actions are usually in response to public request or application that results in a title transfer, wherein the lands leave the public domain. Lands identified for disposal in the MPA are listed in Appendix D – Lands Identified for Disposal. Criteria for land tenure adjustments are outlined in Appendix A – Land Tenure Adjustment and Withdrawal Criteria.

3.6.2.1.1 Sales

Public sales of BLM lands are managed under the disposal criteria set forth in Section 203 of FLPMA. Public lands determined suitable for sale shall be offered on the initiative of the BLM and sold at not less than fair market value. Public lands classified, withdrawn, reserved, or otherwise designated as not available or subject to sale are unavailable.

In the current RMP (1985a), lands were identified that met the criteria of Section 203 of FLPMA for consideration for disposal by sale. Consequently, those lands identified in the plan are isolated parcels that are difficult for the BLM to manage as part of the public lands (I), lands that the city of Moab and Grand County thought should be available for community expansion (C), and lands that were nominated by private individuals (P). The list of lands identified for disposal was revised to include parcels that were added through amendments to the 1985 RMP and to delete parcels that are no longer in BLM ownership (see Appendix D – Lands Identified for Disposal). As of 2003, 12,415 acres were identified for disposal.

3.6.2.1.2 Exchanges and Acquisitions

Exchanges are initiated in direct response to non-agency proposals or by the BLM, to improve management of the public lands. Lands considered for exchange must be determined suitable for disposal and acquisition, and the exchange package must be shown to be in the public interest. The specific planning criteria for land tenure adjustments and exchanges are described in a February 1989 amendment to the existing RMP (1985a) under which the MFO operates its lands and realty program. This 1989 amendment includes measures for acquisitions and disposals to

determine if a proposed exchange is in conformance with the land-use plan and would be in the public interest, and is hereby incorporated by reference (BLM 1989b).

Two land acquisitions, from private parties, have taken place in the history of the MFO. In 1977, the BLM acquired 6.28 acres for the Westwater Ranger Station. In 1992, 158.54 acres were purchased for the Cisco Take-out.

3.6.2.1.3 Recreation and Public Purposes Act (R&PP)

The R&PP Act was established by Congress as a means for state and local governments as well as non-profit organizations to acquire or lease (without patent) public lands at no cost or reduced cost for public or recreational purposes. Many Western governmental entities have taken advantage of this Act in order to provide the public with much-needed local services and locations for recreational activities.

3.6.2.2 Partial Interest Acquisitions

Public land cannot be effectively administered without both legal and physical access. Methods used to acquire legal rights that meet resource management needs include negotiated purchase, donation, and exchange. Acquisition alternatives include purchase of fee or less-than-fee interest above, on, and below the surface, as well as perpetual exclusive and permanent or temporary nonexclusive easements. Acquisitions of road or trail easements are probably the most frequently encountered access needs. Types of easements include:

- road easements;
- sign locations;
- stream clearance projects;
- utility easements;
- hunting and fishing easements; and
- range improvements.

Acquisition of access rights are meant to support one or more of these resources: lands, minerals, forestry, range, wildlife, recreation, or watershed. Additionally, access may be closed or restricted, where necessary, to protect public health and safety and to protect significant resource values.

Forty-five easements were on file in the MFO as of 2003. Easements acquired from the 1930s through the 1970s were primarily related to range management (e.g., fences, roads, spring developments). Easements acquired since the Grand RMP was approved in 1985 are primarily related to recreation. Eighty-nine percent of the easements have been acquired from State of Utah Trust Lands. Easements can be acquired when there is a need, as happened in 1994 when the Kokopelli's Trail was "created" by connecting existing roads and trails from Loma, Colorado, to the Moab Slickrock Bike Trail.

3.6.2.3 WITHDRAWALS/CLASSIFICATIONS

Withdrawals are formal actions that set aside, withhold, or reserve Federal land by statute or administrative order for public purposes. A withdrawal may remove areas from the public lands to be managed under the authority of another Federal agency or department, but the land does not leave Federal ownership. Criteria for withdrawals are outlined in Appendix A – Land Tenure Adjustment and Withdrawal Criteria.

Withdrawals accomplish one or more of the following:

- Transfer total or partial jurisdiction of Federal land between Federal agencies;
- Close (segregate) Federal land to operation of all or some of the public land laws and/or mineral laws;
- Dedicate Federal land to a specific purpose.

Withdrawals are used to preserve sensitive environmental values, protect major Federal investments in facilities or other improvements, support national security, and/or provide for public health and safety. Withdrawals may segregate a particular portion of public land from operation of any, some, or all of the public land laws (withdraw from settlement, location, or entry), and/or prevent disposal (sale or exchange) of public lands or resources. Withdrawals remain in effect until they expire or are specifically revoked or terminated.

Withdrawal review is mandated by FLPMA, which requires the BLM to eliminate all unnecessary withdrawals and classifications. The BLM must ensure that withdrawals are supported by a definite show of need and must recommend revocation of withdrawals that lack sufficient justification. Before recommending a withdrawal continuation, alternatives such as rights-of-way (ROWs) and interagency agreements must be explored.

Four withdrawals existed within the MFO as of 2005 (see Map 2-1, Existing Withdrawals from Mineral Entry). All four withdrawals are Bureau motion actions. Two of the existing withdrawals are in effect in the Westwater Canyon section of the Colorado River (Table 3.8). The first withdrawal protects the river bottom and lands one-quarter mile from the edge of the river. The second withdrawal expands protection to the corridor from canyon rim to canyon rim, and to side drainages. The third withdrawal (Three Rivers) protects the remaining river corridors in the MPA. These three areas are withdrawn from mineral entry. In general terms, the withdrawals protect the corridors of the Colorado, Green , and Dolores Rivers from new mining claims subject to valid existing rights. The fourth withdrawal in the MFO reserves lands for the disposal of uranium mill tailings to be removed from the Atlas Mill Site in Moab.

Table 3.8. Withdrawals in the MPA

Serial Number	Name of Withdrawal	Effective Date	Expiration Date	Acres
UTU-71781	Westwater Canyon	03/30/1995	03/29/2045	4,710

Table 3.8. Withdrawals in the MPA

Serial Number	Name of Withdrawal	Effective Date	Expiration Date	Acres
UTU-74247	Westwater Canyon Withdrawal Expansion	06/02/1998	06/01/2018 (renewable)	3,386
UTU-75392	Three Rivers: Colorado, Dolores, Green	10/06/2004	10/05/2024 (renewable)	65,037 in MFO
UTU-80808	Moab Mill Site Remediation Project	11/15/2005	11/15/2010 (renewable)	2,300

There are 11 Federal Energy and Regulatory Commission (FERC) Power Site Reserves/Classifications within the three river corridors administered by the MFO. The lands were opened to the operation of the mining laws in 1955; therefore, they remain withdrawn from disposal actions. Rights-of-way can be granted on these lands with a FERC stipulation in the grant. Disposal actions require partial revocation of the withdrawal.

3.6.2.4 Utility/Transportation Systems

3.6.2.4.1 Rights-of-Way

A right-of-way (ROW) is an authorization to place facilities over, on, under, or through public lands for construction, operation, maintenance, or termination of a project. Public lands are made available throughout the planning area for ROWs and corridors. With the exception of defined avoidance and exclusion areas, the planning area is subject to the authorization of ROWs. Avoidance areas are areas where special environmental and/or management considerations exist. Rights-of-way either will not be granted in these areas or, if granted, will be subject to stringent terms and conditions. Rights-of-way avoidance areas were established under the 1985 RMP for crucial habitat for deer (Westwater Canyon) and bighorn sheep (canyons east of the Green River and Shafer Basin). Exclusion areas prohibit ROWs. No exclusion areas were identified in the 1985 RMP.

Rights-of-way are granted on a case-by-case basis. The majority of ROWs granted between 1998 and 2003 were for non-energy-related activities. Only 17% of new ROWs during this time were for oil and gas gathering systems or roads. In the same five-year period, 407 case files were assigned (ownership transferred). Of these, 93% were energy related and 7% were not. There is nothing to indicate that this trend will change in the next 10 years, especially in light of the resurgence of the energy market after 2003. Historically, pipeline ROWs granted within the MPA have been small surface pipelines, because they have been determined to be the least environmentally damaging. Large-diameter (10 inches and over) pipelines were buried.

3.6.2.4.2 Utility Corridors

The 1985 RMP Management Action Decision for Utility Corridors established electrical utility corridors along I-70, U.S. Highway 191 (U.S. 191), the MAPCO pipeline route between I-70 and U.S. 191, and the Pacific Corporation transmission line route between U.S. 191 and the Green River. The portion of the U.S. 191 utility corridor that runs through Moab Canyon has since

reached maximum capacity. In 1999, the Western Regional Corridor Study Committee (Western Utility Group) recommended that utility corridors within the MPA continue to be designated alongside the I-70 and U.S. 191 roadway corridors. All corridors identified in the previous plan remain designated at present. The Western Utility Group (WUG) is currently working to identify additional corridors throughout the region, and has put forth one additional utility corridor in the MPA following the Questar, Williams et al. pipeline route through East Canyon (BLM 2001c). As additional or future corridors are identified, the BLM would strive to consolidate utility corridors to the extent possible.

3.6.2.4.3 Communication Site Rights-of-Way

Within the MPA, there are 11 designated communication sites along I-70 and U.S. 191, six of which were granted between 1998 and 2003. The rapid growth of wireless networking in the U.S. indicates that the public expects to be able to make cell phone contact most of the time. This trend is expected to continue, with increasing demands placed on the existing 11 sites. Cleartalk is currently in the process of creating a cellular communication network along I-70 (completed) and U.S. 191 (not complete). There is a proposed or existing tower every 10 to 12 miles along these two major highways. Each of the Cleartalk communication sites would be built to house four users. The Geyser, Klondike, and Black Ridge areas have room for additional facilities.

3.6.2.5 Leases and Permits

Section 302 of FLPMA authorizes the use, occupancy, and development of public lands, through leases and permits, for uses not authorized through other authorities. Applicants can be state and local governments and private individuals. These uses of public lands include agricultural development, residential use (under certain conditions), commercial use, advertising, and National Guard use. Leases are long-term authorizations that usually require a significant economic investment in the land.

Permits are usually short-term authorizations not to exceed three years. The MFO issues an average of 50 permits each year, primarily for filming projects. During calendar years 1998 through 2002, the MFO issued 182 film permits. Approximately 75 commonly used filming locations have been identified. Filming is an important part of the Grand County economy. The annual report of the Moab to Monument Valley Film Commission, on the economic impact of on-location production, gives a figure of $4,862,000 for the reporting period from July 1, 2001, to June 30, 2002. This number represents the money that filming companies spent in Grand County, with no additional factoring.

3.6.2.6 Trespass

The BLM is responsible for realty trespass abatement, which includes prevention, detection, and resolution. Land authorizations, such as leases and permits, have typically been issued to resolve agriculture and occupancy trespass. Locations in the planning area where trespass is likely to occur are along drainages, in oil fields, and in areas where private lands border public lands.

Approximately 90 cases of alleged trespass have been formally identified within the MPA. None of these situations poses a problem if it is not immediately resolved. Twenty trespass cases were

resolved during FY 2003. The remaining cases are expected to be resolved on an estimated timetable of 10 cases per year.

Willful trespass is dealt with immediately, especially if resources are threatened.

3.6.2.7 Planning-Based Protection Zones

Protection zones were incorporated into the existing Grand RMP (1985a) through "Plan Changes" for an airport runway undeveloped area and for protection of drinking water sources.

The airport runway protection zone was added to the plan on May 5, 1995. Ninety acres are included in the protection zone, which restricts construction of residences or places of public assembly (churches, schools, hospitals, office buildings, shopping centers, and other uses with similar concentrations of persons.) Automobile parking is also discouraged within the area. The location of the protection zone is:

T24S, R19E, Sec. 1, S½ of S½ of SE¼ of SE¼; Sec. 12, N½ of NE¼

The BLM has entered into three land-use agreements to not allow potential contamination sources, as defined in R309-113-6(1)(u) of the Utah Administrative Code, within a drinking water protection zone. The protection zones are not necessarily ROW avoidance areas. Examples of possible pollution sources include, but are not limited to, storage facilities that store the liquid forms of extremely hazardous substances, septic tanks, drain fields, Class V underground injection wells, landfills, open dumps, landfilling of sludge and septage, manure piles, salt piles, pit privies, drain lines, and animal feeding operations with more than 10 animal units.

BLM has responded to requests for agreements from one private entity, the Thompson Springs Water Conservancy District, and one state agency, the Utah Department of Transportation. The size of the protection zone has varied by the source of water and the hydrology of the area. The protection zones have been documented in the existing RMP amendment and are displayed on the appropriate master title plats

3.6.2.8 Alternative Energy Sources

A national trend is using public lands to develop renewable energy sources such as wind power, solar power, biomass, and hydropower. National organizations are looking at public land to help provide power sources for an ever-increasing population, without creating air pollution problems. In the future, BLM-administered lands will play an increasing role in providing clean energy sources.

The February 2003 publication, "Assessing the Potential for Renewable Energy on Public Lands" prepared by the U.S. Department of Energy (DOE) assessed the potential for the following renewable energy sources on public lands in the 11 western states by planning area: solar, biomass, geothermal, water, and wind. Tables were created for each resource listing the 25 planning areas with top potential for development of these energy sources. At this time, the DOE data show that most of the MPA has been identified as possessing a low potential for all of the

resources studied. There are, however, a few isolated areas, on the western side of the MPA (e.g., along a ridge on the west side of U.S. 191 between Moab and Crescent Junction), where there are small pockets of medium and high wind resource potential. The MFO can expect to have these sites investigated more closely in the future due to the projected increase in demand for renewable energy.

3.7 Livestock Grazing

3.7.1 Resource Overview

Livestock grazing allotments occur on approximately 95% of all lands located within the MPA boundary. Areas not within the boundaries of a grazing allotment include lands around Moab, the surface areas of the Colorado and Dolores Rivers, I-70, and the Pear Park and Spring Creek areas. Of the lands within grazing allotments, 1,794,798 acres (77%) are BLM lands within the State of Utah; 375,299 acres (16%) are State of Utah lands; 83,640 acres (4%) are private; 1,632 acres (less than 1%) are military; 1,146 acres (less than 1%) are United States Forest Service lands; and 73,395 acres (3%) occur within the State of Colorado (Figure 3.5).

The following subsections provide a summary of the number of permitted allotments, amount and condition of riparian areas, allotment management categories, and ecological status for the allotments. Information on each allotment can be found in the Analysis of Management Situation for the MFO (Chapter 7: Grazing and Domestic Livestock).

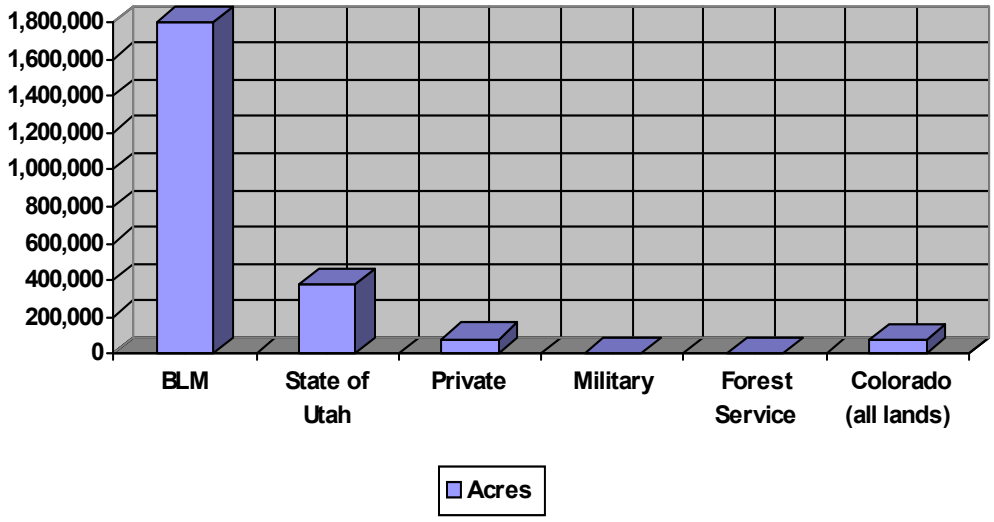


Figure 3.5. Acres within grazing allotments of the MPA.

3.7.1.1 Allotment Status

A total of 84 allotments occur within the boundaries of the MPA. Of these allotments, 74 are administered by the MFO, four are administered by the Vernal Field Office, and six are

administered by the Grand Junction, Colorado, Field Office. Seventy-seven of the allotments are available for use by domestic livestock, and seven allotments were made unavailable for grazing by domestic livestock in 1995 and 1996. These seven allotments were made unavailable for the following reasons: enhancement of wildlife habitat, improvement of riparian vegetation, watershed benefits, and recreation values.

3.7.1.2 Riparian Areas

A total of 26,085 acres of riparian have been inventoried within the grazing allotments. Of this total, 14,020 acres (54%) have been identified as being in "proper functioning condition;" 8,962 acres (34%) as "functioning-at risk;" 2,947 acres (11%) as "not functioning;" 120 acres (0.5%) as "reservoir or well;" and 35 acres (0.1%) as "dikes."

3.7.1.3 Allotment Management Categories

Each permitted allotment has been evaluated and designated into one of three management categories: maintain (M), improve (I), or custodial (C). Allotments in category M are in generally good condition and have no serious resource conflicts under present management. They may have some potential for a positive return on investments. Category I allotments have serious resource conflicts or unsatisfactory range condition or may be producing below their potential under present management, and/or climatic conditions (drought related). These allotments have potential to improve or have conflicts that can be resolved through changes in grazing management or investments in range improvement projects. Allotments in category C have low productivity potential, limited resource conflicts, and limited opportunity for a positive return on public investments (Table 3.9). A more detailed and specific list of criteria used for categorizing each allotment is found in the Analysis of Management Situation for the Moab RMP.

Table 3.9. Current Number of Grazing Allotments in Each Management Category

Category M (Maintain)	Category I (Improve)	Category C (Custodial)
25 allotments (32%)	37 allotments (48%)	15 allotments (20%)

3.7.1.4 Ecological Status

The ecological status of BLM acres within the MPA (excluding acres within Colorado) was estimated as part of the 1985 Grand RMP process. Since the ecological status estimates were made on a MPA-wide basis, the ecological status for each allotment is not known. Four classes are used to express the degree to which the kinds, proportions, and amounts of plants in a biotic community reflected the potential natural community (PNC). These classes are PNC, Late-Seral, Mid-Seral, and Early-Seral (Table 3.10).

Table 3.10. Current Acreages of Plants that Are Similar to Potential Natural Community (PNC)

Class	% Similarity to PNC	Acreage (% of Total Area)
PNC	76-100%	461,156 acres (26%)

Late-Seral	51-75%	661,502 acres (38%)
Mid-Seral	26-50%	520,802 acres (30%)
Early-Seral	0- 25%	108,009 acres (6%)

BLM Manual H-1601-1 (BLM 2005a) states that vegetation management decisions, including grazing, must be based on desired future conditions (DFC). The DFC are those conditions on a landscape scale that are meeting management objectives, incorporating ecological, social, and economic considerations; and does not necessarily assume vegetation should, or will, reach PNC. It is usually expressed as ecological or management status of vegetation (species composition, habitat diversity, age and size classes of species) and desired soil qualities (conditions of soil cover, erosion, compaction, loss of soil productivity).

3.7.1.5 Rangeland Improvements

Rangeland improvements, including fencing, cattle guards, water pipelines, well development, spring development, and stock ponds, are used to assist in livestock and wildlife distribution. Fire management practices are often used to achieve ecological conversion and/or reduce catastrophic fuel loads. Rangeland manipulation can be used to rehabilitate or restore a particular ecological community with respect to plant composition and structure.

General impacts associated with rangeland improvements tier to the Vegetation EIS (BLM 1991a), which analyzes and recommends treatment methods to be used on BLM-administered lands. Methods include manual and mechanical treatments, biological treatments, prescribed burning, chemical applications, and use of livestock.

The current RMP (1985a) identifies rangeland manipulation actions that were to be accomplished within various allotments. These actions are shown on pages 18, 19, 30 and A-29 of the Grand RMP.

3.7.2 Current Management Practices

Of the 77 allotments that are permitted for use by domestic livestock, 64 allotments are grazed by cattle, three are grazed by cattle and horses, two are grazed by cattle and sheep, six are grazed by sheep, one is grazed by sheep and horses, and one is grazed by horses. Twenty-five (25) of the permitted allotments have allotment management plans (AMPs), while the remaining 52 allotments do not. Livestock use of these allotments, as well as those managed through AMPs, is authorized through grazing permits which contain terms and conditions controlling the numbers, timing, and duration of use as wells as other restrictions to livestock use. Allotment Management Plans have been (and will be) developed where appropriate, since all allotments do not need to have AMPs. Please refer to the Analysis of Management Situation prepared for the Moab RMP (2004d).

Authorized livestock use is typically expressed in animal unit months (AUMs), which is the amount of forage necessary for the sustenance of 1 cow, 1 horse, or 5 sheep for a period of one month. A total of 107,931 animal unit months (AUMs) are currently authorized (active) within

boundaries of the MPA. Of the total authorized AUMs, 87,097 (81%) are used by cattle, 18,466 (17%) are used by sheep, and 485 (less than 1%) are used by horses. 1,883 AUMs (2%) are, through agreement with the permittee(s), held in temporary suspension to maintain improved resource conditions. An additional 25,972 AUMs are allowed through exchange of use (other ownership). Table 3.11 shows the grazing management systems currently in use for the 77 permitted allotments.

Management actions accomplished since the 1985 Grand RMP have affected current livestock resources. These accomplishments include: developing the Rangeland Program Summary (RPS) for the resource area; changes in the season of use on 54,380 acres to (a) provide for growth requirements of perennial plants, (b) restrict use of spring forbs by livestock in crucial wildlife areas, and (c) protect soils in critical watershed areas; changes in the class of livestock on the Buckhorn Allotment to reduce competition between livestock and wildlife; land treatments to increase available forage and increased use by livestock and wildlife.

Table 3.11. Current Number of Permitted Allotments under Each Grazing Management System

Grazing Management System	Number of Allotments
Season-long grazing*	52
Deferred rotation grazing	21
Rest rotation grazing	1
Holistic grazing	3

* The lengths of season under season-long grazing systems generally vary from 1 month to 8 months, with the majority being 4-5 months. One allotment is grazed year-long. The majority of grazing systems include both dormant season and growing season use. However, 11 allotments are grazed only during the dormant season, and three allotments are grazed only during the growing season.

3.7.3 Specific Allotments of Concern

Specific concerns have been raised concerning twelve entire allotments as well as well as portions of four other allotments. South Sand Flats, North Sand Flats, Between the Creeks, Bogart, Cottonwood, Diamond and Arth's Pasture allotments were analyzed in a Plan Amendment to the 1985 Grand RMP (EA #068-94-047). Pear Park, Spring Creek and Castle Valley allotments were made unavailable for grazing in the Grand RMP itself.

The allotments of concern and the conflict identified in each area are summarized below:

North Sand Flats: This allotment covers approximately half of the Sand Flats Recreation Area (home of the Slickrock Bike Trail and the Hell's Revenge and Fins and Things Jeep Routes), as well as popular recreation areas along the Colorado River such as Negro Bill Canyon. Due to the large number of recreational users, conflicts between people and cattle are a concern. Watershed, cultural, and riparian values (especially in Negro Bill Canyon) are also identified as a concern. In addition, the entire allotment is crucial deer winter range.

South Sand Flats: This allotment covers approximately half of the Sand Flats Recreation Area, and is also heavily visited by recreational users. This allotment also contains a portion of the Mill

Creek watershed, which is the municipal watershed for Spanish Valley and the city of Moab. Watershed, cultural, and riparian values (especially in Mill Creek Canyon and its tributaries, such as Rill Creek and Burkholder Draw) are also identified as a concern. In addition, the entire allotment is crucial deer winter range.

Between the Creeks: This allotment contains a portion of the Mill Creek watershed, which is the municipal watershed for Spanish Valley and the city of Moab. Watershed, cultural, and riparian values (especially in Mill Creek Canyon and its tributaries) are also identified as a concern. In addition, the entire allotment is crucial deer winter range, and competition between deer and livestock for both forage and space occurs in this allotment.

Bogart: This allotment is within the Bookcliffs. The area is unfragmented, high quality crucial deer and/or elk winter range, and contains riparian habitat (especially along Nash Wash) and watershed values. The 1985 Grand RMP identified the need to control accelerated erosion, stream channel downcutting, braiding, bank destabilization and salinity discharge from Greater Sagers Wash Watershed. Wildlife values include mule deer, elk and pronghorn, as well as potential Mexican spotted owl habitat, sensitive raptors and bald eagle. Much of the allotment experienced a catastrophic fire in 2002. There is limited accessibility to this allotment.

Diamond: This allotment is within the Bookcliffs. The area is unfragmented, high quality crucial deer and/or elk winter range, and contains riparian habitat (especially along Diamond Creek) and watershed values. The 1985 Grand RMP identified the need to control accelerated erosion, stream channel downcutting, braiding, and bank destabilization. Wildlife values include mule deer, elk and pronghorn, as well as potential Mexican spotted owl habitat, sensitive raptors and bald eagle. Much of the allotment experienced a catastrophic fire in 2002. There is limited accessibility to this allotment.

Cottonwood: This allotment is within the Bookcliffs. The area is unfragmented, high quality crucial deer and/or elk winter range, and contains riparian habitat (especially along Diamond Creek) as well as watershed values. The 1985 Grand RMP identified the need to control accelerated erosion, stream channel downcutting, braiding, and bank destabilization. Wildlife values include mule deer, elk and pronghorn, as well as potential Mexican spotted owl habitat, sensitive raptors and bald eagle. Much of the allotment experienced a catastrophic fire in 2002. There is limited accessibility to this allotment.

Pear Park: This allotment is within the Bookcliffs. The area is unfragmented, high quality crucial deer and/or elk winter range. Wildlife values include mule deer, elk and pronghorn, as well as potential Mexican spotted owl habitat, sensitive raptors and bald eagle. There is very limited accessibility to this allotment, and no water or potential access to water.

Spring Creek: This allotment is within the Dolores Triangle, and is high quality crucial mule deer and/or elk winter range. There are also sensitive raptors, potential Gunnison sage-grouse habitat, and potential MSO habitat.

Mill Creek: this allotment is in the South Fork of Mill Creek, a perennial stream. The area covered by the allotment is rich in cultural and riparian resources. The density and types of

cultural resources in this area are critical to advance professional knowledge on the prehistoric use of perennial streams in the desert environment of southeast Utah. Mill Creek is especially known for the density of its rock art. This rock art is found in alcoves, which are also favored by cattle. Cattle clustering in these alcoves create an adverse chemical mix from body wastes that is detrimental to the rock art. The Mill Creek allotment receives high recreation use from four wheel drive enthusiasts, hikers and bicyclists. The riparian area of Mill Creek is one of the richest in the entire MPA.

Professor Valley: This allotment is along Utah Highway 128, which has over 300,000 vehicles per year, mostly out-of-town visitors. There are many recreation sites within the allotment, which results in conflicts between people and livestock, especially along the highway itself. In addition, the allotment is habitat for desert bighorn sheep (lambing), bald eagle winter range, Southwestern willow flycatcher, the threatened and endangered fish of the Colorado River, peregrine falcon and other sensitive raptors.

River: This allotment is along Utah Highway 128, which has over 300,000 vehicles per year, mostly out-of-town visitors. There are many recreation sites within the allotment, which results in conflicts between people and livestock, especially along the highway itself. In addition, the allotment is habitat for desert bighorn sheep (lambing), bald eagle winter range, Southwestern willow flycatcher, the threatened and endangered fish of the Colorado River, peregrine falcon and other sensitive raptors.

Ida Gulch: This allotment is along Utah Highway 128, which has over 300,000 vehicles per year, mostly out-of-town visitors. There are many recreation sites within the allotment, which results in conflicts between people and livestock, especially along the highway itself. In addition, the allotment is habitat for bald eagle winter range, Southwestern willow flycatcher, the threatened and endangered fish of the Colorado River, peregrine falcon and other sensitive raptors.

Castle Valley: This allotment is within the Castle Valley sole source aquifer. It is also in Mexican spotted owl habitat, and within crucial mule deer winter range.

In addition, portions of the following allotments have been identified as allotments of concern:

A portion of Arth's Pasture: This allotment is on Poison Spider Mesa, a popular recreation destination for bicycling and four wheel driving. In addition, there is competition for forage, space and water between livestock and desert bighorn sheep. In addition, the area is habitat for sensitive raptors and is Mexican spotted owl habitat.

A portion of Beaver Creek (1,351 acres in the upper part of Beaver Creek canyon): The upper portions of Beaver Creek have riparian habitat. The watershed contains Colorado cutthroat trout (a sensitive species). The area is also crucial winter habitat for mule deer and/or elk, as well as bald eagle wintering habitat.

A portion of the Kane Springs allotment (558 acres along the road from the Colorado River to SITLA land in Grand County: This area along a busy county road (175,000 vehicles per year)

receives heavy recreational traffic. The corridor is confined, making recreation-livestock traffic encounters likely. In addition, it is Mexican spotted owl critical habitat.

A portion of the Professor Valley allotment (400 acres along Highway 128 between Hittle and Dewey Campgrounds: This area is a narrow strip of land between the Colorado River and Utah Highway 128 (which receives 300,000 vehicles per year). There are traffic issues along this stretch of the highway; the Utah Department of Transportation has put cattle guards along this portion of the highway in order to reduce livestock-vehicle collisions. In addition, the area is habitat for the threatened and endangered fish of the Colorado River, as well as bald eagle wintering, Southwestern willow flycatcher and sensitive raptor habitat.

3.7.4 Resource Demand

The resource demand is considered to be the amount of grazing by both domestic livestock and wildlife. However, for the purposes of the grazing section, the resource demand discussed will be limited to grazing by domestic livestock.

- The resource demand by domestic livestock can be considered the sum total of permitted active use (currently 107,931 AUMs) and suspended livestock use (currently 28,896 AUMs). This amounts to a current total resource demand by domestic livestock of 136,827 AUMs.
- The total AUMs of active use listed in the 1982 Analysis of Management Situation was 112,140. This compares to the current active use of 107,931 AUMs (a 4% reduction; BLM 1982).
- A dramatic shift from sheep use to cattle has occurred since the 1982 Analysis of Management Situation was written. In 1982, the active sheep and cattle use was 49,338 AUMs (44%) and 62,802 AUMs (56%) respectively. This compares to the current active sheep and cattle use of 18,466 AUMs (17%) and 87,097 AUMs (81%), respectively.

3.8 Minerals

The MPA is known to have significant occurrences of mineral resources, as noted in a variety of studies.

In 2000, the Energy Policy and Conservation Act (EPCA) directed the Secretary of the Interior, in consultation with the Secretaries of Agriculture and Energy, to conduct an inventory of oil and gas resources beneath Federal lands. The inventory was intended to 1) identify reserve estimates (prepared by the USGS) of oil and gas resources underlying these lands, and 2) identify the extent and nature of any restrictions or impediments to the development of such resources. As a result, in 2003 a multi-agency effort produced a "Scientific Inventory of Onshore Federal Lands' Oil and Gas Resource and Reserves and the Extent and Nature of Restrictions or Impediments to their Development." The information in this report was utilized in assessing the oil and gas resources within the MPA.

In addition to the EPCA study, which is a very large-scale portrayal of oil and gas information, the BLM further assessed the oil and gas resources of the planning area based on more site-specific data. These data included geologic reports, oil and gas plays, historic exploration and

development, and well records. Numerous data sources were utilized, such as the USGS, the Utah Geological Survey (UGS), the Utah Division of Oil, Gas and Mining (UDOGM), BLM reports and information, and industry records. All the data used to assess the oil and gas resources of the planning area are compiled in the Mineral Potential Report for the MFO (BLM 2005e).

The Mineral Potential Report (BLM 2005e) provides an assessment of all the mineral resources within the MPA. It provides a description of the geology and the mineral resource, a summary of exploration and development, a classification of the occurrence and development potential of each resource, and a projection of future development. The occurrence potential of each mineral resource is classified using the ratings system provided in BLM Manual 3031 (BLM 1985e), as shown in Table 3.12. The development potential specified for each mineral resource is based on considerations such as mineral occurrence potential; historical development; and the commodity price supply, demand, and other market factors.

Table 3.12. Ratings for Mineral Occurrence and Development Potential and Certainty

Rating	Description
Level of Potential Ratings	
O	The geologic environment, the inferred geologic processes, and the lack of mineral occurrences do not indicate potential for the accumulation of mineral resources.
L	The geologic environment and the inferred geologic processes indicate low potential of accumulation of mineral resources.
M	The geologic environment, the inferred geologic processes, and the reported mineral occurrences or valid geochemical/geophysical anomaly, and the known mines or deposits indicate moderate potential for accumulation of mineral resources.
H	The geologic environment, the inferred geologic processes, and the reported mineral occurrences or valid geochemical/geophysical anomaly, and the known mines or deposits indicate high potential for accumulation of mineral resources. The known mines and deposits do not have to be within the area that is being classified, but have to be within the same type of geologic environment.
ND	Mineral potential not determined due to lack of useful data.
Level of Certainty Ratings	
A	The available data are insufficient and/or cannot be considered as direct or indirect evidence to support or refute the possible existence of mineral resources within the respective area.
B	The available data provide indirect evidence to support or refute the possible existence of mineral resources.
C	The available data provide direct evidence but are quantitatively minimal to support or refute the possible existence of mineral resources.
D	The available data provide abundant direct and indirect evidence to support or refute the possible existence of mineral resources.

3.8.1 LEASABLE MINERALS

The exploration and development of leasable minerals is accomplished in several stages of activity. The first stage (land categorization) involves determining which public domain lands

should be leased and under what conditions. The second stage is leasing. The third stage includes exploration, development, and production operations.

The BLM has developed four allocations (i.e., categories) to be applied to all public lands to indicate availability for oil and gas leasing. The first three allocations contain stipulations that pertain to how oil and gas activities would be conducted. The fourth allocation precludes oil and gas leasing altogether. These allocations also apply, where appropriate and practical, to other surface-disturbing activities and occupancy associated with land-use authorizations. The allocations are described as follows:

- Standard Stipulations – Areas identified with Standard Stipulations are open to exploration and development subject to standard lease terms and conditions.
- Timing Limitations and Controlled Surface Use (minor constraints) – Areas identified with these stipulations are open to exploration and development with relatively minor constraints. A Timing Limitation would preclude activities during specified timeframes to protect resource values such as wildlife species. A Controlled Surface Use stipulation would require proposals for oil and gas activities to be authorized according to only the controls or constraints specified.
- No Surface Occupancy (major constraint) – Areas identified as No Surface Occupancy are open to exploration and development, but with the major constraint of precluding oil and gas activities that utilize the surface of the land.
- Closed – Areas identified as Closed are not available for oil and gas leasing.

3.8.1.1 Oil and Gas

3.8.1.1.1 Resource Overview

As described in the 1995 National Assessment of United States Oil and Gas Resources (Gautier et al. 1996), the USGS has delineated oil and gas plays in the Uinta-Piceance and Paradox Basins, which fall within the northern one-third and southern two-thirds of the MPA, respectively. The 1995 assessment represents the latest delineation of oil and gas plays in the basins performed by the USGS (BLM 2005e). In 2003, the USGS published the results of a more recent assessment of the petroleum systems of the Uinta-Piceance Basin that was conducted pursuant to the EPCA and was based on the total petroleum system rather than the plays concept (USGS 2003). However, because no similar assessment has been conducted for the Paradox Basin, to maintain consistency in describing oil and gas resources throughout the MPA, the 1995 data are used.

3.8.1.1.1.1 Paradox Basin

Three USGS plays of the Paradox Basin occur in the MPA: the Buried Fault Block Play (USGS Play 2101), the Fractured Interbed Play (USGS Play 2103), and the Salt Anticline Flank Play (USGS Play 2105). Each of these plays has producing oil and gas fields from its individual reservoirs in the MPA (Morgan 1993; Gautier et al. 1996; Huffman 1996a, 1996b).

The largest of the six oil and gas accumulations in Buried Fault Block Play in the MPA is the Lisbon field, which has produced approximately 43 million barrels of oil and 250 billion cubic feet of gas.

Within the Fractured Interbed Play, the Pennsylvanian shales and mudstones, the Cane Creek Shale reservoirs, and other organic-rich shales in the Pennsylvanian Paradox Formation like the Chimney Rock, Gothic, and Hovenweep Shales are targets for development (BLM 2005e).

The Salt Anticline Flank Play occurs along the flanks of the northwest-trending salt anticlines. This play has been confirmed with the development of wells targeting the Honaker Trail Formation of the Hermosa Group at the Big Indian field and sands of the Cutler Group in southwestern Colorado.

3.8.1.1.1.2 Uinta-Piceance Basin

Three Uinta-Piceance Basin plays delineated by the USGS (Gautier et al. 1996) occur in the northern portion of the MPA: the Cretaceous Conventional Play (USGS Play 2003), the Cretaceous Dakota to Jurassic Play (USGS Play 2004), and the hypothetical Sego Coalbed Methane Play (USGS Play 2051; discussed in Section 3.8.1.2, Coalbed Methane).

The Cretaceous Conventional Play includes sandstone reservoirs in the Mancos Shale and the Mesaverde Group strata in the northern part of the MPA (Gautier et al. 1996).

The Cretaceous Dakota to Triassic Play has been modified from the one defined by Gautier and others (1996) and now includes new reservoirs defined in the 2003 USGS reassessment of the Uinta Basin petroleum systems (Johnson 2003). The play reservoirs have been expanded to include Lower Jurassic and Triassic sandstones not included in the 1995 assessment. The play primarily yields gas in conventional reservoirs; however, oil is also present, particularly in the Morrison Formation (Johnson 2003).

3.8.1.1.2 Past and Present Exploration, Development, and Production

The MPA has had a long history of oil and gas exploration. Records from the Utah Division of Oil, Gas and Mining (UDOGM 2004) indicate that approximately 2,027 petroleum wells have been drilled in the MPA from 1891 through 2004, of which 292 are currently producing, 265 are inactive but capable of producing, 7 are injection wells, and 1,470 are plugged and abandoned (some of which may have been producers at one time). This amounts to approximately 18 wells drilled per year for the MPA for the period between 1891 and 2004.

However, drilling activity between 1991 and 2004 occurred at a slower rate than in the past. Records from the Utah Division of Oil, Gas and Mining (UDOGM 2004) for the period from 1991 through 2004 indicate that drilling activity in the MPA ranged from 0 to 12 wells drilled per year and averaged about 5 wells per year. Breaking down the 5 wells per year by drilling result shows that, on average, one of those wells was an oil well, 2 were gas wells, and one was plugged and abandoned as a dry hole. The remaining well was split between those categories.

Recently, the number of wells drilled has increased significantly due to higher energy prices. In 2005 there were 28 wells drilled and in 2006 there were 25 wells drilled (UDOGM). For 2007 the number of wells drilled is projected to be about 50.

All but one of the 34 historical and active oil and gas fields throughout the MPA are shown on Map 3-1, Moab Planning Area and Oil and Gas Fields. Discovered in 1925, the Greater Cisco is the oldest field in the MPA. A couple other fields near the Greater Cisco field were also discovered in 1928, but only one field was discovered from 1929 through 1954. Many of the larger fields in the planning area, including Lisbon field, were discovered in the 10-year period between 1955 and 1964, when 15 of the 34 fields in the MPA were located. Development activity in the MPA was minimal from 1965 through 1974, and only one new oil field was discovered during this period. The period from 1975 through 1984 saw modest activity, with a total of 6 new fields discovered. The 10-year period from 1985 through 1994 was another relatively active period for oil and gas in the MPA, and 11 more fields were discovered, mostly during the last five years. From 1995 through 2004, no new fields were discovered in the MPA, although some limited exploration has continued.

Lisbon Field, which straddles the BLM Moab-Monticello planning area boundary, is the only large field (50 to 100 million barrels of oil and 0.5 to 1.0 tcf of gas) currently in the MPA. Within the MPA, the average size of an oil field would be classified as tiny (0.1 to 1.0 million barrels), and the average gas field would be classified as very small (0.01 to 0.10 tcf). Disregarding the large Lisbon field and the Greater Cisco field, which is the combination of a number of smaller fields, an average producing field in the MPA consists of 10 wells. The estimated acreage for the existing wells, roads, and pipelines is 8,500 acres, or 15 acres of surface disturbance per well.

Table 3.13 presents the cumulative production data for the 34 oil and gas fields—including 20 active fields, 10 inactive fields, and 4 abandoned fields—within the MPA (UDOGM 2004).

These data indicate that the MPA has been a petroleum-producing region, accounting for over 14% of the total gas and over 4% of the total oil produced in Utah.

Oil and gas production generally has occurred in several distinct regions of the MPA; for convenience, these areas are referred to as the southern, northern, and central MPA. The southern part of the planning area covers a portion of the fold and fault belt of the Paradox Basin and encompasses the Salt Wash, Big Flat-Hatch Point, and Lisbon Valley areas. During the past 15 years, a total of three wells have been drilled in the Salt Wash area, and all of these wells have been plugged and reclaimed (McClure, BLM, personal communication, 2003). A new application for a permit to drill (APD) has been filed for a well sited in Section 9 of T23S, R17E. The Big Flat-Hatch Point area encompasses eleven oil and gas fields that produce from reservoirs from both the Buried Fault Block and the Fractured Interbed Plays. Oil and gas shows have also been noted from the Moenkopi Formation, the Cedar Mesa Sandstone of the Cutler Group, the Honaker Trail Formation, the Ismay and Desert Creek zones of the Paradox Formation, the Pinkerton Trail Formation, and the upper section of the Elbert Formation (Jackson 2000). Four seismic exploration programs have also been completed in the Big Flat-Hatch Point area over the past 15 years (McClure, BLM, personal communication, 2003).

Petroleum production for the Lisbon Valley area comes mainly from one active (Lisbon) and two inactive (Big Indian [north] and Little Valley) fields tapping Buried Fault Block Play reservoirs. Initial completion at the Lisbon field in the Devonian McCracken Sandstone Member of the Elbert Formation yielded 587 barrels of oil per day (Parker 1981). Later testing in the shallower Mississippian Leadville Limestone resulted in the discovery of a large oil and gas accumulation, which has ultimately resulted in approximately 90% of the oil produced from the Lisbon field.

Table 3.13. Cumulative Oil and Gas Production in the MPA, by Field, as of December 31, 2003

Field Name	USGS Play Number	Field Type	Producing Formation	Status	Discovery Year	Active Wells	Cumulative Oil Production	Cumulative Natural Gas Production	Cumulative Water Production
Bar X	2003	Gas	Morrison	Active	1948	40	1,943	45,498,423	4,622
Big Flat	2101	Oil	Leadville-Cane Creek	Active	1955	3	843,581	790,210	122,124
Big Flat West	2103	NA	Paradox	Inactive	1993	1	0	0	0
Big Indian (north)	2101	Gas	Leadville	Inactive	1961	1	194	1,995,461	36,122
Big Indian (south)	2105	Gas	Honaker Trail	Inactive	1958	1	178,160	26,420,267	98,446
Blaze Canyon	2003	Oil	Navajo	Inactive	1976	2	36,672	4,470	141,442
Book Cliffs	2003	Gas	Dakota	Inactive	1957	2	0	438,418	0
Bryson Canyon	2003/04	Gas	Dakota, Mesaverde	Active	1928	40	6,563	23,062,513	2,659
Bushy	2003	Oil	Mancos-Dakota	Active	1977	2	38,528	3,507	13,189
Dark Canyon	2003	Gas	Dakota	Active	1988	2	0	767,003	16
Diamond Ridge	2003	Gas	Dakota-Cedar Mtn	Abandoned	1960	0	0	466,479	0
East Canyon	2003	Gas	Dakota-Morrison	Active	1960	14	7,206	2,928,022	1,576,143
Greater Cisco	2003	Gas	Cedar Mtn	Active	1925	260	1,902,111	24,564,425	276,172
Hatch Point	2101	Oil	Leadville	Inactive	1993	1	4,607	10,731	259
Hell Roaring	2103	Oil	Paradox	Active	1992	1	536,743	497,672	32,744
Kane Creek	2103	Gas	Paradox	Abandoned	1925	0	1,887	25,000	NA
Left Hand Canyon	2003	Oil	Entrada	Active	1972	2	96,640	557,839	144,461
Lion Mesa	2103	Oil	Ismay	Inactive	1984	3	1,624	0	8
Lisbon*	2101	Gas	Leadville-McCracken	Active	1961	23	51,076,593	761,560,184	49,512,009
Little Valley	2101	Gas	Leadville	Inactive	1959	1	137,848	17,311,939	742,951
Long Canyon	2103	Oil	Paradox	Active	1962	1	1,114,079	1,164,983	451,157
Mancos Flat	2003	Oil	Mancos	Inactive	1981	1	16,733	0	53
Middle Canyon	2003	Gas	Dakota	Active	1988	3	247	1,512,016	0
Park Road	2103	Oil	Paradox	Active	1991	1	301,233	288,611	22,023

Table 3.13. Cumulative Oil and Gas Production in the MPA, by Field, as of December 31, 2003

Field Name	USGS Play Number	Field Type	Producing Formation	Status	Discovery Year	Active Wells	Cumulative Oil Production	Cumulative Natural Gas Production	Cumulative Water Production
Pear Park	2003	Gas	Dakota-Cedar Mtn	Active	1963	1	0	325,603	0
Salt Wash	2101	Oil	Leadville	Active	1961	8	1,555,787	11,746,434	6,022,091
San Arroyo	2003	Gas	Dakota	Active	1962	103	181,351	151,472,679	16,662
Shafer Canyon	2103	Oil	Paradox	Abandoned	1963	0	67,554	63,805	1,408
South Pine Ridge	2105	Gas	Hernosa Group?	Active	1981	1	7,194	682,395	174
Stateline	2003	Gas	Dakota	Active	1928	16	10,472	12,887,318	3,639
Ten Mile	2103	Oil	Paradox	Inactive	1990	1	962	0	599
Westwater	2003/04	Gas	Dakota, Mesaverde	Active	1957	27	617,478	36,300,009	299,665
Wilson Canyon	2103	Gas	Paradox	Active	1955	2	111,248	1,954,793	10,334
Winter Camp	2003	Gas	Dakota	Abandoned	1982	0	0	13,673	70
TOTALS						564	58,855,238	1,125,314,882	59,531,242

Source: Modified from Utah Division of Oil, Gas and Mining (2004), oil and water production in barrels, gas production in million cubic feet (mcf).

*Partially located in the Monticello Planning Area to the south.

Notes: The Gold Bar field was abandoned so long ago that its production is not reflected in recent UDOGM production books or in this table. This table also does not include the production from one small, unnamed Wildcat oil field, which is included with all other fields named Wildcat in UDOGM records.

Minor production has also been recorded for Pennsylvanian Paradox Formation reservoirs of the Fractured Interbed Play at the Wilson Canyon field, as well as from Pennsylvanian Honaker Trail Formation reservoirs of the Salt Anticline Flank Play at the Pine Ridge South and Big Indian (south) fields (see Table 3.13). Four seismic exploration programs were completed in the Lisbon Valley area over the past 15 years, and four new wells were drilled but eventually abandoned as dry holes without production (McClure, BLM, personal communication, 2003). Hydrogen sulfide (H_2S) and helium have also been produced from the Lisbon field from McCracken and Leadville reservoirs (Eric Jones, BLM – MFO, personal communication, July 2003).

The northern part of the MPA, within the Uinta Basin region, encompasses the Greater Cisco, Book Cliffs, and Roan Cliffs areas, which produce predominantly gas but some oil from various Jurassic through Cretaceous-age reservoirs of the Dakota-Triassic and Cretaceous Conventional Plays. The Greater Cisco area/field consists of a number of individual fields. Within the Book Cliffs area, 15 oil and gas fields produce primarily from the Dakota Sandstone, or various combinations of that reservoir with reservoirs in the Mancos Shale, Cedar Mountain Formation, Morrison Formation, or the Entrada Sandstone. Recent successful gas completions in these deeper reservoirs of the Cretaceous Dakota to Jurassic Play on Uintah and Ouray Indian Reservation lands north of the MPA have stimulated new interest in the potential of this play (Eckels et al. 2005), and gas potential may also exist in the Cretaceous Conventional Play in the northwestern portion of the Book Cliffs area.

The central part of the MPA encompasses the Eastern Paradox area, which has seen limited exploration and development activity. Only two fields were producing in this area as of the end of 2003 (UDOGM 2004). One of these is the Blaze Canyon oil field; the other is a wildcat that produced 198 barrels of oil before being shut-in (UDOGM 2004).

3.8.1.1.3 Occurrence and Development Potential

The three plays in the southern Paradox Basin portion of the MPA (the Buried Fault Block Play, the Fractured Interbed Play, and the Salt Flank Anticline Play) cover the same area and are rated as having high (H) occurrence potential for oil and gas resources with a certainty level of D. There is a low (L) potential with a C level of certainty for oil and gas occurrence within the Uncompahgre Uplift area and the area around the La Sal Mountains. The Dakota-Triassic Play and the Cretaceous Conventional Play, in the northern Uinta Basin portion of the MPA, have been rated as having an H occurrence potential with a D level of certainty.

Based on analysis of various factors, most of the area within the five conventional oil and gas plays in the MPA have been rated as H for oil and gas development potential and development is likely to occur in these areas over the next 15 years. Areas with a L geologic development potential for oil and gas are the Uncompahgre Uplift and the La Sal Mountains. Other areas in the MPA given an L development potential are those areas administratively closed to mineral leasing and disposal, such as WSAs (Map 3-2, Moab Planning Area Composite Oil and Gas Development Potential).

3.8.1.2 Coalbed Methane

3.8.1.2.1 Resource Overview

The Uinta Basin Sego Coalbed Methane Play (USGS Play 2051, Gautier et al. 1996) encompasses the Sego coal field in the northern portion of the MPA (Map 3-3, Moab Planning Area Coalbed Methane-Development Potential); it is a hypothetical play, since there has been no production from these coals to-date. The play is mostly untested.

The gas content of the Nelsen-Formation coal beds in the Sego coal field is estimated by the UGS to range from 50 to 300 standard cubic feet per ton (scf/ton). Figuring that 100,000 acres of the northern portion of the MPA are underlain by Neslen Formation coal from 1,000 to 5,000 feet deep, and that the average net coal thickness for this area is 12.5 feet, the total coal resource would be 2.25 billion tons (1,800 tons per acre-foot). Using the gas content range listed above, the Neslen coals could contain a coalbed methane resource ranging from 0.11 to 0.68 tcf of gas in place in the MPA portion of the Sego Coalbed Methane Play. The USGS (Gautier et al. 1996) also provided coalbed gas data for the Sego Play (BLM 2005e) and estimated that ultimate recoverable gas reserves would range from 0.08 to 0.60 tcf, or very similar to the UGS estimate. However, it is important to note that gas in place is not the same as recoverable gas reserves.

Cumulative data from the UGS and Doelling (1972a, 1979), indicate that coals of the Nelsen Formation at depths of less than 1,000 feet are only moderately gassy. Examination of the coal quality of the near-surface samples (UGS unpublished data) shows that the coals could hold 280–380 cubic feet of gas per ton and, thus, are undersaturated near the surface. More saturated reserves are anticipated between 1,000 and 5,000 feet.

3.8.1.2.2 Past and Present Exploration, Development, and Production

Only a few coalbed methane wells have been drilled in the Uinta Basin Sego Coalbed Methane Play through 2004. There have been no wells specifically drilled to test the coalbed gas potential of the MPA to date. Data suggest that coal beds fully saturated with gas (and attractive for development) may exist between 1,000 and 5,000 feet. Some of the Neslen coal deposits prospective for coalbed methane development also occur in an area of existing oil and gas development, which provides nearby pipeline infrastructure to transport any coalbed gas found.

CDX Rockies, LLC, a small independent petroleum company, has conducted recent coal coring and desorption tests in Uintah County to the north of the MPA. Although methane content data has not been released, the test results are reported to be encouraging (BLM 2005e).

3.8.1.2.3 Occurrence and Development Potential

The hypothetical Uinta Basin Sego Coalbed Methane Play has been subdivided into various levels of occurrence potential. The occurrence potential for coalbed methane is high (H) with a rating of C for certainty in the Neslen Formation of the Sego coal field where the net coal in the formation is more than 8 feet thick, moderate (M) with a C certainty rating where the net coal is 4-8 feet thick, and low (L) with a C certainty rating where the coal is less than 4 feet thick.

The development potential for coalbed methane of the northeastern portion of the Sego coal field, outside the WSAs, is ranked as H because there are thick coal deposits present and existing oil and gas infrastructure present. Development is likely to occur in these areas over the next 15 years. Low (L) development potential is assigned to the portion of the Sego coal field covered by thin coal and WSAs, and to the La Sal coal field. A development potential of M was assigned to areas outside the WSAs with only 4–8 feet of net coal in the Neslen Formation, or small areas between the WSAs that had thicker coal (Map 3-3, Moab Planning Area Coalbed Methane-Development Potential).

3.8.1.3 Coal

3.8.1.3.1 Resource Overview

Along the Book Cliffs to the east of the Green River, in what is known as the Sego coal field, coal beds in the Upper Cretaceous Neslen Formation of the Mesaverde Group are exposed along the cliffs. These coal beds generally extend at least ten miles and dip into the subsurface of the Uinta Basin, and their quality is relatively good compared to the coals in the Book Cliffs and Wasatch Plateau fields of central Utah. Four coal zones have been identified in the Neslen Formation in this area: the Palisade, Ballard, Chesterfield, and Carbonera coal zones, in ascending stratigraphic order (Doelling 1972a). The thickest and most extensive coal beds occur in the Carbonera zone in the far northeastern part of the MPA.

In 1978, the BLM and USGS collaborated to designate the Thompson Known Recoverable Coal Resource Area (KRCRA), which consists of about 41,325 acres of the Sego coal field located in parts of T20S, R19E, R20E, and R21E, and T21S, R19E and R20E. More recent analysis by the UGS of oil and gas well logs penetrating the Neslen Formation indicates that the Thompson KRCRA only covers the southwestern one-third of the actual recoverable coal-bearing lands of the Sego coal field within the MPA. Doelling (1972a) estimated that there are 294 million short tons of coal in the Sego field, but his resource estimate is mainly limited to the coal in the Thompson KRCRA and only includes about 8 million tons of hypothetical coal resources along the Book Cliffs in the northeast MPA. Notably, some of the most attractive coal deposits in the Sego coal field are located outside the established KRCRA in the northeast portion of the MPA where there is active oil and gas development.

The La Sal coal field occurs in the southeast portion of the MPA. Here, the coal is thin and high in ash and sulfur content and, thus, not as attractive for mining (Doelling 1972b; Gloyn et al. 1995). A KRCRA has not been defined for this coal field (Doelling 1972b).

3.8.1.3.2 Past and Present Exploration, Development, and Production

There has been limited production in the Sego coal field in the MPA occurring since 1898 (Doelling 1972a). Almost 2.7 million tons of coal have been produced from this field, primarily between 1912 and 1954, and primarily from one mine. The remaining small mines have produced only minor amounts of coal, primarily for ranch use (Doelling et al. 1979). There are no currently active coal mines in the MPA, but the relatively low sulfur and ash contents of the coal and the close proximity of the Sego field to roads and railroads make the coal here attractive for mining at some time in the future.

3.8.1.3.3 Occurrence and Development Potential

The area where the Cretaceous Mesaverde Group is exposed in the Sego coal field has been rated as high (H) for coal occurrence potential with D rating for certainty. The Dakota Sandstone La Sal coal field is also rated H for occurrence potential with a certainty rating of D. Because of the presence of WSAs and potential conflicts with existing oil and gas developments, the coal deposits of the MPA are rated as having low (L) development potential. The La Sal coal field is rated as having L development potential due to the thin beds and poor quality of its coal deposits. Development is not anticipated in the Sego and La Sal coal fields over the next 15 years (Map 3-4, Moab Planning Area Coal Deposit-Development Potential).

3.8.1.4 Potash and Salt

3.8.1.4.1 Resource Overview

Within the Paradox Basin portion of the MPA, potash (potassium-bearing) deposits, comprising primarily salt, sylvite, and carnallite, are hosted by the Pennsylvanian Paradox Formation. Saline potash mineralization is limited to an area totaling approximately 2,800 square miles (Dames & Moore 1978) in the northeastern half of the basin. Both sylvite and carnallite occur in varying proportions throughout most potash deposits, but sylvite is dominant in those horizons under economic consideration (Hite 1960; Dames & Moore 1978; Gloyn et al. 1995). Using a cutoff grade of 14% K_2O, Patterson (1989) estimates that known resources of K_2O potash contain 254 million tons, while inferred resources are estimated at 161 million tons. The recovery of salt in the MPA is exclusively a by-product of potash solution mining. Salt by itself is not considered economic to mine in the MPA because abundant, less expensive sources are available elsewhere.

Most of the interest in potash and salt deposits in the Paradox Basin has been concentrated in the fold and fault belt, where continuous potash beds are relatively close to the surface. The only commercial production of potash and by-product salt in the Paradox Basin (Moab Salt Company) has occurred on the Cane Creek anticline. However, other potentially valuable deposits are known to occur in the MPA. These include the Lisbon Valley area, the Seven Mile area, and the Ten Mile area. In 1960, the U.S. Geological Survey classified the Lisbon Valley area, the Seven Mile area, and the Cane Creek area as Known Potash Leasing Areas (KPLAs), or areas where potentially valuable deposits of potash are known to exist. There also appears to be sufficient resource data to define the Ten Mile area as a KPLA (BLM 2005e; Map 2-6, Known Potash Leasing Areas).

3.8.1.4.2 Past and Present Exploration, Development, and Production

Potash deposits in the Paradox Basin were initially discovered during the exploration for oil and gas between 1924 and 1944. Based on these initial discoveries, further potash exploration concentrated in Cane Creek, Seven Mile, and Lisbon Valley and contributed to the classification of these KPLAs in 1960 (Hite 1960). In the 1960s, underground mining operations were planned in the Lisbon Valley KPLA, but they were never fully developed due to technological and logistical complications (Merrell 1979). Leases within the Seven Mile KPLA have also occurred since designation of the area as a KPLA (Merrell 1979). There are currently 13 prospecting permit applications in the MPA.

Two companies in particular have shown and continue to show some interest in the potash deposits of the MPA.

Buttes Resources drilled seven exploratory holes for potash deposits in the Ten Mile area in 1978. In 1984, they expressed interest in developing the area via solution mining based on the 1978 exploration, but the project was abandoned (BLM 2005e). The company then acquired 4 inactive preference right leases and 13 prospecting permit applications for potash in the Ten Mile area. Buttes Resources has recently transferred its holdings in the leases and permit applications to Reunion Resources, which has expressed some interest in conducting a modest amount of exploration and possibly a pilot test plant for solution mining in this area in the unspecified future (Denice Swanke, BLM – MFO, personal communication 2005).

Moab Salt LLC's Cane Creek Mine, in the Cane Creek KLPA, is and has been the sole producer of potash and salt in the Paradox Basin since 1964. This solution mining operation is located on both private and state lands on the crest of the Cane Creek anticline. Almost all production has been from a zone of Salt Cycle #5 of the Paradox Formation. Production in 2000 was approximately 60,000 tons of potash per year, with a by-product of 210,000 tons of halite per year (BLM 2005e).

3.8.1.4.3 Occurrence and Development Potential

The three KPLAs (Lisbon Valley area, the Seven Mile area, and the Cane Creek area) and the Tenmile area have been classified as high (H) for occurrence potential for potash and salt with a D level of certainty. Development is likely to occur in the Tenmile area within the next 15 years. One area around the La Sal Mountains igneous intrusive has been rated as having low (L) potash and salt occurrence potential, with a C level of certainty. The remainder of the Paradox Basin area has been rated as moderate (M) potash and salt occurrence potential with a C level of certainty (Map 3-5, Moab Planning Area Potash and Salt Deposit-Development Potential).

3.8.2 Locatable Minerals

Locatable minerals comprise the base and precious metal ores, ferrous metal ores, and certain classes of industrial minerals. Developers of these minerals stake a mining claim (location) over the deposit and then acquire the necessary permits to explore or mine. Operations for locatable minerals are not allowed in areas expressly identified as not available by law (e.g., wilderness areas) or in areas withdrawn from these operations.

3.8.2.1 Uranium-Vanadium

3.8.2.1.1 Resource Overview

An important locatable commodity in the MPA is sediment-hosted uranium. It is usually found intimately associated with vanadium, and sometimes copper, because of these elements' mutual chemical affinities. Uranium-vanadium deposits in the MPA are generally found in the Moss Back Member of the Triassic Chinle Formation and the Salt Wash Member of the Jurassic Morrison Formation. Deposits in the Salt Wash Member are generally larger reserves, higher

grades, and more closely clustered (Johnson and Thordarson 1959; Chenoweth 1981, 1996). Although the Chinle and Morrison Formations are predominantly composed of shale (low-energy muds), it is the sandstone and conglomerate units (high-energy fluvial channel deposits) in each that host the uranium-vanadium mineralization. In addition to these Mesozoic deposits, the late Paleozoic Cedar Mesa Sandstone of the Permian Cutler Group contains some minor uranium-vanadium deposits (a result of an unconformity with the Chinle Formation), and some of these have had historical mining production in the MPA.

3.8.2.1.2 Past and Present Exploration, Development, and Production

Due to the recent rise in uranium prices, there is currently an increased amount of interest in uranium exploration in the MPA. Regionally, an estimated 4.2 million tons of ore reserves remain in the Four Corners region. Approximately 57% of these reserves are hosted in the Morrison, 39% in the Chinle Formation, and 4% in the Cutler Group (Johnson and Thordarson 1959; Gloyn et al. 1995).

Although uranium deposits in the MPA had been mined for over 90 years, first for their radium content and then for their vanadium co-product, it was the "Uranium Boom" beginning in the late 1940s that lead to large-scale extraction of mineral in the early 1950s (Chenoweth 1996). Exploration drilling was still being conducted as late as the 1970s to decipher the configuration of existing deposits and delineate new discoveries. However, a national and international trend of declining uranium and vanadium demand and prices and economics brought on by socio-political factors, international oversupply, and competition from lower cost producers began in the 1980s (Chenoweth 1996; BLM 2005e). The MPA's last mines and mills closed in 1990.

Historical uranium mining has been conducted over much of the southern half of the MPA. Mines developed in the Chinle Formation produced 92% of the ore between the early 1950s and the mid 1960s. However, by the mid 1970s, production from the Morrison Formation overtook and slightly exceeded that of the Chinle ($500 million vs. $600 million, respectively). Table 3.14 lists the 7 mining districts and 18 mining areas in the MPA and the uranium host deposits for each. Map 3-6, Moab Planning Area Uranium/Vanadium Deposit-Development Potential depicts these mining districts and mining areas. Table 3.15 provides a summary of historical mining production in the MPA.

Table 3.14. Historical Locations and Hosts of Uranium and Vanadium Deposits in the MPA, by Mining District

Mining District (Mining Areas)	Salt Wash Member/ Morrison Formation	Moss Back Member/ Chinle Formation	Permian Cutler Group	Other
Gateway (Buckhorn Mesa-Scharf Mesa, Polar Mesa-Beaver Mesa)	Major	Minor		Brushy Basin Member/ Morrison Formation (Minor)
Inter-river (Mineral Canyon, Inter-river, Seven Mile Canyon)		Major	Minor	Moenkopi Formation (Minor)
La Sal (La Sal, La Sal Creek)	Only			

Table 3.14. Historical Locations and Hosts of Uranium and Vanadium Deposits in the MPA, by Mining District

Mining District (Mining Areas)	Salt Wash Member/ Morrison Formation	Moss Back Member/ Chinle Formation	Permian Cutler Group	Other
Lisbon Valley*		Major	Minor	"lower member"/Chinle Formation (Major)
Moab East (Browns Hole, Brumley Ridge, Upper Cane Creek, Wilson Mesa)	Only			
Moab West (Indian Creek, Lockhart Canyon, Lower Cane Creek)		Major	Minor	
Thompson (Dewey, Klondike Ridge-Courthouse Wash, Ten Mile Canyon, Yellow Cat)	Only			

Sources: Merrell 1979; Chenoweth 1996; Sprinkel 1999; Gloyn, unpublished report 2004.

* Also known as Big Indian Wash mining area (Gloyn et al. 1995).

Table 3.15. Historical Uranium Grade and Production in the MPA, by Mining District[1]

Mining District	Number of Properties	Average Ore Grade (% U_3O_8/% V_2O_5)	Aggregate Production (million tons)
Gateway	Unknown	0.32 / 1.28	0.21
Inter-river[2]	31	0.30 / 1.20	0.49
La Sal	17	0.22 / 1.06	1.24
Lisbon Valley[3]	57	0.30 / 0.34	17.78
Moab East	5+	0.28 / 1.52	0.10
Moab West	18	0.20 / 0.10	0.07
Thompson[4]	93	0.20 / 1.13	0.14

Notes:

1. All information from Chenoweth (1996), unless otherwise noted.
2. Elevatorski 1978; BLM files and records.
3. Also known as Big Indian Wash mining area (Gloyn et al. 1995).
4. Chenoweth 1989.

3.8.2.1.3 Occurrence and Development Potential

Areas of historical uranium and vanadium mining are rated as having high (H) occurrence potential with a D for certainty. Outside these known mining areas, the areal extent of the Jurassic Morrison and Triassic Chinle Formations has been classified as having a moderate (M) occurrence potential with a C for certainty. Where mineralization in the Cutler has occurred in Lisbon Valley mining area, uranium and vanadium has a low (L) occurrence potential;

otherwise, mineralization in the Cutler is not expected. Two past mining areas, the La Sal and Lisbon Valley areas, are rated as H for development potential because they are established land holdings with significant minable reserves of uranium and vanadium and because the recent upsurge in prices makes future development in those areas likely (BLM 2005f). The remaining mining areas, including the Paradox Basin, have been rated as M for development potential, and the host formations outside past mining areas have been rated as L for development potential (Map 3-6, Moab Planning Area Uranium/Vanadium Deposit-Development Potential).

3.8.2.2 COPPER

3.8.2.2.1 RESOURCE OVERVIEW

For convenience, copper deposits are divided into two types in this section: manto-hosted and redbed-hosted. Manto deposits are generally fault zone-hosted veins and strata-bound, mineralized layers. As their name suggests, redbed copper deposits form in red host rocks, which get their color (essentially rust) from the oxidation of the rock's exposure to the atmosphere. Redbed mineralization can be either volcanic or sedimentary. Sedimentary-hosted deposits, which form in fluvial (river) environments, are the type found in the MPA. Sedimentary redbed deposits are relatively small in comparison to the volcanic redbed deposits and manto-hosted deposits, and few are ever brought into production.

Starting in the late 1960s, a series of drilling programs in the Lisbon Valley area culminated in the delineation of several, commercial-sized, sandstone fault and manto-hosted copper deposits in the Cretaceous Dakota Sandstone and Burro Canyon Formation. As described by Gloyn and others (1995) and Hahn and Thorson (2002), the three deposits are the Centennial, Sentinel, and GTO ore bodies which, combined, contain 46.5 million tons of ore grading 0.43% copper (Roberts & Schaefer 1996). There may be potential for smaller sandstone-hosted copper deposits and/or copper with less mineralization in two additional stratigraphic intervals: the Entrada Sandstone-Navajo Sandstone, and the Wingate Sandstone (BLM 2005e).

Within the MPA, redbed copper is associated with uranium found primarily in the Triassic Chinle Formation, and with other deposits found in the Jurassic Morrison Formation and the Pennsylvanian Hermosa Group (McFaul et al. 2000). Similar, low-grade copper/uranium associations can be found in the Inter-river, Lower Cane Creek, and Lisbon Valley mining areas. The greatest potential for economically viable development of redbed copper appears to be in the northwest part of the Klondike Ridge-Courthouse Wash area on the southwest flank of the Salt Valley anticline, where mineralization is found in the upper sandstones of the Salt Wash Member and, to some degree, the Brushy Basin Member of the Morrison Formation (Doelling et al. 1988).

3.8.2.2.2 PAST AND PRESENT EXPLORATION, DEVELOPMENT, AND PRODUCTION

Copper development in the MPA began in the 1890s with the production of high-grade copper-oxide ores, primarily from the Big Indian and Blackbird Mines in the Lisbon Valley area (Hahn and Thorson 2002), which are responsible for the bulk of the copper that has been produced in the MPA. Approximately 155,000 tons of ore, with an average grade of 1.5% copper, were extracted from these mining operations up through 1960 (Gloyn et al. 1995). Numerous other

exploration programs from the 1960s through 1995 resulted in the delineation of commercial copper reserves in the Lisbon Valley area (BLM 2005e). Most redbed-hosted copper occurrences in the MPA are too small and low-grade to be commercially mined, except for the copper occurrences in the Morrison Formation on the southwest flank of the Salt Valley anticline.

Dane (1935) also reports several small mines and an old mill in Mill Canyon along the Sevenmile fault, where the Moab Tongue of the Entrada Formation mineralizes. An unreported but large tonnage of low-grade copper has been drilled out in this area (Merrell 1979).

A new copper-mining operation is being conducted in the MPA. The Summo Corporation, in a project referred to as the Lisbon Valley Copper Project, prepared to remove ore from the Centennial, Sentinel, and GTO deposits near the southeast end of the Lisbon Valley anticline beginning in 1997. There have been several delays in the development of the mine-mill complex, but presently, full production at the mine began in 2006 (Constellation Copper 2006). The Constellation Copper Corporation (formerly Summo Corporation), through its wholly owned subsidiary, Lisbon Valley Mining Company, currently controls the property, which is located primarily on Federal lands but also on state and private lands. A total of 1,103 acres will be disturbed by the development of facilities and production (BLM 1997b).

- Phil Gramlich submitted a drilling proposal to the BLM in November 2004 to drill on the Charlie #2 claim in the Salt Valley anticline area. The purpose of the proposal was to delineate an ore body in the Salt Wash Member of the Morrison Formation identified 20 years ago. This drilling was conducted, but indications are that the results were not favorable (Brent Northrup, BLM, personal communication 2005).

3.8.2.2.3 Occurrence and Development Potential

The sites of manto-hosted copper in the Burro Canyon Formation and Dakota Sandstone along the Lisbon fault in the Lisbon Valley area have been classified as high (H) for occurrence potential with a high (D) degree of certainty because of the known deposits of the Centennial, Sentinel, and GTO ore bodies. These ore bodies, as well as the Constellation Copper's Lisbon Valley mine and the Dakota-Burro Canyon-Cedar Mountain trend along the northern flank of the Lisbon Valley anticline, are rated H for development potential. Outside these known sites, the Burro Canyon and Dakota Sandstone hosts are rated moderate (M) for occurrence potential with a C level of certainty. Based on available information, there is a high (H) occurrence potential with a high degree (D) of certainty of redbed copper deposits in the Chinle Formation in the Inter-river and Cane Creek uranium areas; the Morrison Formation in the Moab and Klondike Wash-Courthouse Wash areas; and the Pennsylvanian Hermosa Group and Morrison Formation in the Lisbon Valley area. Other than the Morrison Formation of the Klondike Wash-Courthouse Wash area, which is rated H for development potential, the remaining redbed copper-uranium deposits of the MPA are rated low (L) for development potential (Map 3-7, Moab Planning Area Copper Deposit-Development Potential).

The Lisbon Valley Copper Project, involving the Centennial, Sentinel, and GTO copper deposits, has been approved, initial operations have commenced, and copper production began in early 2006. The project includes development of three open pits to access copper ore, three waste dumps, crushing facilities, a pad to leach the ore (266 acre), a processing plan and ponds to

recover the ore, construction of a 10.8-mile power line to the project site, and associated support facilities. The total disturbance area would be 1103 acres over a 10-year period, with reclamation taking an additional 5 years to complete. Additional drilling is occurring about 4 miles southeast of the Lisbon Valley Project in the Flying Diamond target area involving about 5 acres of disturbance.

3.8.2.3 Placer Gold

3.8.2.3.1 Resource Overview

Placer gold in the MPA occurs primarily along the Colorado River, from the mouth of the Dolores River downstream to Moab, and at a few other places along these two rivers. The gold occurs in alluvial bars and has been found in high-level terraces as much as 200 feet above the present Colorado River. It is commonly distributed uniformly throughout the gravels rather than concentrated along the bedrock contact, but it may occur in slightly higher concentrations on the upstream end of bars and higher terraces (Butler et al. 1920; Chatman 1987). A secondary set of gold placers occurs west and north of the La Sal Mountains, at Miners Basin, Placer Creek, and Wilson and Bald Mesas, in glacial deposits up to 50 feet thick (Johnson 1973). Because of the gold's derivation, the most highly weathered glacial gravels in these areas offer the highest concentrations of gold (Johnson 1973). Pre-Wisconsin glacial gravels on Wilson and Bald Mesas exhibit the higher concentrations of placer gold (Johnson 1973; Merrell 1979; Shubat et al. 1991), and operations on Wilson Mesa have been among the most productive.

3.8.2.3.2 Past and Present Exploration, Development, and Production

Due to the fine flaky mode of the gold (flakes less than 0.1 mm, average; Butler et al. 1920) and the difficulty in recovering it, most operations have not been commercially successful (Butler et al. 1920; UGMS 1966; Johnson 1973; Chatman 1987). The gold grades of historical placer operations range from 0.03 to 0.05 ounces per cubic yard (Gloyn et al. 1995). After over 100 years of effort, only about 1,500 ounces of gold has been produced from gravels of the Colorado River and other streams in Grand County (Johnson 1973; Shubat et al. 1991).

Placer gold was worked almost continuously along the Colorado and Dolores Rivers, as well as in the Miners Basin/Wilson and Bald Mesas area, from the late 1800s until 1942, but only sporadically thereafter (Johnson 1973; Merrell 1979). Since 1998, activity has essentially ceased in the MPA.

3.8.2.3.3 Occurrence and Development Potential

Within the MPA, the alluvial deposits along the Colorado and Dolores Rivers and the glacial deposits in the La Sal Mountains, where placer gold has been produced at some locations, are classified as having high (H) gold occurrence potential, with a D certainty level. However, the development potential for placer gold at these locations is rated as low (L), partially because of the low economic potential (Butler et al. 1920; UGMS 1966; Johnson 1973; Chatman 1987), and partially because of the Secretary of the Interior's recent Three Rivers withdrawal (September 2004) of lands covering the river drainages that prevent the location of new mining claims along

the affected river corridors for the next 50 years (BLM 2005f; see also Chapter 2 regarding withdrawals). Development of the placer gold contained in the alluvial deposits along the Colorado and Dolores Rivers is considered unlikely in the next 15 years.

3.8.2.4 LIMESTONE

3.8.2.4.1 RESOURCE OVERVIEW

High-calcium limestone is rare in the MPA because exposures of Paleozoic carbonate units are limited. Limestone exploration and production has been limited to the southern portion of the mining area, along the southwest flank of the Lisbon Valley anticline. Here, the Pennsylvanian Honaker Trail Formation of the Hermosa Group, which contains limited amounts of relatively high-quality limestone (Gloyn et al. 1995), crops out as a 12- to 15-foot-thick limestone bed. This good-quality, readily minable deposit has about 6 million tons of reserves on state land and an additional 3 million tons on adjacent Federal land (Reed 1996).

3.8.2.4.2 PAST AND PRESENT EXPLORATION, DEVELOPMENT, AND PRODUCTION

High-calcium limestone (95% calcium carbonate, or $CaCO_3$) has been produced at Cotter Corporation's Lisbon Valley quarry (Papoose Mine; Reed 1996), located on state land at the north end of Lisbon Valley. Between 1994 and 2003, this operation produced approximately 550,000 tons of limestone (UDOGM 2004). One other, small, permitted but inactive limestone quarry occurs in the Lisbon Valley area. Records from UDOGM (2004) for the Lilim Claims quarry list Chris Shumway as the operator.

3.8.2.4.3 OCCURRENCE AND DEVELOPMENT POTENTIAL

The identified Honaker Trail limestone deposits in the Lisbon Valley area of the MPA have been rated as having high (H) occurrence potential with a D level of certainty. Elsewhere in the MPA, the Honaker Trail Formation limestone exposures are characterized as having moderate (M) occurrence potential with a C level of certainty. The development potential for the Lisbon Valley limestone deposits in the MPA is rated as H. All other areas of Honaker Trail exposures in the MPA are rated as having M development potential (Map 3-8, Moab Planning Area Limestone Deposit-Development Potential).

Limestone production is projected to continue at Cotter Corporation's Lisbon Valley quarry, which is located on state land. Based on the size of the existing reserves and current production rates, any future exploration and development of limestone in the MPA is anticipated to remain on state land in this area for the next 15 years. Therefore, no development of limestone is expected on Federal lands in the MPA over the next 15 years.

3.8.3 SALABLE MINERALS

Salable minerals are commodities disposed of via sales or free use (government agencies and municipalities) by the Federal government and generally comprise common varieties of construction materials and aggregates. The BLM will not dispose of salable minerals in areas not

available by law (e.g., wilderness areas) or in areas identified in land-use plans as not appropriate for disposal. Current management of salable minerals allows their disposal on 7,750 acres within the MPA, and there are currently 12 community pits totaling about 2,693 acres within the MPA.

3.8.3.1 Sand and Gravel

3.8.3.1.1 Resource Overview

Sand and gravel development is largely driven by the need to find suitable material for public works projects, including local and state road projects and community development. Sand and gravel operations are widely dispersed across the MPA—and Utah—to facilitate distribution of the materials and keep the costs to consumers low. They are commonly found near population centers and aligned along roadways.

Sand and gravel deposits in the MPA consist of unconsolidated Quaternary sediments. Important sand and gravel deposits occur along the major river courses—the Colorado, Dolores, and Green Rivers—as alluvial bars and terraces. The rock fragments in these deposits are especially hard, which makes them suitable for most uses, including concrete aggregate. Other important and widely used sand and gravel deposits surround the La Sal Mountains and occur as pediments and alluvial fill and fans. Less important and lower-quality sand and gravel can be found in the eolian sands derived from the Entrada Sandstone and the Glen Canyon Group; alluvium (not derived from the La Sal Mountains) along tributaries to the major rivers; and glacial moraines.

3.8.3.1.2 Past and Present Exploration, Development, and Production

In the MPA, most past production has occurred in close proximity to existing roads. The BLM has granted 57 sand/gravel authorizations within the MPA since 1989, and since 1982, approximately 200,000 cubic yards of sand/gravel have been produced from BLM-authorized areas in the MPA (BLM 2005e). The main producers are the Utah Department of Transportation and the Grand County Highway Department.

3.8.3.1.3 Occurrence and Development Potential

Sand and gravel deposits are associated with Quaternary sediments. All these deposits are rated as high (H) for occurrence potential, with a C level of certainty; the specific, known sand and gravel sites are elevated to D level of certainty for occurrence potential. Those sand and gravel deposits that lie within three miles of existing roads have been rated as having an H development potential; the areas within the WSAs have been rated as having low (L) development potential, and the remaining areas have been rated moderate (M) development potential. Development of sand and gravel deposits is anticipated to occur over the next 15 years in the areas rated as high development potential (Map 3-9, Moab Planning Area Sand and Gravel Deposit-Development Potential).

3.8.3.2 Building Stone

3.8.3.2.1 Resource Overview

Sandstone appropriate for use as a high-quality building stone can be found in the Triassic Moenkopi and Chinle Formations and the Jurassic Kayenta and Morrison Formations (Merrell 1979; Atwood and Doelling 1982; BLM 2005e). The Cretaceous Dakota Sandstone may also be a source of building stone in the MPA, as it is south of the MPA, near Blanding, Utah. The Kayenta Formation, which naturally fractures into useable-sized blocks, appears to be the most favorable source in the MPA for building stone.

3.8.3.2.2 Past and Present Exploration, Development, and Production

Approximately 700 tons of building stone have been produced from reported BLM-authorized activities in the MPA since 1982 (BLM 2005e; Denice Swanke, BLM – MFO, personal communication June 2003). The four main host formations (i.e., the Moenkopi, Chinle, Kayenta, and Morrison Formations) each contributed to the total yield of building stone during this period. Most disposal of building stone in the MPA consists of small sales (5 tons or less) to individuals in the local area for personal use; 106 small sales of building stone occurred between 1989 and 2004 (BLM 2005e). No permits for any large-scale building stone operations have been authorized in the recent past.

3.8.3.2.3 Occurrence and Development Potential

Known sites of building stone production in the MPA are rated as high (H) for occurrence potential with a D level for certainty. Elsewhere in the MPA, the exposed outcrop areas for the formations mentioned above have been classified as moderate (M) for building stone occurrence potential and with a C level of certainty. Development potential is rated as H for the known building stone sites in the MPA and is rated as M elsewhere where favorable formations for building stone occur. Within the existing WSAs, which have been administratively withdrawn, the development potential is rated as low (L). Development of building stone is likely to occur over the next 15 years in the areas rated as high development potential (Map 3-10, Building Stone Deposit-Development Potential).

3.8.3.3 Travertine

3.8.3.3.1 Resource Overview

Travertine is a type of calcium carbonate ($CaCO_3$) that is frequently mined and sold as an ornamental stone (BLM 2005e). Travertine deposits are not extensive in the MPA. They occur intermittently as old geyser deposits and vein-filling along faults in a 50- to 100-square-mile area near the Green River that extends south from the town of Green River, Utah). In the MPA, travertine of the geyserite variety is known to occur along faults where thermal springs precipitate calcium carbonate.

3.8.3.3.2 Past and Present Exploration, Development, and Production

There have been only a few small-scale attempts to produce travertine in the MPA. Since 1982, four authorizations have been issued for travertine exploration/production near the town of Green River (BLM 2005e), and since 1988, quarries in the MPA have yielded only approximately 160 tons of travertine (BLM 2005e). Deloy Shumway operates a small travertine quarry, named the Travertine #8 & 9, which has disturbed less than 5 acres in Section 25 of T22S, R16E. A second small travertine quarry, the Judy #1, is operated by Richard Bedier in Section 35 of T21S, R16E (Bon and Wakefield 2002a, 2002b).

3.8.3.3.3 Occurrence and Development Potential

Known travertine sites in this area are characterized as having high (H) occurrence potential with D certainty level. Elsewhere near the town of Green River, travertine faulting is given a moderate (M) occurrence potential with a C level of certainty. Though past production has been limited, the known sites of travertine are rated as H for development potential, and the remainder of the identified travertine area is rated as having M development potential. Development of travertine is considered likely over the next 15 years in the areas rated with high development potential (Map 3-11, Moab Planning Area Travertine Deposit-Development Potential).

3.8.3.4 Humate

3.8.3.4.1 Resource Overview

Humate is derived from plant debris associated with carbonaceous shales or coals that were deposited in a swampy, continental environment. Its most desirable feature is its humic acid content, which is used to enhance soil productivity (Jackson 1983). Other lesser uses of humate include neutralization of acid wastewater through the formation of insoluble humic acids and the removal of heavy metals by chelation or precipitation in insoluble humate.

3.8.3.4.2 Past and Present Exploration, Development, and Production

To-date, no commercial humate production has been conducted in the MPA. Limited mapping and surface-sampling have identified potentially minable humate deposits at two locations in the east-central portion of the MPA.

Jackson (1983) reports and Ellis and Hopeck (1985) confirm that one humate deposit occurs as a 20- to 30-foot-thick, 15-mile-long, carbonaceous and coaly shale zone in the middle to lower portions of the Cretaceous Dakota Sandstone southeast of Harley Dome, outcropping in some places. At least 1.12 million tons of humate-bearing material is present over a 250-acre tract at this location. Limited sampling has shown the humate to contain 45–50% total organics and 25% total humic acids. BLM records (2005g) indicate there have been two proposed operations involving this deposit since 1988, though no development activity has ever occurred.

Seal (2002) only generally describes the second humate deposit as being located approximately three miles southeast of Crescent Junction. No details on the amount and grade of humate are reported for this deposit, which occurs on land belonging to the Utah School and Institutional

Trust Lands Administration (SITLA). A notice posted by SITLA on February 12, 2003 states that a humic shale mining and processing operation was proposed on their lands in Section 14 of T22S, R19E.

3.8.3.4.3 Occurrence and Development Potential

Known humate resources in the MPA are rated as having a high (H) occurrence potential with D certainty. Elsewhere in the MPA, the Cretaceous Dakota Sandstone exposures are rated as having moderate (M) occurrence potential with C certainty. The known sites near Crescent Junction and Harley Dome are rated H for development potential, and most of the rest of the Cretaceous Dakota Sandstone outcrops are rated as M for development potential. Some interest in mining the Harley Dome deposit has been expressed and development in this area is considered likely over the next 15 years (Map 3-12, Moab Planning Area Humate Deposit-Development Potential).

3.8.3.5 Clay

3.8.3.5.1 Resource Overview

Clay deposits are widespread in the MPA but have been little used or tested. Bentonite and bentonitic clays are among the most desirable; they swell when saturated with water and can be used as a natural sealant for reservoirs, stock ponds, ditches, and landfills. According to Merrell (1979), bentonite clay occurs in the upper Chinle Formation, the Monitor Butte Member of the Chinle Formation, and the Brushy Basin Member of the Morrison Formation. In the MPA, in Lisbon Valley, clay samples from the Brushy Basin Member have a bentonite content exceeding 90% (Gloyn et al. 1995). The Morrison Formation has been the focus of most clay exploration and development in the MPA.

3.8.3.5.2 Past and Present Exploration, Development, and Production

Exploration and production of clay within the past 20 years has been as follows.

Within the MPA, the Grand County Water Conservancy District has periodically mined bentonitic clay from the Brushy Basin at the Spanish Valley Pit (Section 18 of T27S, R23E) in northernmost San Juan County (Gloyn et al 1995). Reported production includes 400 cubic yards of bentonitic clay in 1989 and 1,872 cubic yards of the same material in 1992. The host is presumed to be the Morrison Formation (Gloyn et al. 1995).

Since 1989, approximately 4,250 cubic yards of clay have also been reportedly produced in the MPA under two separate BLM authorizations (BLM 2005e). The source of these clays is also presumed to be the Morrison. New disturbance for these authorizations totaled 16,500 cubic yards (BLM 2005e).

3.8.3.5.3 Occurrence and Development Potential

Given the available information, known clay sites occurring in the Morrison Formation in the MPA have been classified as high (H) for occurrence potential with a D level of certainty, and have also been classified as H for development potential. Elsewhere in the MPA, the Morrison Formation has been classified as having moderate (M) potential and C certainty for the occurrence of bentonite in the MPA and has been classified as having M development potential. Development of clay is considered likely over the next 15 years in the areas rated as high development potential (Map 3-13, Moab Planning Area Clay Deposit- Development Potential).

3.9 Non-WSA Lands with Wilderness Characteristics

3.9.1 Resource Overview

Since wilderness study areas (WSAs) were established in the 1980s, designation and protection of wilderness in Utah has become a prominent national issue. For more than 20 years, the public has debated which lands have wilderness characteristics and should be considered by Congress for wilderness designation. As a result of the debate (and a significant passage of time since BLM's original inventories), in 1996 the Secretary of the Interior directed BLM to take another look at some of the lands in question. In response to the direction of the Secretary, BLM inventoried these lands and approximately 2.6 million acres of public land statewide (outside of existing WSAs) were found to have wilderness characteristics (1999 Utah Wilderness Inventory).

In September 2005, the BLM and the State of Utah, the Utah School and Institutional Trust Land Administration (SITLA), and the Utah Association of Counties (collectively "Utah") reached an agreement negotiated to settle a lawsuit originally brought in 1996 by Utah, challenging the BLM's authority to conduct new wilderness inventories. The settlement stipulated that the BLM's authority to designate new WSAs expired no later than October 21, 1993. The BLM, however, does have the authority to conduct inventories for characteristics associated with the concept of wilderness and to consider management of these values in its land-use planning process. The BLM's Land-use Planning Handbook (H-1601-1) states that decisions on whether or not to protect wilderness characteristics are to be considered during planning.

Non-WSA lands with wilderness characteristics are those that have the appearance of naturalness and outstanding opportunities for solitude or primitive and unconfined recreation. Non-WSA lands with wilderness characteristics are areas having 5,000 acres, or areas less than 5,000 acres that are contiguous to designated wilderness, WSAs, or other administratively endorsed for wilderness management lands; or, in accordance with the Wilderness Act's language, areas "of sufficient size as to make practicable its preservation and use in and unimpaired condition." BLM used the same criteria for determining wilderness characteristics as in the 1979 wilderness inventory. The 5,000-acre value was helpful to BLM in making preliminary judgments, but it was not considered a limiting factor. Please refer to Appendix P, "Identification of Wilderness Characteristics on Non-WSA Lands Managed by the Moab BLM" for more information.

Detailed information about non-WSA lands with wilderness characteristics is part of the administrative record for this RMP/EIS. The following records are available for public review at the Moab Field Office: 1)1999 Utah Wilderness Inventory; 2) 1999 Utah Wilderness Inventory Revision Document for the Moab Field Office; 3) 1999 Utah Wilderness Inventory Case Files for the Moab Field Office; 4) Reasonable Probability Determinations for the Moab Field Office; and 5) Documentation of Wilderness Characteristics Review for the Moab Field Office.

3.9.1.1 NON-WSA LANDS WITH WILDERNESS CHARACTERISTICS FROM THE *1999 UTAH WILDERNESS INVENTORY*

Non-WSA lands with wilderness characteristics include areas inventoried by BLM in the *1999 Utah Wilderness Inventory*. Based on subsequent public comments and after conducting additional field checks, the BLM revised the inventory in 2003. The revised inventory identified 22 wilderness inventory areas (WIAs) totaling 190,432 acres under MFO jurisdiction possessing wilderness characteristics. The revised inventory also identified portions of the WIAs totaling 108,733 acres that do not have wilderness characteristics. The inventory findings for lands administered by the MFO are summarized in Table 3.16 and depicted in Map 2-24-B. These lands are currently managed according to the existing Grand Resource Management Plan (RMP).

Table 3.16. Non-WSA Lands Inventoried in the *1999 Utah Wilderness Inventory* (revised 2003), Total Acreage and Acreage with and without Wilderness Characteristics

Name	Total Acreage	Acreage with Wilderness Characteristics (WC)	Acreage without Wilderness Characteristics (NWC)
Beaver Creek	33,357	25,722	7,635
*Behind the Rocks	7,961	3,381	4,580
*Coal Canyon	15,229	13,850	1,379
*Desolation Canyon	10,690	10,498	192
Fisher Towers	17,095	16,668	427
*Floy Canyon	12,228	9,983	2,245
*Flume Canyon	5,344	3,563	1,781
Goldbar	12,876	6,106	6,770
Gooseneck	5,540	1,040 [3]	4,500
Granite Creek	5,328	4,528	800
Harts Point (MFO)[1]	NA	1,568	NA
Hatch Wash	24,096	10,979	13,117
Hunter Canyon	4,492	4,462	30
Labyrinth Canyon	68,717	24,300	38,969
*Lost Spring Canyon	12,661	11,456	1,205
Mary Jane Canyon	25,158	24,748	410
*Mill Creek Canyon	6,684	3,394	3,290
*Negro Bill Canyon	13,724	2,324	11,400
Shafer Canyon	3,045	1,845	1,200

Table 3.16. Non-WSA Lands Inventoried in the *1999 Utah Wilderness Inventory* (revised 2003), Total Acreage and Acreage with and without Wilderness Characteristics

Name	Total Acreage	Acreage with Wilderness Characteristics (WC)	Acreage without Wilderness Characteristics (NWC)
*Spruce Canyon	2,213	1,131	1,082
*Westwater Canyon	2,073	1,193	770
Westwater Creek	9,100	8,701	399
Total	**299,939**	**190,440**	**108,733**

Areas marked with an asterisk [*] are contiguous with a WSA of the same name.

[1]The majority of the Harts Point unit is in the Monticello Field Office. Acreage with wilderness characteristics is within the MPA only.

3.9.1.2 Non-WSA Lands With Wilderness Characteristics from Wilderness Characteristics Review

In addition to the lands that were inventoried in the 1999 Utah Wilderness Inventory as described above, additional lands in the MPA have been reviewed for wilderness characteristics by BLM. These are lands currently proposed for wilderness as part of S.1170, America's Red Rock Wilderness Act of 2007, and are neither WSAs nor WIAs. (Note: The Act has been introduced in this year's Congress as S.1170.) Table 3.17 identifies the areas considered and summarizes the determinations made by the BLM regarding each non-WSA area's wilderness characteristics. The wilderness characteristics review process involved use of a BLM interdisciplinary team that reviewed available information and followed up with field trips where necessary. Refer to Appendix P - Identification of Wilderness Characteristics on Non-WSA Lands Managed by the Moab BLM for more information. Map 2-24B shows non-WSA lands with wilderness characteristics (WC) within the MPA, including findings made in the 1999 Utah Wilderness Inventory and findings made through the wilderness characteristics review process. The process used by the BLM to determine the non-WSA acreage with wilderness characteristics consisted of several steps. BLM used a combination of field visits, data layers including roads, vegetative treatments, (especially chaining), range improvements, and rights-of-way, aerial photography interpretation, and interdisciplinary review to reach a conclusion on those acreages that have wilderness characteristics. Setbacks from 3 to 91 meters were placed on all routes, depending upon the type of route.

3.9.2 Management Direction for Non-WSA Lands with Wilderness Characteristics

Non-WSA lands with wilderness characteristics are managed in accordance with existing land-use plans. Refer to the no action alternative discussion in Chapter 2 for how non-WSA lands with wilderness characteristics are currently managed.

Table 3.17. Non-WSA Lands with and without Wilderness Characteristics (WC and NWC, Respectively) from Wilderness Characteristics Review

Name	Total Acres[1]	Acres with WC	Acres with NWC	Comments[2]
Arches Adjacent	11,410	6,396	5,014	Adjacent to Arches NP/AE.
Beaver Creek	9294	0	9294	Adjacent to Beaver Creek WIA/WC.
Behind the Rocks	286	262	26	Adjacent to Behind the Rocks WIA/WC or WSA.
Big Triangle	20,542	5,200	15,342	
Coyote Wash	28,069	0	28,069	
Dead Horse Cliffs	2,346	796	1,550	Adjacent to WIA/WC or Canyonlands NP/AE.
Diamond Canyon*	15,467	7,759	7,708	Adjacent to WIA/WC or WSA.
Dome Plateau	25,818	14,206	11,612	
Duma Point	14,698	0	14,368	
Fisher Towers	1,740	556	1,184	Adjacent to WIA/WC.
Goldbar Canyon	435	329	106	Adjacent to WIA/WC.
Gooseneck	53	38	15	Adjacent to WIA/WC.
Hatch/Lockhart	46,729	2,679	44,050	Adjacent to WC in Monticello FO.
Hells Hole	2,540	2,538	2	Adjacent to WC in Vernal FO.
Hideout Canyon	12,269	11,607	662	
Horsethief Point	14,172	8,358	5,814	Adjacent to WIA/WC or Canyonlands NP/AE.
Labyrinth Canyon	21,189	550	20,639	
Mary Jane Canyon	86	31	55	Adjacent to WIA/WC.
Mexico Point	12,837	12,837	0	
Mill Creek Canyon	1,028	0	1,028	
Morning Glory**	96	6	87	Adjacent to WIA/WC or WSA.
Porcupine Rim**	67	3	64	Adjacent to WIA/WC or WSA.
Renegade Point	6,635	0	6,635	
Survey Point	10	0	10	Majority of unit in Vernal FO.
Westwater Canyon	4,509	758	3,751	

Table 3.17. Non-WSA Lands with and without Wilderness Characteristics (WC and NWC, Respectively) from Wilderness Characteristics Review

Name	Total Acres[1]	Acres with WC	Acres with NWC	Comments[2]
Yellow Bird	2,212	358	1,854	Adjacent to WIA/WC or Arches NP/AE.
Total	**254,017**	**75,279**	**178,561**	

[1] Public lands managed by MFO. Excludes acreage encompassed by state lands, Wilderness Study Areas, and lands inventoried by BLM in 1999 (both with and without wilderness characteristics).

[2] FO = Field Office

* Joined with Non-WSA Lands with WC in Coal Canyon for purposes of analysis.

** Joined with Non-WSA Lands with WC in Negro Bill Canyon for purposes of analysis.

3.10 PALEONTOLOGICAL RESOURCES

3.10.1 RESOURCE OVERVIEW

Paleontology is a biological and geological scientific discipline involving the study of fossil materials. Paleontological resources, or fossils, include the body remains, traces, or imprints of plants or animals that have been preserved in the earth's crust since some past geologic time. Among paleontologists, fossils are generally considered to be 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 the science. The BLM considers all vertebrate fossils to be scientifically significant. Invertebrate and plant fossils may be determined to be significant on a case-by-case basis. Petrified wood is treated as a mineral material and may be collected or purchased under the Material Sales Act of 1947 (as amended) but cannot be obtained under the General Mining Law of 1872.

The types of fossils preserved in a sedimentary rock sequence depend on the geologic age of the rocks in which they occur and the environment in which the sediments that comprise the rocks accumulated. The types of rocks that crop out (are exposed) at the surface of an area and can potentially yield fossils is the result of geologic (depositional, structural, and erosional) history.

Geologic formations and sediments exposed at the surface of the MPA, range from Precambrian to Recent in age (See Map 3-14, Generalized Geology of the Planning Area). Fossil-bearing sedimentary rocks range in age from Pennsylvanian to Quaternary in age and include parts of the three great periods of earth history during the Phanerozoic (*phaneros,* meaning visible, *zoic,* meaning life), the Paleozoic, Mesozoic, and Cenozoic. Fossils preserved in these deposits include invertebrate, vertebrate, and plant fossils. Vertebrate fossils include the body remains of fish, amphibians, reptiles (including dinosaurs), mammals, and birds, as well as their tracks and traces. These fossils occur in rocks of Pennsylvanian, Permian, Triassic, Jurassic, Cretaceous, Tertiary, and Quaternary age and include specimens unique to this area.

A search of the Utah Geological Survey (UGS) fossil database in Salt Lake City revealed a total of 246 fossil localities in the MPA (Hayden 2003). Of the 246 fossil localities identified: 22 are vertebrate localities; 24 are invertebrate localities; 23 are plant localities; and 8 are known to be

trace fossil localities. Details are lacking about the fossils identified for the other 177 known localities. Information from this database, supplemented by publications and personal experience, document that vertebrate fossils (which the BLM considers of scientific significance) are known from at least 20 geologic units that crop out in the planning area.

Additionally, a portion of the Dinosaur Diamond Prehistoric National Byway runs through the planning area. The Dinosaur Diamond Prehistoric Byway is a 512-mile driving route through Colorado and Utah that has educational kiosks and displays of dinosaur tracks and remains. Some sites have reconstructed skeletons and fleshed out recreations of dinosaurs. The portion in the planning area runs south from I-70 on Highway 191 to Moab and returns to I-70 via Highway 128.

The BLM favors the development of museum exhibits and informational kiosks or similar developments at roadside turnouts over the interpretation of areas where fossils remain in the ground. These projects provide opportunities for learning and enjoyment. There may be substantial risk of damage or unauthorized collecting of fossils by the public in interpretive areas that are not staffed.

3.10.2 Current Management Practices

The BLM has identified four objectives for the management of fossil resources on lands it administers. They are: 1) locating, evaluating, managing, and protecting fossil resources; 2) facilitating appropriate scientific, educational and recreational uses of fossils; 3) ensuring that proposed land uses do not inadvertently damage or destroy important fossil resources; and 4) fostering public awareness of the Nation's rich paleontological heritage (BLM 1998b:01). Uniform procedural guidance for management of paleontological resources on BLM lands is provided by *Paleontological Resources Handbook 8270-I*.

Collection of fossils from BLM lands in the MPA is allowed with some restrictions, depending on the significance of the fossils. Under existing regulations, hobby collection of common invertebrate or plant fossils by the public is allowed in reasonable quantities using hand tools. The public is also allowed to collect petrified wood without a permit for personal noncommercial purposes. People can collect up to 25 pounds plus one piece per person per day, with a maximum of 250 pounds in one calendar year. Current regulations do not allow any commercial collecting of paleontological resources.

Collection of significant fossils, which includes all vertebrate and any so designated plant or invertebrate fossils can only be done by obtaining a permit that is issued to qualified researchers. Vertebrate fossils are the remains or traces of fish, turtles, dinosaurs, mammals, reptiles, and birds, and include material such as fossil bones, teeth, tracks, coprolites, and burrows. Significant plant and invertebrate fossils are determined on a case-by-case basis and must be identified in decision documents.

Two types of paleontological use permits are issued. The basic permit is a survey and limited collection permit, issued for reconnaissance work and collection of surface finds, with a one square meter limit on surface disturbance. If disturbance during the paleontological work will

exceed one square meter, or will require mechanized equipment, the researcher must apply for an excavation permit. Prior to authorization of an excavation permit, BLM must prepare an environmental assessment of the proposed location. All fossils collected under a permit remain public property, must be placed in an approved repository, and can never be sold. Annual reports of findings including locality and specimen information are required to be submitted to the BLM. Researchers may have multiple active permits.

3.10.3 Resource Demand and Analysis

Recreational fossil collecting of common invertebrates, plants and petrified wood is appropriate on most lands administered by the BLM, except in developed recreation areas and other special management areas, such as Special Recreation Management Areas (SRMAs) or where otherwise posted. Recreational collecting of vertebrate fossils, as well as noteworthy fossil invertebrates and plants is prohibited on all BLM administered lands.

Professional paleontologists conducting research or assessment and mitigation are regulated through the permit process. The BLM issues about a half-dozen permits a year specifically for the MPA (L. Bryant, personal communication 2003). There are also about 12 statewide research permits allowing surface collecting/reconnaissance that include the planning area. The BLM also issues about 8 consulting permits annually in Utah and all of these are statewide and thus include the planning area.

Amateur fossil collectors and hobbyists may collect reasonable amounts of common invertebrate and plant fossils on public lands. The number of people involved in this activity is unknown. The MFO deals with about 10 inquiries a year regarding fossil collection. Further interest in fossil collection is demonstrated by the existence of a local rock-hounding club known as Points and Pebbles. In addition, hikers, mountain bikers, and other outdoor enthusiasts sometimes accidentally discover fossil remains. Some of these discoveries are passed on to the appropriate agencies, but some are not. Certainly many important paleontological discoveries have been and will continue to be made by amateur or accidental paleontologists, but the number of such discoveries is also unknown.

3.10.4 Issues and Concerns

Fossil theft and vandalism occur with some regularity throughout the MPA. Increased access results in increased theft and vandalism. Only a small number of these occurrences are ever prosecuted. Escalating commercial values of fossils also mean that fossils on Federal lands are increasingly subject to theft and vandalism. These crimes reduce scientific and public access to scientifically significant and instructive fossils and destroy the contextual information critical for interpreting the fossils. Within the planning area, illegal casting of dinosaur tracks is particularly a problem.

3.10.5 Resource Capability and Condition

Occurrences of paleontological resources are closely related to the geologic units that contain them. The potential for finding important paleontological resources can therefore be broadly

predicted by the presence of the pertinent geologic units at or near the surface. Therefore, geologic mapping can be used as a proxy for assessing the potential for the occurrence of important paleontological resources. The Potential Fossil Yield Classification (PFYC) system was originally developed by the U.S. Forest Service's Paleontology Center of Excellence and the Region 2 (USFS) Paleo Initiative (1996). It is in the process of being formally adopted by the BLM to promote consistency between agencies and throughout the BLM. The PFYC is appropriate for land-use planning efforts and for the preliminary assessment of potential impacts and mitigation needs for specific projects.

Under the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is best applied at the geologic formation or member level. It is not intended to be an assessment of whether important fossils are known to occur occasionally in these units (i.e. a few important fossils or localities widely scattered throughout a formation does not necessarily indicate a higher class), nor is it intended to be applied to specific sites or areas. The classification system is intended to provide baseline guidance to assessing and mitigating impacts to paleontological resources. In many situations, the classification should be an intermediate step in the analysis, and should be used to assess additional mitigation needs. PFYC classes are defined in detail below:

Class 1: Geologic units that are unlikely to contain recognizable fossil remains. This includes units that are igneous or metamorphic in origin (but excludes tuffs), as well as units that are Precambrian in age or older. Management concern for paleontological resources in *Class 1* units is negligible or not applicable. No assessment or mitigation is needed except in very rare circumstances. The occurrence of significant fossils in *Class 1* units is non-existent or extremely rare.

Class 2: Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. This includes units in which vertebrate or significant nonvertebrate fossils are unknown or very rare, units that are younger than 10,000 years before present, units that are aeolian in origin, and units which exhibit significant diagenetic alteration (physical changes in rock which occur over time such as compaction, cementation, mineral replacement). The potential for impacting vertebrate fossils or uncommon invertebrate or plant fossils is low. Management concern for paleontological resources is low, and management actions are not likely to be needed. Localities containing important resources may exist, but would be rare and would not influence the classification.

Class 3: Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential. These units are often marine in origin with sporadic known occurrences of vertebrate fossils. Vertebrate fossils and uncommon nonvertebrate fossils are known to occur inconsistently, and predictability is known to be low. *Class* 3 includes units that are poorly studied and/or poorly documented, so that the potential yield cannot be assigned without ground reconnaissance. Management concern for paleontological resources in these units is moderate, or cannot be determined from existing

data. Surface-disturbing activities may require field assessment to determine a further course of action.

The *Class 3* category includes a broad range of potential impacts. Geologic units of unknown potential, as well as units of moderate or infrequent fossil occurrence are included. Assessment and mitigation efforts also include a broad range of options. Surface-disturbing activities will require sufficient assessment to determine whether significant fossil resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4: These are *Class 5* geologic units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation. They include bedrock units with extensive soil or vegetative cover, bedrock exposures that are limited or not expected to be impacted, units with areas of exposed outcrop that are smaller than two contiguous acres, units in which outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic effects, and units where other characteristics are present that lower the vulnerability of both known and unidentified fossil localities.

The potential for impacting significant fossils is moderate to high, and is dependent on the proposed action. The bedrock unit is *Class 5*, but a protective layer of soil, thin alluvial material, or other mitigating circumstances may lessen or prevent potential impacts to the bedrock resulting from the activity. Mitigation efforts must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils are anticipated, on-the-ground surveys prior to authorizing the surface-disturbing action will usually be necessary. On-site monitoring may also be necessary during construction activities. Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered. *Class 4* and *Class 5* units are often combined as *Class 5* for general application, such as planning efforts or preliminary assessments, as *Class 4* is determined from local mitigating conditions and the impacts of the planned action.

Class 5: Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils or uncommon invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation. These include units in which vertebrate fossils or uncommon invertebrate or plant fossils are known and documented to occur consistently, predictably, or abundantly. *Class 5* pertains to highly sensitive units that are well exposed with little or no soil or vegetative cover, units in which outcrop areas are extensive, and exposed bedrock areas that are larger than two contiguous acres.

Management concern for paleontological resources in *Class 5* units/areas is high, because the potential for impacting significant fossils is high. Vertebrate fossils or uncommon nonvertebrate fossils are known from the impacted area, or can reasonably be expected to occur in the impacted area. Assessment by a qualified paleontologist is required in advance of surface-disturbing activities or land tenure adjustments, and mitigation will often be necessary before and/or during surface-disturbing actions. Field surveys prior to authorizing any surface-disturbing activities

will usually be necessary. On-site monitoring may also be necessary during construction activities. Designation of areas of special interest and concern may be appropriate.

3.11 RECREATION

3.11.1 RESOURCE OVERVIEW

The MPA is an internationally recognized recreation destination. The proximity of two national parks (Arches and Canyonlands), the extraordinarily scenic and diverse landscape, the accessibility of two major river systems (the Colorado and Green Rivers), the presence of interesting cultural and paleontological resources, and the opportunities for a wide range of recreational activities have made the MPA very popular for those seeking outdoor experiences. Recreational opportunities range from casual sightseeing and hiking to more intense activities such as mountain biking, rock climbing, and river running. In general, the planning area experiences a high number of seasonal visitors and an intense demand for recreational activities. Busy seasons include both spring and fall, with spring bringing the most visitors to the area. The estimated annual visitation to the MPA is at least 1.6 million visitors. Visitation occurs throughout the year, with the spring season beginning in February and lasting through May, and the fall season running from September through November. Spring and fall visitors engage in the full range of recreation activities, including scenic driving, camping, hiking, jeeping, mountain biking, canoeing and rafting, rock climbing, off-highway vehicle (OHV) and dirt bike riding, and horseback riding. (Note: The BLM defines off-road vehicles (also known as off-highway vehicles, or OHVs) to include all-terrain vehicles (ATVs), off-highway motorcycles, and snowmobiles.) Summer visitation is mainly associated with touring the nearby National Parks (Arches and Canyonlands) and with river-related activities. However, the summer season also brings large numbers of visitors, who engage in sightseeing activities such as driving through the public lands and viewing the landscape from scenic overlooks, and some hiking and biking.

The current RMP (approved in 1985) did not anticipate the subsequent rapid growth in and demand for recreational opportunities and activities. Since the approval of the current RMP, there have been increases in the demand for recreational opportunities and in the growth of the recreation industry within the planning area. As a result, demand-driven recreation management and planning in the years following the approval of the current RMP has been completed in a piecemeal fashion, and there has been an attempt to document and accommodate the rapid rise in and high demand for recreational opportunities. A fundamental concept in the management of BLM recreation resources is the designation of Special Recreation Management Areas (SRMAs) and an Extensive Recreation Management Area (ERMA). These areas within the MPA are discussed below.

An outcome of the rapid growth in recreation opportunities and activities in the MPA has also created the need for the development of specific Recreation Area Management Plans (RAMPs) to assist in recreation management within areas that are experiencing intense recreational activity. Five RAMPs (Colorado Riverway, Mill Creek, Sand Flats, Cameo Cliffs and Canyon Rims) have been completed to-date. Three of these plans (the Colorado Riverway, Mill Creek and Sand Flats Plans) have been accompanied by Federal Register Notices that instituted rules and regulations associated with some or all of these plans. These regulations are temporary,

subject to completion and approval of the proposed RMP. The Cameo Cliffs and Canyon Rims RAMPs were Plan Amendments to the Grand RMP. These plan amendments limited travel to designated and/or existing roads and created SRMAs for the planning areas.

3.11.1.1 Special Recreation Management Areas (SRMAs)

Special Recreation Management Areas (SRMAs) are those areas where a commitment has been made to provide specific recreational activities and recreational opportunities, and where public recreation issues or management concerns occur. Special or more intensive types of management are typically needed in these areas. Detailed recreation planning is required in SRMAs and a large managerial investment is usually needed. Also, SRMAs usually require stricter rules and guidelines to manage the intensive recreational use within the area. Areas hosting large numbers of visitors are usually those that are designated as SRMAs. However, in the MPA, at present, the SRMAs are not the areas that receive the greatest visitation.

Three areas have been formally established as SRMAs within the MPA: Canyon Rims Recreation Area, Cameo Cliffs Recreation Area and the Colorado River Recreation Area.

3.11.1.1.1 Canyon Rims SRMA

Canyon Rims was established on 100,273 acres south of Moab. Two campgrounds and four overlooks are within the SRMA, as well as the Trough Springs Hiking trailhead. Major activities include hiking, backpacking, and sightseeing. The primary roads within Canyon Rims, which were constructed by the BLM and include several scenic turnouts, are Utah Scenic Backways. The Canyon Rims Recreation Area is managed under the Canyon Rims Recreation Area Management Plan (RAMP), completed in 2003. An amendment to the 1985 RMP accompanied this RAMP.

The overall objective for the Canyon Rims Recreation Area RAMP (BLM 2003b) is to protect, manage and improve the natural and visual resources of the area while allowing for responsible recreation. The goal is to manage the Canyon Rims Recreation Area for recreation activities such as camping, vehicle touring on the primary road system, touring the secondary road system by motorized vehicle and mountain bike, and hiking and backpacking within the canyons. Interpretive and educational opportunities will be used to fulfill the potential of the Canyon Rims Recreation Area. Recreation management will give special consideration to protecting the visual resources of Canyon Rims.

3.11.1.1.2 Cameo Cliffs SRMA

The Cameo Cliffs SRMA consists of 15,597 acres east of U.S. Highway 191, south of the town of LaSal and north of the Lisbon Valley Industrial Area. Off-highway vehicle riding, horseback riding and some limited hiking and mountain biking are the primary recreational activities. A Plan Amendment to the Grand RMP (1985a) established the SRMA and designated the roads within it. The purpose of the Cameo Cliffs planning effort is to provide opportunities for motorized recreation, primarily ATV riding.

3.11.1.1.3 COLORADO RIVER SRMA

This SRMA extends along the Colorado River from the Colorado State Line to Castle Creek (near the Castle Valley turnoff on Utah Highway 128), and along the Dolores River from the Colorado State line to its confluence with the Colorado River. The SRMA includes Westwater Canyon of the Colorado River, and includes the extensive facilities surrounding the Westwater Ranger Station. It also includes the upper portion the area bordering the River along Utah Highway 128 (from Dewey Bridge to Castle Creek). The size of this SRMA is 24,124 acres. Major activities include boating and camping. Note that this area is not the same as the Colorado Riverway, discussed below as an ERMA.

3.11.1.2 GRAND EXTENSIVE RECREATION MANAGEMENT AREA (ERMA)

The ERMAs are areas where dispersed recreation is encouraged and where visitors have recreational freedom-of-choice with minimal regulatory constraint. They are usually areas that receive very little recreation use. These areas could include developed and primitive recreation sites with minimal facilities. Public recreation issues or management concerns are limited, and minimal management suffices in these areas. Detailed planning is not usually required for these areas; however, in the MPA, the areas with the greatest numbers of visitors and those that are in the greatest need of special management are currently within the Grand ERMA. All areas within the MPA that are not part of a SRMA are included within the Grand ERMA. Popular recreation sites within the ERMA are briefly described below.

3.11.1.2.1 THE COLORADO RIVERWAY

The Colorado Riverway includes the public lands managed by the BLM in the following areas:

- Along the Colorado River and Utah Highway 128 from Dewey Bridge to U.S. 191, including Negro Bill Canyon Trailhead, Onion Creek, Castleton Tower (Castle Rock) and Fisher Towers. Utah Highway 128 is a State Scenic Byway, and is also a portion of the Prehistoric Highway National Scenic Byway.
- Along the Colorado River and Utah Highway 279 from Moab Valley to Canyonlands National Park, including Wall Street, Poison Spider Trailhead and Shafer Basin. Utah Highway 279 is a State Scenic Byway
- Along Kane Creek Road from Moab Valley to the block of state land south of Hunter Canyon, including Amasa Back.

A very small portion of this area (Dewey Bridge to Castle Creek) is within the Colorado River SRMA, with the great majority of the Riverway lying within the Grand ERMA. The Riverway is the most popular destination of MPA visitors, with recent visitation estimated at approximately 1.04 million people. Visitors engage in camping, hiking, four-wheel driving, scenic auto touring, mountain biking, bouldering, BASE (Building, Antennae, Span, Earth) jumping, rock art viewing, dinosaur track viewing, rock climbing, and rafting and boating within the Colorado Riverway.

Based on observation and casual interviews, users of the Colorado Riverway can be divided into several categories:

- Day and overnight campers using sites along the Riverway to mountain bike, drive and ride OHVs, hike or participate in a special event;
- Campers displaced from Arches National Park's campground;
- Campers using sites because they provide a relatively inexpensive place to camp;
- Motorists taking scenic drives along routes described on the Moab Auto Tour brochure or taking an alternate route to Grand Junction; and
- Rafting and paddling groups, fishermen, climbers, mountain bikers, hikers, OHV users, BASE jumpers, and other day users.

Recreation management within the Riverway includes providing information at recreation sites, managing developed recreation sites, protecting visual quality and health and human safety by limiting the areas where visitors can camp and drive, and managing commercial uses in accordance with the Riverway Plan (BLM 1992a, 2001a).

While many of the resource use problems within the Colorado Riverway have been addressed and corrected since 1992 by the actions taken through the Colorado Riverway RAMP, there are still some remaining problem areas. Cross-country OHV travel and camping restrictions are addressed only through a Federal Register Notice (July 1992), which is in effect only until the completion and approval of the proposed RMP. Some undeveloped camping areas still remain, which are causing resource use problems.

3.11.1.2.2 Sand Flats Recreation Area

Sand Flats, part of the Grand ERMA, is located between the Negro Bill Canyon and Mill Creek Wilderness Study Areas (WSAs). Sand Flats Recreation Area encompasses 7,240 acres, and is managed as a self-funding site in partnership between Grand County and the MFO. Major activities include camping and mountain biking, especially on the Slickrock Trail, which was designated as a National Recreation Trail. The Recreation Area provides access to popular mountain bike and OHV trails, including the Slickrock Trail, Porcupine Rim Bike and Jeep Trail, Fins and Things Jeep Trail, and Hell's Revenge Jeep Trail. A RAMP was completed in 1994 (see below) for the Sand Flats Recreation Area, and the area is managed according to this Plan. In addition, there is a Cooperative Management Agreement between Grand County and the BLM, MFO to provide guidance in administering the area. Camping restrictions and off-road vehicle designations are addressed only through a Federal Register Notice (July 1992), which is in effect until the proposed RMP is approved.

The Sand Flats Management Plan identifies the following management objectives:

- To provide for a recreational "mix" of opportunities necessary to meet a variety of visitor expectations, while maintaining the relative natural characteristics of the area;
- To maintain wilderness values in adjacent Wilderness Study Areas;
- To prevent degradation of the natural values in the planning area and provide for restoration of areas where vegetation and soils have been damaged by recreational use; and
- To provide for public health and safety.

3.11.1.2.3 EAST OF HIGHWAY 191

The area south of I-70 and east of U.S. Highway 191 borders Arches National Park. This area of public land includes the Klondike Bluffs Trail, the Copper Ridge Sauropod Trackway and the Bar M Loop Bike Trail. Cross-country OHV travel is prohibited in most of this area through a Federal Register notice. In the portion of this eastern area that is south of Utah Highway 313, camping is limited to designated sites. This camping restriction is in effect until the completion of the proposed RMP.

3.11.1.2.4 WEST OF HIGHWAY 191

This area includes scenic driving and several motorized and non-motorized trailheads. U.S. Highway 191 from I-70 to its intersection with Utah Highway 128 is part of the National Prehistoric Highway National Scenic Byway. A substantial amount of unrestricted camping occurs in this area, especially around Bartlett Wash and Mill Canyon, and has led to sanitation problems and resource damage. Although off-road driving is prohibited by Federal Register notice, substantial cross-country OHV travel is occurring. This off-road damage includes hill climbs, alternate route choice, play areas around campsites and other forms of damage. The current vehicle designation ("Limited to Existing Roads and Trails") is in effect until the approval of the proposed RMP.

The area west of 191, south of I-70 and east of the Green River has seen explosive growth in recreation since the time of the 1985 RMP. Additionally, this recreation growth has included both motorized and non-motorized recreation, often vying for the same locations. Motorized recreation includes jeeping and OHV use; non-motorized recreation includes mountain biking, hiking, horseback riding, and BASE jumping. The area west of Highway 191 has seen the largest growth in recreation user conflict in the MPA.

3.11.1.2.5 UTAH HIGHWAY 313

Utah Highway 313 is also the Dead Horse Mesa Scenic Byway (a State Scenic Byway), providing access to Canyonlands National Park, access to Dead Horse Point State Park, access to Seven Mile Canyon and to two dispersed camping areas as well as to one BLM campground. The camping areas provide overflow and destination camping for the two parks. Utah Highway 313 also provides access to Labyrinth Canyon of the Green River, the rims and mesas above the Green River (Labyrinth Rims), upper Long Canyon and the upper portion of the Gemini Bridges Route. Camping and off-road vehicle restrictions have been implemented by Federal Register notice for this area, and are in effect until the completion of the proposed RMP. Resource damage is currently occurring in this area from both camping and OHV travel.

3.11.1.2.6 KOKOPELLI'S TRAIL

Kokopelli's Trail is a 140-mile multiple use trail connecting Loma, Colorado and Moab, Utah. Mountain bikers use this route heavily, although most portions are also suitable for OHVs and full-sized four-wheel drive vehicles. The route passes through lands administered by the MFO, the BLM Grand Junction Field Office, and the USDA Forest Service (Manti-LaSal National

Forest). Kokopelli's Trail was established for multi-day bike trips. Small, primitive campsites are located along the trail. Three of these campsites (Bitter Creek, Cowskin and Rock Castle) are managed and maintained by the MFO. Kokopelli's Trail is a Millennium Trail, designated in 2000 by the White House Millennium Council.

3.11.1.2.7 WHITE WASH SAND DUNES/TEN MILE CANYON

The only dune area in the MPA, White Wash Sand Dunes are located east of the Green River and south of I-70, about 25 miles from the city of Green River, Utah. White Wash is very popular with OHV users, especially on spring and fall weekends. Off-Highway Vehicle riders also visit other sites in this area, including Ten Mile Canyon, Crystal Geyser, Red Wash, Rainbow Rocks, and Duma Point. Currently, the area has no facilities other than an informational bulletin board.

Off Highway Vehicle use categories in this area are mixed. The current RMP has designated the northern part of the area as Limited to existing roads and trails. The southern portion of the area is limited to existing roads and trails through a Federal Register Notice (January 2001) and is in effect until the proposed RMP is approved. A middle portion of the area is Open to cross-country travel. Extensive resource damage is occurring from camping activities and especially from unrestricted vehicle travel. Resource damage from OHV use includes damage to soils, scenic quality, vegetation, cultural, and paleontological resource degradation as well as to damage to riparian resources.

3.11.1.2.8 KEN'S LAKE

Ken's Lake is a reservoir 10 miles south of Moab, within Spanish Valley. Jointly managed by the MFO and by the Spanish Valley Water Conservancy District, Ken's Lake has a 31-site campground, as well as a day use area and beach. Hiking, biking, fishing, non-motorized boating, OHV and horseback riding opportunities are within or adjacent to the recreation area. Vehicle and camping restrictions are the result of a Federal Register Notice (November 1996) that is in effect until the proposed RMP is approved.

3.11.1.2.9 KANE CREEK CROSSING

The area where the Hurrah Pass road crosses Kane Creek has become very popular for dispersed camping especially among OHV enthusiasts. Off-Highway Vehicle play at camp is the major threat to the scenic values of the area, as well as to water quality within Kane Creek. Both dispersed camping and OHV use have led to sanitation problems and resource deterioration due to these unrestricted recreational activities. Cross-country vehicle travel has been restricted by a Federal Register Notice (January 2001), but much of this type of activity still occurs. The OHV restrictions are in effect until the proposed RMP is approved. Camping is limited to designated sites through a Federal Register Notice (2005) and is in effect until the proposed RMP is approved.

3.11.1.2.10 MILL CREEK CANYON

Mill Creek Canyon is located directly east of Moab. This perennial stream is the "backyard" for those Grand County residents who live on the east side of Spanish Valley. An extraordinarily scenic canyon, it is popular for hiking, swimming, and viewing rock art. Some horseback riding also occurs in the canyon. Recreational use of Mill Creek Canyon is guided by a 2001 management plan (BLM 2001b). Management is made more difficult by the split ownership of the canyon: public lands are interspersed with School and Institutional Trust Lands Administration (SITLA) and private lands. A well-known off-road vehicle challenge hill, Potato Salad Hill, is located at the entrance to Mill Creek Canyon.

The Mill Creek Canyon RAMP was signed in February 2001. The RAMP affects the Mill Creek Planning Area, which includes all BLM lands along the south fork of Mill Creek Canyon from the town of Moab to the USFS boundary. The overall goal for the area is to protect, manage and improve natural and cultural resources through effective use of minimum tools.

3.11.1.2.11 GREEN RIVER CORRIDOR

The Green River is the western border of the MPA, and management of the Green River is shared with the Price Field Office. Three popular float sections are shared between the two BLM field offices. These three float trips are: Desolation Canyon, Gray Canyon (which constitutes the last day of the Desolation trip and is also the Green River "Daily"), and Labyrinth Canyon. Facilities along the Green River include a campground, toilets and a boat ramp along the Green River Daily, and a seasonal contact station and toilet at Mineral Bottom, the termination of the Labyrinth Float trip. The launch point for the Labyrinth Canyon trip is at Green River State Park; the riverbed of Labyrinth is state sovereign land, with most of the shoreline managed by the BLM. Both the BLM and Utah State Sovereign lands share management of the area via a formal agreement.

3.11.1.2.12 THE BOOK CLIFFS

The Book Cliffs are a large area in the northern portion of the MPA. Within this lightly used and relatively unknown area, which stretches from the Green River to the Colorado State line north of I-70, are five Wilderness Study Areas (WSAs). Recreation seekers use the Book Cliffs for big game hunting, scenic drives, horseback riding, wildlife viewing, backpacking and some limited vehicle camping. There are ample opportunities for solitude and primitive, dispersed recreation in the Book Cliffs. The Sego Canyon Rock Art site is located on the southern edge of the Book Cliffs.

3.11.1.2.13 UTAH RIMS

The Utah Rims area consists of 15,400-acres immediately west of the Colorado border and south of I-70. This area is primarily used for day use by western Colorado residents. Dirt biking is the primary recreational activity but the area is also popular with mountain bikers and horseback riders. Currently, resource damage is occurring as a result of OHV travel.

3.11.1.2.14 OTHER AREAS

In addition to the areas listed above, areas such as Entrada Bluffs and Kane Creek Canyon Rim receive substantial visitation. Some areas, such as Yellow Cat and Black Ridge receive moderate visitation. Other areas, such as the Dolores Triangle, East LaSal Creek, the Cisco Desert, and Beaver Creek are less visited, but can be very popular at certain times. As many areas within the MPA become more visited and more crowded, visitors are increasingly seeking out less traveled areas. Much of the former backcountry in the planning area is now receiving heavy to moderate recreational use; the majority of the areas have the potential for substantial recreational use.

3.11.1.2.15 CAMPGROUNDS

The MFO manages 22 developed fee area campgrounds, with 313 individual fee campsites and 11 group sites. In addition, the Sand Flats Recreation Area has a total of 120 campsites. Although located in the MPA, the Price Field Office manages the 10-site campground at Swasey's Boat Ramp on the Green River Daily.

3.11.1.2.16 VEHICULAR ROUTES

The MFO marks 277 miles of road. The MFO also maintains the main entrance roads in the Canyon Rims Recreation Area (the Needles Overlook and Anticline Overlook Roads, both of which are State Scenic Backways). Other routes, which are primarily used for vehicular recreation, are those that are marked by the MFO, often in conjunction with user groups.

Additionally, many other motorized routes within the MPA are used for recreational purposes. The most popular motorized routes include any of the 785 miles of the Jeep Safari Route system (this figure includes dirt roads within the planning area that are permitted for Jeep Safari use). This network of backcountry routes has been popularized in guidebooks and on maps as well as by club use. "Rockcrawling," an extreme type of jeep recreation, is currently popular in the Black Ridge area, though much of this route is on state and private lands.

There are no routes solely dedicated to OHV use. These activities take place on the same routes as used by four-wheel drive vehicles, and often occur on Jeep Safari routes. There is an informal, user-made network of motorcycle routes in the White Wash Dunes area.

3.11.1.2.17 POPULAR MOUNTAIN BIKE ROUTES

Mountain bike use occurs on many of the Jeep Safari routes as well as on other routes. Popular mountain bike routes include Gemini Bridges, Porcupine Rim, the Slickrock Bike Trail, Amasa Back, Flat Pass, Klondike Bluffs, Kokopelli's Trail, Poison Spider, Lower Monitor and Merrimac, Bartlett Wash, Moab Rim, Kane Creek Canyon Rim, Bar M, Hurrah Pass and Onion Creek.

A survey conducted by the Institute of Outdoor Recreation and Tourism (IORT 2002) discussed mountain bike use. Although this survey is not indicative of the entire mountain biking community, it does shed light on attitudes and perceptions of mountain bikers, particularly

tourists, visiting the area. Attitudes concerning issues and management were mixed. When asked about the physical impacts resulting from outdoor recreation in the Slickrock/Sand Flats area, 37% of respondents thought the impacts were moderately or extremely high, while the remainder thought they were low or at an acceptable level. Respondents felt that vehicle travel off designated routes and human waste and garbage disposal were more pressing management problems then resource impacts. Visitors felt that there should be more of a focus on resource protection than on the development of visitor services.

Most mountain bikers support the use of fees to help fund Slickrock Trail management, which possibly could be extrapolated to the rest of the mountain biking population as well. Respondents were willing to support modest fees for trail use (IORT 2002).

3.11.1.2.18 Popular Hiking Trails

The following trails are reserved for hiking use only: Hunter Canyon, Fisher Towers, Corona Arch, Amphitheater Loop, Copper Ridge Sauropod Trackway Interpretive Trail, Mill Canyon Dinosaur Trail, Negro Bill Canyon, the Ken's Lake hiking trail system, Trough Springs Trail and the Windwhistle Nature Trail. These routes are marked and maintained by the MFO. While the Hidden Valley Trail and the Portal Trail are marked and maintained as hiking trails, bicycle use is also allowed. Hikers also extensively use the Moab Rim Route. Hiking also occurs elsewhere in the MPA, particularly in canyon systems. Hiking is allowed anywhere within the planning area, and general areas that are popular for hiking include the Sand Flats area, the entire Mill Creek area, Richardson Amphitheater, Spring Canyon, Behind the Rocks, and the area above Potash Road (Goldhor-Wilcock). Hiking is a popular activity and there is a demand for additional non-motorized activities, such as marked hiking routes.

3.11.1.3 Recreational Activities

Recreational opportunities in the MPA are extensive. The following list of activities shown in Table 3.18 is categorized by use level.

Table 3.18. Activities in the MPA, by Use Level

High Use	Medium Use	Low Use
Driving for pleasure (sight-seeing) Mountain biking Hiking Jeeping Camping River activities (rafting and paddling) Nature study/cultural study	OHV riding (including ATV, dirt biking) Rock climbing (sport, traditional, bouldering, canyoneering) Special events Road cycling	BASE jumping Backpacking Hot air ballooning Hunting Fishing Swimming Canyoneering Rock crawling

Source: Personal communication between Katie Stevens, Russ von Koch, Brent Northrup, Alex Van Hemert, and Bill Stevens, BLM MFO, on May 5, 2003.

3.11.1.4 River Recreation Use

The MPA provides year-round rafting and boating experiences. All commercial use is under Special Recreation Permit (SRP) with limited permit availability outside of Labyrinth Canyon. Nine sections of the Colorado and Green Rivers are floated extensively. These sections are described below.

3.11.1.4.1 Westwater Canyon of the Colorado River

This is a whitewater segment, and is managed under a limited use permit system, with limitations on the numbers of people allowed to launch. Westwater Canyon is considered one of the finest whitewater float trips in the country. Westwater Canyon is entirely within the Colorado River SRMA. Extensive facilities are maintained at Westwater to help manage the area, including a full service ranger station, employee housing, a water system, boat ramps, parking lots and a campground. Private as well as commercial boaters benefit from this intensive management.

3.11.1.4.2 The Colorado River Daily (from Hittle Bottom to BLM Takeout along Utah Highway 128)

This section has several mild rapids. Private boaters are not required to obtain a permit, and there are no limitations on the numbers of boaters allowed. The Colorado River Daily is within the Grand ERMA below Castle Creek (shoreline only). The Colorado River upstream from Castle Creek (river as well as shoreline) is located within the Colorado River SRMA.

3.11.1.4.3 The Colorado River along Utah Highway 279

This 20-mile flatwater section is usually canoed. There are no permits or use limitations. It is within the Grand ERMA.

3.11.1.4.4 The Colorado River from the Colorado State Line to Westwater

The section of the Colorado River from Loma, Colorado to Westwater, Utah is called Ruby/Horsethief. This popular flatwater float trip is administered by the BLM, Grand Junction, Colorado Field Office, with four miles of the trip located within the MPA. As the takeout is at Westwater, heavy use along Ruby/Horsethief can lead to parking overflow problems at the Westwater Ranger Station.

3.11.1.4.5 Green River – Desolation Canyon (from Sand Wash to Nefertiti Rapid)

This 76-mile section of the Green River is called the Desolation Canyon float trip. There are fifty ripples and rapids in this section. Private permits are required for Desolation Canyon, and are issued by the BLM Price Field Office. The lower segments on the east side of Desolation Canyon are within the Grand ERMA.

3.11.1.4.6 The Green River Daily (from Nefertiti Rapid to Swasey's Beach, 10 Miles North of Green River, Utah)

This is the last 10 miles of the Desolation Canyon float trip. There are several mild rapids along this stretch. Permits are not required for this Daily portion. It is within the Grand ERMA.

3.11.1.4.7 Green River – Labyrinth Canyon (From the City of Green River to Mineral Bottom)

This 60-mile section of the Green River is one of the premier flatwater canoe and float trips within the U.S. Permits are required for Labyrinth Canyon, although the numbers of boaters are not limited. Labyrinth Canyon is within the Grand ERMA, and it is managed by agreement with Utah Sovereign Lands with assistance from Utah State Parks.

3.11.1.4.8 Colorado River – Cisco to Dewey Bridge and The Dolores River Confluence

The flatwater section of the Colorado River from Cisco to Dewey Bridge is growing in popularity. Both private and commercial users float this 20-mile section of the river. There is no private permitting process for this section of the river. In addition, the Dolores River from the Colorado/Utah state line to its confluence with the Colorado River is floated in the springtime by a limited number of people (free permits are required). Limited flows on the Dolores restrict its use for much of the year.

3.11.1.4.9 River Recreation Use and Demand

Visitor counts for boaters are based on permit data and observations and illustrate the current demand for river recreation on four river segments in the MPA (Table 3.19).

In general, satisfaction of river users is high, with the average satisfaction of approximately 95% on both the Green and Colorado Rivers (Reiter and Blahna 2001).

Table 3.19. River Recreation Use in the MPA

	Green River Labyrinth	Green River Daily	Colorado River Daily	Colorado River Westwater
Number of Boaters	8,000	11,000	59,000	14,000
Segment Length (Miles)	70	8	13	17
Rapid Classes	I	II-III	I-III	III-IV
Average Trip Length (Days)	5	1	1	2

Source: IORT 2001.

3.11.2 CURRENT MANAGEMENT PRACTICES

3.11.2.1 THE GRAND RESOURCE MANAGEMENT PLAN (RMP)

The current (Grand) RMP provides the framework for planning in the area. As mentioned above, the 1985 Grand RMP was completed prior to the rapid expansion of recreational use on public lands in the MPA. The RMP specifically addresses the Colorado and the Dolores Rivers, and the issuance of recreation permits as well as a few routes; however, most of the issues and locations that are now important to the BLM Recreation Program are not addressed. The guidance given in the 1985 RMP to the recreation program lacks the specificity needed to manage the current burgeoning use of recreation resources.

The 1985 RMP also made the following OHV decisions:

1. Designate 1,183,660 acres as open to OHV use;
2. Designate 596,234 acres limited to existing roads and trails;
3. Designate 24,454 acres as closed to OHV use;
4. Designate 15,206 acres as in Mill Creek and East Mill Creek as limited to designated roads and trails.

3.11.2.2 OFF-HIGHWAY VEHICLE (OHV) MANAGEMENT

Since the approval of the current RMP, there have been substantial changes in visitation in the MPA: the numbers of visitors have increased, and the numbers of visitors engaging in motorized recreation have also increased. These changes forced alterations in the OHV designations in order to protect visual, cultural, soil, and vegetation resources.

The current RMP outlined OHV designations; however subsequent Federal Register Notices have instituted rules that remain in place until the proposed RMP is approved. They are shown in Table 3.20 below. In addition, wilderness has been designated in Utah as part of the Colorado Canyons National Conservation Area Bill. The Black Ridge Wilderness Area is closed to OHV use.

Table 3.20. Comparison of 1985 RMP OHV Designations and Present OHV Designations

	Grand RMP (acres)	After Additional Restrictions and Designations (acres)
Open to cross country travel	1,183,660	725,370
Limited to Existing Roads and Trails	596,234	734,074
Limited to Designated Roads and Trails	15,206	48,169
Limited to Inventoried Roads	309,749	309,749
Closed to OHV Use	24,454	33,819

The management of OHV activities within the planning area includes monitoring and maintaining trails, maintaining and adding to a database of monitoring use, installing fencing to protect vegetation on certain trails, coordination with local officials and other agencies, WSA

monitoring, ongoing training on OHV related issues, and issuing citations and written warnings for OHV violations.

The Utah Division of State Parks and Recreation monitors OHV registration through the Department of Motor Vehicles. The following data show a dramatic increase in OHV ownership in the State of Utah (Table 3.21).

Table 3.21. Utah OHV Registrations*, 1998 Compared with 2002

	1998	2002	% Increase
Statewide	77,361	160,583	207%
Grand County	238	726	305%

*OHV registrations include ATVs, non-street legal motorbikes, snowmobiles, and dune buggies. Vehicles that are street legal, such as jeeps and trucks, are licensed, and are not considered OHVs for registration purposes.

It is important to note that the majority of OHV and dirt bike users in the MPA are residents of Colorado. In addition, users come from the Wasatch Front of Utah, other western states, and from all over the country to dirt bike and ride OHVs on public lands within the MPA. The planning area has been featured in national OHV publications (four-wheelers, dirt bike, and four-wheel driving), and has become nationally known as an OHV destination. OHV demand is highest within the following areas:

- Near Dead Horse Point State Park including Arth's Rim, Poison Spider Mesa, Gold Bar Rim, and Golden Spike;
- The area just east and south of Moab including Porcupine Rim, Hell's Revenge, Fins & Things, and Steel Bender;
- Near Kane Creek, including Cliff Hanger, Kane Creek Canyon Road, Moab Rim, Hurrah Pass, Pritchett Canyon, Behind the Rocks and Flat Iron Mesa; and
- Northwest of Arches National Park including Wipeout Hill, Seven Mile Rim, Hey Joe Canyon, Ten Mile, Secret Spire, 3D and Crystal Geyser (Reiter et al. 1998).

Demand for OHV activities is expected to continue to increase in the MPA. This will place demands on the MFO to provide for and monitor motorized users. This anticipated increase in demand also has implications for OHV designations and for route marking.

3.11.2.3 Special Recreation Permits (SRPs) for Special Events

Due to recent increases in recreational use in the MPA that exceed monitoring capability and available space, priority for authorization of new SRPs for land-based commercial and competitive events is given (where conflicts exist) to applicants proposing uses that:

- Do not duplicate existing uses;
- Take place outside the months of March, April, May and October;
- Use lands and facilities off public lands for overnight accommodation of guests;
- Display and communicate the Canyon Country Minimum Impact Practices; and

- Focus visitation on sites and areas capable of withstanding repeated use.

The great number of visitors to public lands during peak periods led to the promulgation of these rules in order to protect resources and to disperse visitation. Other factors are also considered including the public demand for the proposed use, the capability of the applicant to carry out the proposed use, projected government revenues, and past performance.

3.11.2.4 Special Area River Recreation Permits

In addition to commercial permit requirements, permits for private boaters are required for three river stretches within the MPA: Westwater Canyon of the Colorado River; the Dolores River from Gateway to the confluence with the Colorado River; and interagency river trip permits (joint jurisdiction of the BLM and Utah Division of Forestry, Fire and State Lands) for the Labyrinth section of the Green River (noncommercial trips between Green River State Park and the northern boundary of Canyonlands). All permittees are required to follow standard river use stipulations.

3.11.2.5 Demand for Facility Development

In the past 15 years, the MFO has constructed and maintained a variety of recreation infrastructure. However, the present level of facility development is still not sufficient to meet the needs of the recreating public, nor is it sufficient to protect resources from the recreating public. Areas within the Grand ERMA that are receiving heavy visitation and camping use will require facilities such as camping areas, toilets, information kiosks, marked routes and parking areas in the very near future. These areas include the Utah 313 corridor, the area northwest of Moab known as Labyrinth Rims/Gemini Bridges (including Ten Mile Canyon and White Wash Sand Dunes), the Bartlett Wash/Mill/Tusher Canyon areas, Klondike Bluffs, Bar M, areas south of Moab, Utah Rims, and Kane Creek Crossing area.

It is reasonable to expect that, in the next 15 years, recreation facilities construction will continue to be needed, although the pace of construction is expected to lessen. With visitation to BLM-administered public lands around Moab continuing to increase (and with the need for additional facilities already extant with the present visitation), facilities to provide for these visitors must keep pace in order to protect the land and to provide for human sanitation. Current use levels continue to produce degradation of resources, and additional facilities are needed to accommodate visitation and stabilize resource values. Examples of demand-driven development include: 1) providing camping facilities where dispersed camping activity exceeds capacity, or 2) providing marked OHV or bike routes when numbers and types of users change so that route marking can maintain public safety and protect resources. In addition, providing for vehicular users often requires building parking lots, trailheads and toilet facilities.

3.11.2.6 User Conflict and Displacement

As recreational use has increased throughout the MPA, recreationists have moved into areas historically used by other resource users, such as ranchers and the oil and gas industry. Sometimes, conflicts have developed among these user groups, as long-term users resent encroachment of recreationists on the public lands. In turn, some recreation users see their use of

the public land as the highest and best use, and feel that the established users have a lesser claim to that land.

There has also been a displacement of certain recreation groups from some areas due to conflicts with other recreation user groups. For instance, the growing popularity of Gemini Bridges for OHVs has led to fewer numbers of mountain bikers, as they have been displaced by the faster moving and louder modes of transportation.

Another source of tension is among various recreation user groups. When recreational use reaches a certain threshold, user groups start to resent the multi-use nature of public lands. For example, some hikers resent mountain bikers and motorized users on shared trails, while mountain bikers may seek some trails free from motorized use. The multi-use concept becomes strained when use levels reach a threshold. Specific areas in which BLM staff have had reports of user conflict and displacement include:

- Monitor and Merrimac Trail – conflicts between motorcycle users and mountain bikers
- Bartlett Wash – conflict between grazing and recreation uses and between motorized and non-motorized use
- Kokopelli's Trail – conflict between OHVs and mountain bikers
- Hurrah Pass/Kane Creek Crossing – conflict between OHVs and mountain bikers
- Slickrock Trail – conflict between dirt bikes and mountain bikers
- Gemini Bridges – conflict between OHVs and mountain bikers
- Moab Rim – conflict between OHVs, hikers, and mountain bikers
- Seven Mile Canyon –conflict between OHVs and horseback riders
- Poison Spider Trail – conflict between OHVs and mountain bikers

3.11.2.7 Resource Conflicts/Impacts

Various recreation activities impact other resources, such as riparian areas, cultural resources, vegetation, wildlife, soils, grazing, and oil and gas. Resource conflicts occur when two uses compete for the same resource, such as recreation and wildlife competing for land. Specific areas where resource conflict is occurring include:

- Moab Canyon – conflict between recreation users and vehicular traffic
- Gemini Bridges and Long Canyon Roads/Shafer Canyon – conflict between recreation and wildlife (bighorn sheep)
- Bartlett Wash – impact of camping and OHV use on riparian area; impacts to cultural resource sites
- White Wash area– impact of OHV use on visual quality, riparian resources, cultural resources, and oil and gas and ranching operations
- Crystal Geyser/White Wash area – impact of OHV use on visual quality, riparian resources, cultural resources, and oil and gas and ranching operations
- Wall Street – conflict between climbing activities and vehicular traffic

- Castle Rock – conflict between residents' wishes and current recreation use
- Tenmile Canyon – motorized use in stream conflicts with wildlife, cultural, and riparian resources
- Duma Point – motorized use conflicts with bighorn sheep escape habitat
- Kane Creek Crossing– impact of motorized vehicle use and camping on riparian area
- Tusher Canyon – motorized vehicle use in the stream is impacting the riparian area
- Seven Mile Canyon – conflict between motorized vehicle use and cultural resources
- Mill Creek Canyon – hiker and horse use conflicts with cultural resources
- Mill Canyon – motorized vehicle and mountain bike use conflicts with riparian resources, visual quality, cultural resources, and vegetation
- Upper Courthouse Wash – motorized vehicle traffic conflicts with visual quality, vegetation, riparian, and cultural resources
- Pritchett Canyon – conflicts between vehicle use and wilderness values in the Wilderness Study Area and visual quality
- Klondike Bluffs – motorized vehicle and mountain bike use conflict with paleontological resources
- Westwater Canyon – OHV use on the rims of Westwater Canyon conflicts with wilderness values of the Wilderness Study Area and with river visitors' experience along the Colorado River
- Along highway corridors – as OHV trails are created parallel to paved highways, conflict with the visual quality that drivers on the highways wish to experience

3.11.2.7.1 Off-Highway Vehicles (OHV)

The increase in the use of OHVs has created several issues for the MPA. First, the speed and increasing capability of OHVs allows easier access to remote parts of the MPA, making management of this activity more difficult, and increasing the potential range of impacts. Second, the popularity of this activity continues to grow, both in private use and in more special events taking place. Planning for areas in which OHVs can be used continues to receive national and local attention. Cross-country OHV use, both legal and illegal, is creating additional resource damage and is a real and important issue in the MPA. In addition, the issue of conflicting recreational use, primarily between OHV and other users, both recreational and resource users, continues to grow. The ability of OHV users to penetrate the backcountry where patrols are difficult may lead to secondary impacts to cultural resources from increased vandalism and theft.

3.11.2.7.2 Inadequate Facilities/Public Health and Safety

The availability of facilities is directly related to public health. Inadequate numbers of organized campgrounds and restroom facilities contribute to unhealthy levels of human waste in some areas, posing a health risk to visitors. At present, many of the problem areas (especially those close to the city of Moab) are on non-public (state and private) lands. While the BLM has

provided restroom facilities (90 in total), the number is still inadequate for the number of visitors to BLM lands. Funding for maintenance of existing and needed facilities is also a serious issue.

There is a need for more staff presence in the Colorado Riverway, given the level of visitation. Backcountry areas of the Riverway, such as Shafer Basin, areas of Onion Creek, and Castle Rock, are currently devoid of facilities; this may not be adequate for the numbers of visitors these areas are receiving.

A substantial amount of unrestricted camping occurs in the area north of U.S. Highway 191, especially around Bartlett Wash and Mill Canyon, near the Kane Creek Crossing on the way to Hurrah Pass, and in the White Wash/Ten Mile Area; this has led to sanitation problems and resource damage.

3.12 RIPARIAN

3.12.1 INTRODUCTION

Riparian and wetland areas are sensitive vegetative or physical ecosystems that develop in association with surface or subsurface water (Leonard et al. 1992). Riparian and wetland ecological systems comprise less than 1% of the 22 million acres of public lands administered by BLM in Utah, but are among the most important, productive, and diverse ecosystems on the landscape. Benefits from riparian/wetland ecosystems are essential to both human and wildlife values and include:

- Maintaining clean renewable water supplies;
- Supporting various life stages for diverse flora and fauna, including special status species and fisheries;
- Importance in cultural and historic values;
- Economic value derived from sustainable uses (open space, hunting, livestock grazing; commercial recreation);
- Greenbelt associated recreation and scenic values;
- Thermal/shade protection for both humans and wildlife, which is especially important within the arid Southwest;
- Flood attenuation.

Riparian/wetland habitats are fragile resources and are often among the first landscape features to reflect impacts from management activities. These habitats are used as indicators of overall land health and watershed condition. Healthy riparian systems filter and purify water, reduce sediment loads and enhance soil stability, reduce destructive energies associated with flood events, provide physical and thermal micro-climates in contrast to surrounding uplands, and contribute to groundwater recharge and base flow (BLM 1991b).

3.12.2 RESOURCE OVERVIEW

BLM administers 32,800 acres (1.8% of BLM-administered lands) of riparian and wetland resources on public lands within the MPA. The majority of these resources are riparian areas located along the Colorado River, Green River, Dolores River, and their associated tributary drainages including Mill Creek, Kane Creek, Onion Creek, Tenmile Wash and many others.

Riparian and wetland areas include, but are not limited to, areas adjacent to waterways (whether waters are surface, subsurface, or ephemeral), springs, potholes, wet meadows, sloughs, marshes, swamps, bogs, floodplains, lakes, and reservoirs. Riparian areas are recognized as "a form of wetland transition" between permanently saturated wetlands and upland areas (Leonard et al. 1992), and for BLM purposes, riparian and wetland areas are referred to synonymously unless specifically discerned. Riparian and wetland ecosystems are classified by type based on hydrologic, geomorphologic, and biological factors (Cowardin et al. 1979).

Within most riparian/wetland systems in the arid southwest, the potential of a riparian/wetland ecosystem is strongly dependent upon the availability of water. The amount, timing, duration and source of water availability, among other physical factors, is commonly referred to in terms of perennial (yearlong), interrupted (perennial flow discontinuous in space), intermittent (seasonal), or ephemeral (storm) water sources.

The BLM specifically manages and monitors riparian/wetland resources in terms of lotic and lentic ecosystems. Lotic riparian areas are those ecosystems associated with running waters, streams, springs or drainages, while lentic riparian areas are those associated with standing water ecosystems, such as marshes, swamps, lakes, springs, seeps, low velocity backwater areas or areas where permanent soil moisture is available. Ecological evaluations based on ecosystem attributes and processes differ between lotic and lentic systems, with current condition and activities in planning area reported annually to Congress. FY 2003 summaries regarding lotic and lentic systems indicate over 96% (31,700 acres) of riparian/wetland resources in the planning area are lotic riparian systems, with less than 4% (1,102 acres) in lentic wetland systems.

3.12.3 RIPARIAN/WETLAND STATUS

Regardless of the type of riparian or wetland ecosystem, Proper Functioning Condition (PFC) is assessed for each stream or varying segments (Table 3.22). Functioning condition is rated by category to reflect ecosystem health as affected by management practices. Definitions follow below (BLM 1998c):

Properly Functioning Condition (PFC): currently 18,584 acres (57%) of riparian/wetland areas are in PFC when adequate vegetation, landform, or woody debris is present to:

- Dissipate high-energy water flow;
- Filter sediment, capture bedload, and aid floodplain development;
- Improve floodwater retention and groundwater recharge;
- Develop root masses that stabilize streambanks;

- Develop diverse fluvial geomorphology (pool and channel complexes) to provide habitat for wildlife; and
- Support greater biodiversity.

Functioning at Risk (FAR): currently 11,192 acres (34%) of riparian-wetland areas are in functional condition, but at least one soil, water, or vegetation attribute makes them susceptible to degradation following high flow events.

Non-Functioning (NF): currently 2,973 acres (9%) of riparian-wetland areas that are clearly not providing adequate vegetation, landform, or large wood debris to dissipate stream energy associated with high flows, and thus are not reducing erosion, improving water quality, etc.

Table 3.22. 2003 Condition Status of Riparian Areas by Watershed within the MPA

Stream System	PFC (acres/%)	FAR (acres/%)	NF (acres/%)	Total Riparian (acres)
Colorado Headwaters– Plateau Colorado River, Cottonwood Canyon	178.34 100%	0	0	178.34
Upper Colorado-Dolores–Westwater Agate Wash, Bitter Creek, Cisco Wash, Coates Creek, Colorado River, Cotttonwood Canyon, Cottonwood Wash, Danish Wash, Diamond Ck, Dolores River, Dry Gulch, East Canyon, Hay Canyon, Jones Canyon, Little Dolores, Marble Canyon, Nash Wash, Pinto Wash Renegade Ck, Ryan Ck, Sagers Wash, Star Cyn, Sulphur Canyon, Westwater Creek	6,753.21 62%	1,502.91 14%	2,692.47 25%	10,948.59
Upper Colorado-Dolores –Upper Dolores East Coyote Wash, La Sal Creek	559.19 82%	122.89 18%	0	682.08
(Upper Colorado-Dolores – Lower Dolores) Beaver Ck, Colorado River, Dolores River, Fisher Ck, Granite Ck	1,247.36 53%	1,134.60 48%	0	2,381.96
Upper Colorado-Dolores – Kane Springs Castle Creek, Bartlett Wash, Buck, Bull Canyon, Colorado River, Courthouse Wash, Day Canyon, Dolores River, Dripping Spring, Dry Oak Spring, Fish Seep Wash, Gold Bar Canyon, Hatch Wash, Hunters Canyon, Ice Box, Jackass Canyon, Kane Springs Ck, Little Canyon, Little Valley, Lockhart, Mill Canyon, Mill Creek, Muleshoe, Negro Bill Canyon, Onion Creek, Pritchett Canyon, Professor Creek, Rill Creek, Sagers Wash, Salt Valley, Salt Wash, Sevenmile, Shafer Basin, Trough Springs, Trout Water, Tusher Wash, West Coyote Wash, Yellow Jacket	7,035.90 78%	1,923.16 21%	26.47 1%	8,985.53
Lower Green – Desolation Canyon Coal Creek, Green River, Rattlesnake	1,133.97 61%	677.63 37%	43.93 2%	1,855.53

Table 3.22. 2003 Condition Status of Riparian Areas by Watershed within the MPA

Stream System	PFC (acres/%)	FAR (acres/%)	NF (acres/%)	Total Riparian (acres)
Lower Green – Willow Moon Ridge, Willow Creek	30.51 100%	0	0	30.51
Lower Green – Lower Green Tenmile Wash, Browns Wash, Crescent Wash, Dubinky, Floy Creek, Green River, Hell Roaring, Little Grand Wash, Mineral Bottom, Rattlesnake, Red Wash, Salt Valley, Salt Wash, Spring Canyon, Thompson Wash, Tusher Canyon, White Wash	1,646.50 21%	5,831.29 76%	210.61 3%	7,688.40
Total	**18,584.98**	**11,192.48**	**2,973.48**	**32,750.94**

3.12.4 Invasive and/or Non-native Species

While functional ratings can indicate the health of an ecosystem and be used as management tools, they do not in themselves reflect the degree of ecosystem diversity relative to invasive, exotic or noxious plant species. This factor has severely altered the majority of native riparian and wetland ecosystems throughout the west (see Table 3.23 for a list of native and non-native plant species). Under this condition, a system can be severely altered and still function to a lesser degree than its desired or potential condition. Riparian areas are naturally dynamic zones driven by disturbance. Natural disturbance within riparian ecosystems associated with water amount, timing, duration and source supports the establishment of native vegetation but can also lead to encroachment by invasive and/or non-native plant communities if these seed sources are present.

Table 3.23. Common Riparian Plant Species Occurring in the MPA

Species Type	
Common Name	***Scientific Name***
Native Riparian Species	
Fremont cottonwood	*Populus fremontii*
Narrowleaf cottonwood	*Populus angustifolia*
Gooding willow (black willow)	*Salix goodingii*
Coyote willow	*Salix exigua*
Yellow willow	*Salix lutea*
Water birch	*Betula occidentalis*
Box elder	*Acer negundo*
Bulrushes	*Scirpus* spp.
Rushes	*Juncus* spp.
Spike-rushes	*Eleocharis* spp.
Cattail	*Typha* spp.

Table 3.23. Common Riparian Plant Species Occurring in the MPA

Species Type	
Common Name	***Scientific Name***
Invasive/Exotic Species	
Russian olive	*Elaeagnus angustifolia*
Tamarisk	*Tamarix* spp.
Chinese elm	*Ulmus parvifolia*
Ravenna grass	*Erianthus ravennae*
Clematis	*Clematis* spp.
Phragmites	*Phragmites* spp.
Noxious Species	
Russian knapweed	*Acroptilon repens*
Purple loosestrife	*Lythrum salicaria*
Spotted knapweed	*Centaurea maculosa*
Bermudagrass	*Cynodon dactylon*
Bindweed	*Convolvulus* spp.
Broad-leaved peppergrass (tall whitetop)	*Lepidium latifolium*
Canada thistle	*Cirsium arvense*
Diffuse knapweed	*Centaurea diffusa*
Perennial sorghum (including Johnson grass)	*Sorghum* spp.
Musk thistle	*Carduus nutans*
Quackgrass	*Elytrigia repens*
Scotch thistle	*Onopordium acanthium*
Squarrose knapweed	*Centaurea squarrosa*
Whitetop	*Cardaria* spp.

Exotic and noxious species (namely tamarisk, Russian olive, and Russian knapweed) are now common within most riparian/wetland ecosystems along major riverways in the planning area. Possibly the most devastating aspect of invasive exotic species is their contribution to making healthy riparian ecosystems unhealthy. The individual riparian functions or processes that exotic species can alter include:

- Exotics often dewater riparian sites since they have deeper tap roots to out-compete natives for availability of water in arid environments;
- Tamarisk secretes salt and increases soil and water salinity, resulting in reduced seed establishment of native species, and reduced downstream water quality. This has severe economic impacts;
- Exotics compete for sun and space in narrow available habitats;
- Exotics have large numbers of seeds and long seed establishment periods (very prolific in comparison to native species);

- Exotic communities typically reduce biodiversity (significant decreases in numbers and types of associated biotic species, including birds, bats, insects, amphibians, etc.); and
- Exotic or invasive communities (e.g., *Typha* spp. *and Phragmites australis*) because of root and stem densities can armor stream banks promoting entrenched systems with highly destructive flooding energies which remain undissipated within deep channels, resulting in high bank loss downstream, sedimentation, and salinization.

3.12.5 RIPARIAN/WETLAND IMPROVEMENT AND RESTORATION

3.12.5.1 IMPACTS TO RIPARIAN AREAS BY WATERSHED

Improvements and restoration efforts are conducted to ensure proper management of riparian/wetland ecosystems based on monitoring and on evaluations of individual resources, resource objectives or in response to activity plans (Table 3.24). Improvements are actions such as protective fencing or adjustments in management uses, while restoration refers to the repair of ecological functions of a riparian/wetland system.

Table 3.24. Watersheds and Issues Receiving Corrective Restoration Action

Watershed	Issues Receiving Corrective Action
Negro Bill Canyon	Exotics, trail realignment
Kane Springs Creek	Exotics, OHV route delineation
Ten-mile Wash (and tributaries)	OHV route delineation, camping control, exotics, livestock
Seven-mile Wash	OHV route delineation, exotics, livestock control
Hunters Canyon	Exotics, camping
Lost Spring	Exotics
Hay Canyon	Livestock control, exotics
Westwater Canyon	Livestock control
Cottonwood Creek	Fire, stream restoration
Diamond Creek	Fire, stream restoration
Onion Creek	OHV route delineation, stream restoration
Bartlett Wash	OHV route delineation, camping control, road maintenance
Moonflower Canyon	Trail erosion
Granite Canyon	Fish habitat improvement
Dolores River	Exotics/weeds, livestock control
Mill Creek Canyon	Trail realignment, exotics, road control, stream restoration

3.12.5.2 CURRENT RIPARIAN/WETLAND CONDITION STATUS

The 2003 status of riparian/wetland ecosystems in the planning area reflect that approximately 57% of lotic riparian systems are in PFC, while only 30% of lentic wetlands are in PFC. These findings followed a 2002 catastrophic wildfire within Cottonwood and Diamond Creeks which degraded 35% (450 acres) of the total wetlands within the MFO planning area (refer to riparian/wetland status at the beginning of this chapter).

Changes in riparian/wetland functioning condition generally occur dramatically rather than gradually, and often in response to cumulative impacts that cause failure following high flood events when functioning processes are most critical to dissipate destructive flows. However, in assessing the 1990 priority of riparian/wetlands in the planning area, very few changes in management priority are reflected, indicating that similar issues or conditions have been maintained over the last few years. Some notable differences in riparian/wetland condition and priorities have occurred in areas with popular OHV use (and associated dispersed camping), reoccurring livestock grazing, and increased use of county access roads.

Riparian/wetland ecosystems prioritized for restoration (1- high to 4- low) within MFO are listed in Table 3.25. Recent revisions of riparian/wetland priorities are based on the protection of important riparian/wetland resources or the need for additional management in response to impacts resulting in Functioning-At-Risk conditions or declining trends.

Table 3.25. Priority Riparian/Wetland Ecosystems in the MPA, 2004 vs. 1990

Priority Status	2004 Priority	1990 Priority
1	Colorado River (including Day Canyon) Green River Dolores River	Colorado River (Colorado - Utah Stateline to Potash)
2	Mill Creek Canyon Onion Creek Ten Mile Wash Kane Spring Canyon Negro Bill Canyon Cottonwood and Diamond Creeks	Negro Bill Mill Creek Canyon Kane Springs Canyon
3	Seven Mile Creek Bartlett/Tusher/Mill/Courthouse Rattlesnake Canyon	Dolores River Green River (Rattlesnake to GR City)
4	Westwater Creek Hatch Wash Floy Creek Flat Nose George Canyon East Coyote Wash Fisher/Beaver/Granite Creeks	Seven-Mile Creek Courthouse Wash Westwater Creek Cottonwood Creek Hatch Wash Rattlesnake Canyon Flat Nose George Canyon

High priority management is also given to special riparian/wetland ecosystems or conditions including:

- Isolated riparian/wetland areas where exotic/noxious encroachment is low;
- Arid or remote regions where riparian/wetlands are especially critical to wildlife and susceptible to impacts from grazing and recreation uses;

- Riparian/wetlands which contain unique, rare or diverse functions or values, such as rare hanging garden ecosystems, rare plant or wildlife species, or health indicator species including amphibians, arthropods, bats, etc;
- Perennial streams, springs, or seeps that develop and support diverse and developed biotic or aquatic ecosystems including fish;
- Sites containing native riparian/wetland species. Of particular importance are ecosystems containing Fremont cottonwood due to its current recruitment history and susceptibility to fire, grazing and beavers; willows (especially Gooding willow) due to their sparseness from overgrazing; and any wetland/lentic systems, sites or species due to their importance in stabilizing soils and water recharge.

In fall of 2005 the biological control agent, *Diorhabda elongata* or tamarisk leaf beetle, was released on private lands along a stretch of the Colorado River adjacent to the Potash Road north of Moab. This population established successfully and in 2006 spread many miles up and downstream (and into several side canyons) with several miles of significant defoliation near the original release site. The beetle has established itself and is defoliating trees on BLM managed lands near the original release site. Repeated defoliation and spread of the beetle is expected to continue at a rapid pace in the next several years. Eventual death is expected for many of the trees after 4-5 years of continual defoliation, however that is still an estimate based on results of releases in other states or in slightly different ecosystems, it may differ slightly at this location. There will likely be standing dead skeletons, release of other suppressed weed species such as knapweed. Potentially some recovery of willow and other native species may occur, especially in headwaters or areas with less dense tamarisk infestations; however due to salinization of soils from dense tamarisk stands or hydrologic controls which may affect flooding and potential for cottonwood establishment, natural revegetation may not readily occur and more active restoration techniques may be necessary to prevent erosion or degradation of riparian resources.

3.13 Socioeconomic Resources

3.13.1 Social and Economic Conditions

The socioeconomic context of this RMP/EIS refers to the social, cultural and economic settings of communities impacted by the implementation of the BLM's management actions. The following section provides a summary of the planning area's social history and current demographic and economic trend information as well as a description of the key industries that are may be affected by management action implementation.

The southern third of the MPA is in San Juan County, Utah. The full socioeconomic context for San Juan County is presented in the Monticello Resource Management Plan Revision, currently in progress. Relevant portions of the San Juan County socioeconomic report are contained in this chapter. For a full report on the social and economic conditions in San Juan County, see the Monticello RMP.

3.13.1.1 GRAND COUNTY OVERVIEW

Grand County is situated in the eastern part of Utah, bordered by Emery County to the west, Uintah County to the north, San Juan County to the south, and the state of Colorado to the east. The county comprises 2,284,117 acres (3,689 square miles), with approximately 2.3 persons per square mile; Grand County has one of the lowest population densities in the state, (27.2 persons per square mile is the statewide average) (Grand County 2004). The Federal government administers 71% of the land in Grand County. The BLM manages the majority of the Federal land within the county, with jurisdiction over 66% of the land (1,559,814 acres). With just over 95% of the land being managed by Federal, state, and tribal governments, only 4.3% of the land is privately owned. Table 3.26 shows the land composition of Grand County.

Table 3.26. Land Jurisdiction in Grand County

	Total Acres	% of County
Federal Lands	1,694,128	71.0
BLM Lands	1,559,814	66.0
USFS	27,321	1.2
National Park	75,362	3.2
State Lands	365,255	15.5
Private	100,763	4.3
American Indian	198,090	8.4
Total Acres Within the County	**2,363,594**	**100.0**

Source: Utah Division of Travel Development 2004

The large tracts of privately owned land in the county are located in Spanish and Castle valleys, along the Colorado River northeast of Moab, and along the Green River, north of the city of Green River. Because of the concentration of private land in the Spanish Valley, the availability of potable water, proximity to the National Parks, and the lack of infrastructure in other areas, the majority of the county's population resides in the city of Moab or in the unincorporated area of Spanish Valley (Grand County 2004).

The natural landscape in Grand County draws over two million visitors per year and provides a scenic backdrop for a community that values a high quality of life. With the Book Cliffs in the northernmost part of the county, the Manti-La Sal National Forest to the south, the Colorado River running through the county, Arches and Canyonlands National Park, and thousands of acres of BLM Recreation Area, Grand County hosts visitors from all over the world. The remarkable red rock landscape has allowed local residents to develop a strong connection to the area and create a sense of place, identity, and community character unique to Utah.

3.13.1.2 SAN JUAN COUNTY OVERVIEW

An approximately 300,000-acre portion of San Juan County falls under the jurisdiction of the MFO. The Monticello Field Office is concurrently preparing a RMP/EIS for the San Juan County area and was consulted regarding the socioeconomic analysis of San Juan County and the characteristics of the tract of land administered by the MFO. Because the northeast third of San

Juan County is within BLM, MFO jurisdiction, the land management decisions out of the MFO could have a potential impact on socioeconomics of San Juan County. Therefore, social and economic conditions in San Juan County will be mentioned as appropriate throughout this section.

3.13.1.3 Historical Social Context

The MPA is an area rich in cultural and natural history. Past settlements and uses in the planning area by a variety of peoples has been as important as the ecological processes that have created and shaped the place that the BLM manages today. A brief review of the social and cultural history in the area will provide background information on the present-day social setting. Archeological evidence suggests that Grand County and the larger Four Corners area was inhabited by Native Americans, called Anasazi, between the years 1 and 1300 AD, with some evidence dating back as early as 1500 BC (BLM 2005h). The Anasazi, or Ancestral Puebloan People as they are often referred to today, successfully farmed the Four Corners Area for over a thousand years but evidence suggests they left the region by A.D. 1300. Other Native Americans occupied the Grand County area after the Anasazi, including the Utes. These Native American residents used the crossing of the Colorado River at the edge of the Spanish Valley. Remains of Native American dwellings and rock art around the MPA provide glimpses into the history of the cultures that once inhabited the region. The first white people to enter into the area were Spanish explorers who developed a trade route through the Spanish Valley. It was not until the late 1870s and early 1880s that the Moab area was permanently settled by a few Mormon families. Throughout the 1880s and 1890s the settlement grew slowly and its economy was based on farming, ranching, and fruit growing. In the 1890s, as mining efforts began along the Colorado River and in the LaSal Mountains, construction of the Denver and Rio Grande Western Railroad between Denver and Salt Lake City was completed, bringing a railroad connection within 35 miles of the Moab Valley.

3.13.1.4 Recent Regional History

Farming and ranching continued to be the primary way of life in the Moab Valley until the uranium boom of the early 1950s. The population of the Moab area grew significantly in the 1950s as scores of prospectors, miners, and workers hoped to benefit from the uranium boom. In 1956 the nation's second largest uranium processing mill was completed just outside of Moab, employing more than 200 workers (Bearnson 1994). As the demand for uranium began to decrease in the 1960s, potash, salt mining and milling operations contributed to the economy. But by the early 1980s milling and most mining operations in the Moab area ceased given the lack of demand.

In the later half of the twentieth century the Moab area saw the benefits of utilizing its natural resources in other ways: recreation and tourism. Arches National Monument was established in 1929 and declared a National Park in 1971. Canyonlands National Park was established in 1964. The National Parks in the area drew numerous visitors to the area each year and Moab began serving as the gateway to these unique places (Grand County 2004). After World War II, river-running became a popular form of recreation and by the 1970s it contributed significantly to Moab's economy as people would come to Moab to run sections of the Colorado River. During the 1970s and 1980s, Moab continued to grow as a tourist destination as mountain bikers and

motorized vehicle users discovered the recreation potential in the slickrock hills surrounding the Moab Valley.

3.13.1.5 Current Social Context

Today, Grand County is an area that has historically been known for its rural character and, according to local residents, preservation of this character is a priority. While the term "rural character" means different things to different people, residents concluded that it meant the following: affordable, modest, low density housing, open space with farmlands and fields, protected viewsheds, and low population, crime, and traffic levels (Grand County 2004).

The above characteristics illustrate the community's desire to maintain and preserve the quality of life currently enjoyed by its residents. The residents also acknowledge that the public lands in Grand County are the foundation of the county's economic prosperity. Residents in the Moab area define their community as one based on recreation and tourism. The economic benefit is derived from the management of public lands for multiple use, including livestock grazing, tourism, mineral extraction, recreation, watershed protection, hunting, and the film industry. Grand County's goal is to achieve a stable economic base while minimizing degradation of the economic, social, ecological and cultural resources of the public lands (Grand County 2004). Within the Grand County area, there are a variety of social communities that interact with each other and with the BLM. The majority of these groups are concentrated in and around the city of Moab, as it serves as the social and political center for the county. The social communities maintain diverse views on many issues, including public land management, but they do share the common connection to the unique landscape that surrounds their community. Many of the sociocultural groups within the Moab area define themselves through the physical proximity to the area and their interactions within it, their trade, shared worldview, common interests and experiences. Although community groups within the Moab area are quite difficult to define and quantify, groups in the area could be listed as: tourists, motorized and non-motorized recreationists, ranchers/farmers, tourism business community, non-tourism business community, and relative newcomers.

A statewide social survey was conducted by Utah State University (USU) in 2007 to assess the ways in which Utah residents use and value public land resources and their views about public lands management. A complete analysis of the results had not been completed as of February, 2008. "Public lands", as described in the study, consist of all federal and state managed lands, and not only BLM. Surveys were mailed to a random sample of residents of all 29 Utah counties. According to the authors, the study and sample sizes are designed to produce results generalizable at the state-wide level, with generalization increasingly risky as the sample area diminishes. For example, the data may lose much of its generalizability at the individual county level, but increase as additional counties are aggregated into the sample. (Grand County, for example, has 6902 residents 18 years of age or older, which normally would require a random sample of 364 individuals, considerably more than the USU study, to have a reasonable degree of generalizability). The areas sampled do not necessarily coincide with field office planning area boundaries, as that was not the focus of the study. Nonetheless, the study provides current and interesting results not available elsewhere, and shows the dependence of local communities on public lands for a variety of economic and recreational pursuits. Appendix T contains initial summary results for Grand and San Juan Counties lying within the Moab Field office. Where

appropriate, study results are incorporated within the discussion of individual resources in Chapter 4. There is nothing in the preliminary USU results that affect the formulation of alternatives in Chapter 2 or the analysis of impacts in Chapter 4.

3.13.1.6 Economic Context

This section describes existing economic conditions surrounding the MPA and provides a baseline for assessing the potential impacts of the RMP alternatives. Based on the implementation of a particular alternative, the BLM can affect (directly or indirectly) the local economic conditions of the nearby communities. For example, local employment and income levels can be directly impacted by changing the way it manages natural resources or grazing allotments. The construction of new recreation trails or facilities, road maintenance, and other activities can also influence local socioeconomic conditions described in this section. The BLM can also indirectly influence local economic conditions by pursuing new management strategies that alter visitation levels, thus affecting total future spending by recreationists and other tourists (BLM 2004e). Demographic information and selected economic indicators of social well-being (poverty, unemployment, and per capita household income) are also presented in this section to help provide context and put local conditions in perspective relative to statewide conditions.

3.13.1.6.1 Population

Grand County's population data is illustrative of an area that is driven by booms in the local economy. The county's recent history illustrates this trend. As the county's economy plummeted with the decreased need for uranium and other minerals in the 1980s, people quickly left the county in search of jobs and opportunities elsewhere. The county's population was at its height in 1981 with 8,400 residents but net out migration left the county with 6,620 residents in 1990 (Table 3.27). As the tourism industry in Grand County began to take root, the number of county residents began to rise. Between 1990 and 2000 the population grew by 28% which was only slightly less than the state's 30% increase (UDWS 2005).

Table 3.27. Population by Category in Grand County, 1990 and 2000

	1990	% of Total	2000	% of Total	% Chg 1990–2000	% Chg per Year 1990–2000*
Population	6,620		8,485		28%	2.50%
Male	3,214	49%	4,163	49%	30%	2.66%
Female	3,406	51%	4,322	51%	27%	2.42%
Under 20 years	2,250	34%	2,496	29%	11%	0.96%
65 years or over	826	12%	1,061	13%	28%	2.50%

Source: Sonoran Institute 2003 and *BLM staff.

In 2000, the U.S. Census reported a population of 8,485 in Grand County (see Table 3.27; U.S. Census Bureau 2000). The population has grown only slightly since then with a total of 8,611 in 2004 and it is forecasted the growth within the county will continue in the near future but at a much slower pace than in the 1990s (UDWS 2005). The annual population growth rate of Grand

County is slower than that of the state of Utah: approximately 1.9% annual growth in the county, versus 2.3% annual growth in the state. The Governor's Office of Planning and Budget for the state of Utah projects that population in Grand County will reach 10,288 by 2030.

The greatest concentration of people living in Grand County is in the city of Moab, where the population is 4,779. Unincorporated areas account for 3,357 people, most of whom live immediately south of Moab. Castle Valley, approximately 20 miles from Moab, is another unincorporated area within the county that has a significant residential community with a population of 354.

Grand County's population is older than the Utah state average. The median age for the county is 35.6, whereas the state's median age is 27.5. Median age rose by 4% between 1990 and 2000, showing that the community is aging. Another indicator of an aging population is the continuing decline of school-aged children since 1995 (Grand County 2004).

Population Migration

While the population of Grand County has steadily grown over the last 30 years, the migration patterns have experienced slight dips and peaks. In the mid 1970s, the population increased dramatically as a result of the energy boom. Throughout the 1980s, out-migration of the population occurred as the energy market fell. The population continued to decline until the early 1990s, when the tourist economy began to emerge in Grand County. The current influx of migrants can be illustrated by data from the 2000 Census that report 53.3% of Grand County residents were born in a different state and of that percentage, 4.0% were born outside of the U.S. (Sonoran Institute 2005).

San Juan County Population

The 2004 population estimate data shows San Juan County has a total of 14,353 residents, slightly below 14,413 residents reported in the 2000 Census data (UDWS 2005).

In San Juan County the American Indian/Alaskan population is more than half of the total population at 55.7%, but makes up only 1.33% of the Utah population (UDWS 2005). Population on the Navajo Nation has grown steadily over the last two decades. In 1980 population on the reservation was 4,554, 5,252 in 1990 and 6,280 in 2000.

The only town within the MFO jurisdiction in San Juan County is La Sal, Utah. La Sal borders the Manti-La Sal National Forest and is 30 miles north from Monticello. Because it is a "densely settled concentration of population that is not within an incorporated place," it is declared a Census Designated Place according to the Census Bureau (GOPB 2001). According to the 2000 Census, the population of La Sal is 339.

3.13.1.6.2 UNEMPLOYMENT

Unemployment levels are frequently used as an indicator for economic strength of the local economy and social well being of its population. Table 3.28 presents the size of the labor force

and average annual unemployment rates in Grand County. State of Utah unemployment information is given for comparative purposes.

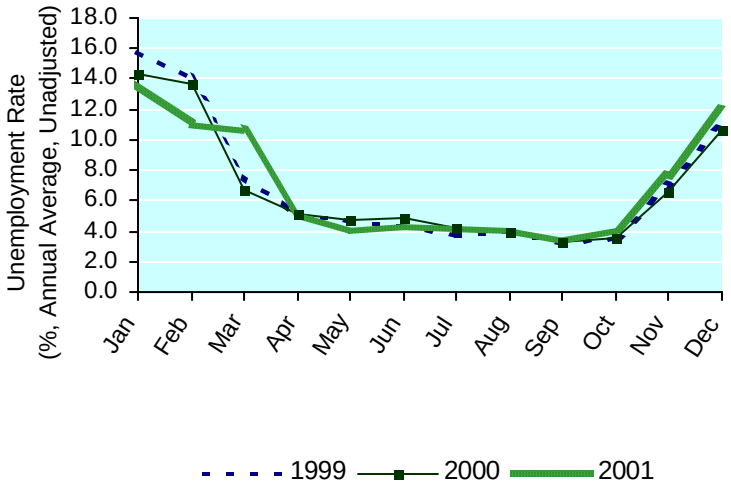
Table 3.28. Unemployment Rates

	1990		2000		2004 (projected)	
	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate	Labor Force	Unemployment rate
Grand County	3,249	6.4%	5,362	6.5%	5,936	6.9%
San Juan County	4,032	7.4%	4,754	9.2%	4,682	11.0%
State of Utah	814,000	4.3%	1,143,200	3.3%	1,208,400	4.7%

Source: Utah Department of Workforce Services 2005

Unemployment in Grand County is higher than the state or national average. In 2004 the unemployment rate in Grand County was 6.9%, compared to 4.7% for the state and 5.3% for the nation (UDWS 2005). The unemployment rates in Grand County are consistently nearly twice the state average and this is attributed to the seasonality of employment in the county. Unemployment in San Juan County has also been consistently above the state or national average. In 2004, San Juan County had the highest unemployment in the state at 11% (UDWS 2005).

In the summer months, unemployment in Grand County matches the state average more closely, while in winter, unemployment is extremely high, reaching over 15% in recent years (Figure 3.6). Members of the community cite seasonality of employment as one reason for this trend. Since tourism is a major factor in the job base, and tourism is highest from spring through fall, jobs are more abundant during these times. According to community input, lifestyle choice may be a second reason for a high unemployment rate in Grand County. Residents may be intentionally choosing jobs or careers that are seasonal in nature. The figure below shows the seasonality of employment in Grand County, with unemployment rates highest in the winter months for 1999, 2000 and 2001.



Source: Sonoran Institute 2003.

Figure 3.6. Seasonal unemployment in Grand County, 1999–2001.

3.13.1.6.3 Per-Capita Personal Income

Personal income[1] is another indicator of social wellbeing. Table 3.29 shows per capita personal income (i.e., total personal income divided by population) in Grand and San Juan Counties and in Utah. Per-capita personal income in Grand County was higher than the state average in 1980. The elevated income is attributed to the mining and mineral extraction jobs (which often pay higher than average wages) that were available at the time. As mineral extraction jobs became virtually non-existent, personal income levels have decreased to below the state average (see Table 3.29). Per-capita personal income has remained well below the state average for San Juan County. In 2003 San Juan County had the lowest per capita income in the state.

Table 3.29. Per-Capita Personal Income

Area	1980	1990	2000	2003
Grand County	$9,991	$12,464	$20,181	$20,634
San Juan County	$5,841	$8,995	$12,881	$14,363
State of Utah	$8,510	$14,913	$23,878	$25,407

Source: BEA 2005.

[1] Personal income is the income that is received by persons from all sources. It is calculated as the sum of wage and salary disbursements, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. This measure of income is calculated as the personal income of the residents of a given area divided by the resident population of the area. In computing per capita personal income, BEA uses the Census Bureau's annual midyear population estimates. (BEA 2005)

3.13.1.6.4 POVERTY

The poverty rate of an area is an estimate of the percentage of the area's total population living at or below the poverty threshold established by the U.S. Census Bureau. Table 3.30 presents poverty rates in Grand and San Juan Counties, with statewide figures included for comparative purposes.

Table 3.30. Poverty Rates

Area	1989	2003
Grand County	19.3%	13.9%
San Juan County	36.4%	22.6%
State of Utah	11.8%	10.0%

Source: U.S. Census Bureau 2005

Poverty rates for Grand County decreased 5.4% in absolute value between 1989 and 2003 and San Juan's decreased 13.8%. Statewide poverty levels also decreased over time by 1.8%, but not to the extent that Grand and San Juan Counties did. Through recent decades, both counties' poverty rates have been significantly higher than the state average. The most recent data shows poverty levels in San Juan County are more than double the state's rate at 22.6%. Poverty rates on the Navajo Nation Reservation (located in the southernmost portion San Juan County) in 2000 were significantly higher than county or state rates at 49.7% (GOPB 2002).

3.13.1.6.5 HOUSING

According to the 2000 Census, Grand County has a total of 4,062 housing units, 84.5% of which are occupied. Of these units, 6.8% are for seasonal and recreational use, and 29% are renter-occupied. Average household size is 2.5 residents, lower than the state's average. The median housing price in 1999 was $120,000, up from $105,000 in 1997. Table 3.31 shows that seasonal housing is much more than the state average, at 6.8% (U.S. Census Bureau 2000).

Yet another indicator of economic strength is the amount of new residential building permits granted for a particular area. An increase or decrease in the amount of building permits granted reflects the growth of a community and allows planners and local governments to plan for the amount of necessary infrastructure (i.e., roads, water, sewer, and power).

Residential buildings permits for Grand County peaked in 1996 at 187 and have dropped sharply since. In 2002, in response to a national recession, the amount of building permits issued was the lowest in recent decades at 36 (Grand County 2004). The amount of permits sharply increased in 2003 to 106 and has leveled off in 2004. Residential construction in the unincorporated areas of Grand County has consistently exceeded that within the city of Moab. For example, in 2004, 31 permits were issued for dwelling units in Moab, and 75 permits were issued for unincorporated areas in the county (UDWS 2005).

Table 3.31. Population by Household Type in Grand County, 2000

	County	% of Total	State	% of Total
Total Housing Units	4,062		768,594	
Occupied Housing Units	3,434	84.5%	701,281	91.2%
Vacant Housing Units	628	15.5%	67,313	8.8%
For Seasonal, Recreational, or Occ. Use	276	6.8%	29,685	3.9%
Homeowner Vacancy Rate (%)	2.0%		2.1%	
Rental Vacancy Rate (%)	13.4%		6.5%	
Housing Tenure				
Total Occupied Housing Units	3,434		701,281	
Owner-occupied Housing Units	2,437	71.0%	501,547	71.5%
Renter-occupied Housing Units	997	29.0%	199,734	28.5%
Avg Household Size - Owner Occupied	2.5		3.3	
Avg Household Size - Renter Occupied	2.4		2.8	

Source: Sonoran Institute 2003.

One recent and difficult to measure trend in the Moab area is the increase in construction of second homes. The challenge is to track the percentage and valuation of new second home permit versus permits for new houses for full-time residents. According to a 2003 BLM MFO study, 13% of all homes in Grand County are second homes and the trend is expected to increase (Goldhor-Wilcock and Stevens 2003). According to the Grand County Assessor's office, nearly 40% of new housing construction permits in 2005 were for non-resident owned housing. The second homes currently being built are often larger and more expensive than those of local residents and this leads to an increase in property taxes and cost of living for residents. This can be problematic for full-time residents as personal income in Grand County is consistently less than the state average. It is likely that the owners of the second homes are choosing to build in Moab because of the scenic beauty and recreation potential. This would be consistent with a recent study of second home ownership sponsored by local county governments in central Colorado. This study found that scenery was cited by 95% of second home owners, and recreation opportunities (where hiking and skiing were the most mentioned activities) by 91% as being important amenities driving the choice of locale (Venturoniet al. 2005). These two qualities, recreation opportunities and scenery, are clearly abundant in lands managed by MFO, making it reasonable to assume that these factors are driving second home ownership trends in Grand County, as well. This may conflict with the full-time residents desire to diversify their economic base, become less-dependant on tourism, and meet the basic needs of the community with respect to affordable housing and education (Grand County 2004). While the trend to build new second homes in the area appears initially beneficial to the county, it may be somewhat problematic given the cost of living increases and conflicts over public land use.

A recent study assessed the impact of second homes on the economies of four central Colorado counties. Using IMPLAN software, the study came up with several conclusions that might be applicable to Grand County:

- Second home construction and subsequent spending by owners for goods and services accounted for over 38% of all jobs in the counties studied. Although the Colorado counties have a higher percentage of second home properties (over 60% of all housing units), the study clearly indicates there are economic benefits to local communities from second homes.
- Resident spending of non-local income (dividends, interest, rent) accounted for about 16% of all jobs in the four counties studied. This type of income is closely linked to the type of wealthy households that tend to retire in amenity-rich, resort type communities. Again, Grand County may be moving in this direction (Lloyd Levy Consulting 2004).

There is, however, a potential downside to the above. As demand for second homes increase, especially in areas with relatively little land available for development (such as in Grand County), housing prices can rise dramatically. This phenomenon decreases the supply of affordable housing for both full-time residents and for workers needed to support the second home economy (Venturoni et al. 2005).

3.13.1.6.6 EMPLOYMENT

Local and regional employment levels could be affected directly or indirectly by the implementation of the updated RMP. The following information reflects trends in employment since the 1970s.

Jobs are typically classified with two systems: the Standard Industrial Classification System (SIC) and the National American Industrial Classification System (NAICS). Each system categorizes jobs differently. Historically, SIC codes have been used to describe employment, but they are limited in their scope. The more recent NAICS codes provide more detail but fail to show historic patterns. Both systems were used in this analysis.

In 2000, the Grand County economy supported 5,692 jobs with most employment (70.4%) in the Services and Professional sector. Government jobs account for 14.9% of all jobs in the county. The remainders of jobs are in farm and agricultural services, mining, manufacturing, and construction. Note that the services sector includes services, retail trade, finance industries, transportation and public utilities, and wholesale trade, essentially everything that is not farming, mining, or government. Of these subcategories, services provide 32% of total employment, and retail trade accounts for 29% of total employment. The prominence of the Services and Professional sector, as a percentage of total employment in the county, has grown over time, from 47.3% in 1970 to 70.4% in 2000. The significant growth within this industry sector highlights the county's shift towards a service-based economy. Table 3.32 presents absolute levels of employment between 1970 and 2000 for Grand County.

Table 3.32. Employment by Industry in Grand County

	1970	% of Total	2000	% of Total	New Employment	% of New Employment
Total Employment	2,724		5,692		2,968	
Wage and Salary Employment	2,320	85.2%	4,424	77.7%	2,104	70.9%
Proprietors' Employment	404	14.8%	1,268	22.3%	864	29.1%

Table 3.32. Employment by Industry in Grand County

	1970	% of Total	2000	% of Total	New Employment	% of New Employment
Farm and Agricultural Services	84	3.1%	146	2.6%	62	2.1%
Farm	78	2.9%	93	1.6%	15	0.5%
Ag. Services	6	0.2%	53	0.9%	47	1.6%
Mining	549	20.2%	120	2.1%	-429	NA
Manufacturing (incl. forest products)	88	3.2%	138	2.4%	50	1.7%
Services and Professional	1,289	47.3%	4,009	70.4%	2,720	91.6%
Transportation and Public Utilities	183	6.7%	147	2.6%	-36	NA
Wholesale Trade	55	2.0%	107	1.9%	52	1.8%
Retail Trade	425	15.6%	1,628	28.6%	1,203	40.5%
Finance, Insurance and Real Estate	115	4.2%	315	5.5%	200	6.7%
Services (Health,						
Legal, Business, Others)	511	18.8%	1,812	31.8%	1,301	43.8%
Construction	211	7.7%	433	7.6%	222	7.5%
Government	503	18.5%	846	14.9%	343	11.6%

Agricultural Services include soil preparation services, crop services, etc. It also includes forestry services, such as reforestation services, and fishing, hunting, and trapping. Manufacturing includes paper, lumber and wood products manufacturing.

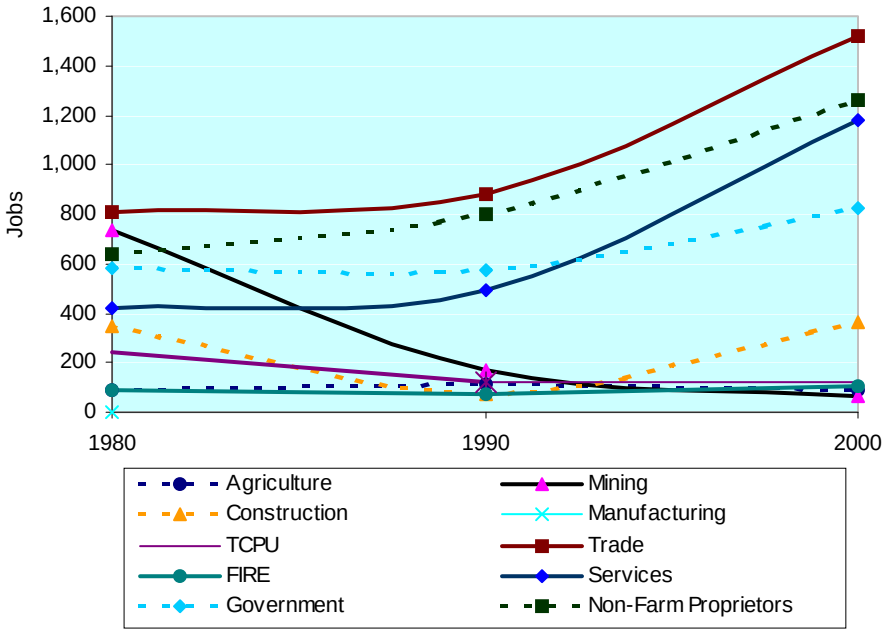
Source: Sonoran Institute 2003.

Shift in Regional Economic Activity

For over 20 years Grand County has been facing a decline in its traditional resource-based economy while other economic sectors have become more dominant (Figure 3.7). The agricultural industry, which was once the primary way of life for the county's residents, has become virtually non-existent as a revenue generator for the county. As mentioned earlier, the bottom fell out of the mining industry by the early 1980s and the county's largest industrial boom came to an abrupt end. By the mid-1980s it was clear that tourism was taking over as Grand County's primary source of revenue and this trend has continued into the twenty-first century. According to the Grand County General Plan, it is likely that tourism will remain important to the county for the foreseeable future.

Table 3.33 shows the trends in Grand County Employment over the last 20 years. Both community perceptions and the data shown below suggest that most jobs in the county are either indirectly or directly related to the tourist industry. Many of the area residents currently feel that the county's economy is too dependent on service jobs related to the tourism industry, which almost always offers lower wages and less stability. Employment data collected by local and national agencies does not include "recreation" specifically as an employment category; "leisure and hospitality" comes closest to this. In Grand County, the average annual earnings in this

sector were $13,615, considerably lower than the Grand County private sector annual average earnings of $21,449. This disparity is likely offset somewhat by earnings in other sectors which likely have a recreation influence. For example, construction in 2005 accounted for 7 per cent of private sector employment in Grand County, with average annual earnings of $27,760. The second home phenomenon in the County is driven, in large part, by the recreation opportunities the area provides. Hence, some of the residents are interested in diversifying the economy and bringing in higher-paying year-round employment to the county. As discussed above, there may be potential for job diversification resulting from the second home phenomenon, as in construction and other second home spending on goods and services in the local economy.



SIC= Standard Industrial Classification System used to categorize employment trends over time
TCUP=Transportation, Communications, and Public Utilities
FIRE=Finance, Insurance, and Real Estate
Source: Sonoran Institute 2003.

Figure 3.7. Changes in the Grand County economy (by SIC code), 1980–2000.

Table 3.33. Trends in Employment (SIC code), Grand County, 1980, 1990, and 2000

Industry	1980	1990	2000	% Change from 1980
Mining	18%	5%	1%	-94%
Construction	9%	2%	6%	-33%
Manufacturing	2%	2%	1%	-50%
TCPU (Trans./Comm./Public Util.)	6%	4%	2%	-67%
Trade	20%	26%	27%	35%
FIRE (Finance, Insurance, Real Estate)	2%	2%	2%	0%
Services	10%	15%	21%	110%

Table 3.33. Trends in Employment (SIC code), Grand County, 1980, 1990, and 2000

Industry	1980	1990	2000	% Change from 1980
Government	14%	17%	15%	7%

SIC= Standard Industrial Classification System used to categorize employment trends over time
Source: Utah Department of Workforce Services with calculations for % change completed by MFO.

The shift in economic activity has been similar in San Juan County over the past several decades. As jobs were lost in mining in the late 1970s and early 1980s, jobs in trade and services increased dramatically. Today, the trade and service sector employees a large amount of people to support the tourism industry around Lake Powell; however, many of these jobs are seasonal in nature, with most lasting from April to mid October.

Direct BLM Contributions to Area Economic Activity

Under the Federal Payment-in-Lieu-of-Taxes (PILT) Program, payments from the BLM and other Federal agencies assist in financing the operations of local governments containing tax-exempt public lands. The annual PILT payments serve as a subsidy to the local governments because, unlike privately owned lands, taxes are not collected from Federal lands. Payment amounts are based on a complex formula that considers among other things revenue sharing from the previous year, county population, and acreage of a county in Federal ownership. The PILT payments may be used for any governmental purpose including improving schools, road, water, and other infrastructure systems. Nearly 72% of Grand County is Federally owned land; therefore PILT payments are an important economic contribution to the area. PILT payments to Grand County have continually increased in recent years. Table 3.34 shows PILT Payments to Grand County between FY 2001 and FY 2005.

Table 3.34. PILT Payments to Grand County

Year	Total PILT Payment
2001	$492,256
2002	$516,376
2003	$622,831
2004	$640,349
2005	$653,761

Source: USDI 2005.

3.13.1.6.7 Local Economic Activity Affected by BLM Management

Recreation and Tourism

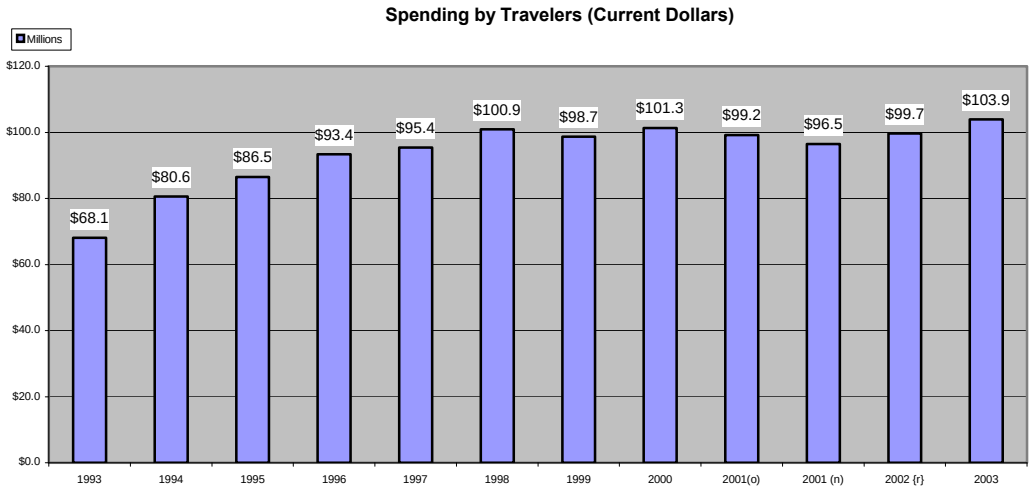
The MFO hosts a variety of recreation enthusiasts to its 1.8 million acres of public lands. Persons visiting the planning area are involved in a multitude of outdoor activities, including mountain biking, hiking, boating, camping, climbing, off-highway vehicle (OHV) driving and general

recreation. These activities occur in this area because of the large expanses of vast and relatively undeveloped lands and because of the unique geologic and scenic beauty the area has to offer. A BLM, MFO study indicates there were approximately 1.6 million recreational visitors to BLM lands in the MPA in 2004 (personal communication between Bill Stevens, BLM – MFO and Laura Burch, SWCA on January 6, 2006). This number exceeds visitation to Arches and Canyonlands National Parks and local state parks combined. More information on recreational visitation can be found in Section 3.10 – Recreation.

Visitation and related recreation activities on Grand County's public lands generates positive income and employment effects in the local economy as visitors spend money on gasoline, lodging, and various supplies including food and equipment. These expenditures generate earning for local proprietors and support local employment. As mentioned in the Updated Grand County General Plan, tourism is the most important economic resource for the county today. As discussed above, the second home phenomenon and the demand of their owners for access to visual resources and recreation opportunities may also contribute positively to Grand County's economy. Given patterns in the rest of the West, as well as the recent trend in Grand County, there is no reason to believe that this sector of the economy will not grow in importance.

Trends in traveler spending follow trends shown in other measures of the economy. As it became clear in the early 1990s that mining would not be the main contributor to the economy, tourism spending contributed just over $60 million to the county's economy. Throughout the 1990s traveler spending continued to grow to over $100 million in 1998 (Figure 3.8). The recession and the terrorist attack on September 11, 2001 caused a slight decrease in tourist spending but the tourist contribution to the Grand County economy continues to remain around $100 million per year.

In 2003, recreation and tourism generated $100.1 million out of $163.64 million in taxable sales of goods and services in Grand County. Thus, Moab's economy for 2003 was 61% tourism based. Although Grand County ranks seventh in the state for spending by travelers, taxable sales actually decreased 8.4% from 2002 (UDTD 2004). Travel and tourism-related employment has increased steadily since 1990s, with tourism spending levels in Grand County supporting 1,999 jobs in 2003.



Source: Utah Division of Travel Development 2004.

Figure 3.8. Tourist spending in millions, Grand County, 1993–2003.

Local sales tax revenue from tourist related services has also risen steadily since the early 1990s. Similar to gross taxable sales, sales tax revenue decreased somewhat in 2001, quickly increased in 2002 and dropped slightly in 2003. In 2003 estimated local tax revenue was estimated at $2 million, 8.4% less than 2002. Other tourism related tax revenue, such as gross taxable room rents, transient room tax, restaurant tax, and car rental tax, declined in 2001 and 2003. Despite recent rises and falls in traveler spending and sales tax revenue, the tourism-related revenues appeared to have leveled off and are not expected to make significant gains in the near future. Table 3.35 shows the contribution of tourism to the local economy.

Table 3.35. Tourism-Related Tax Trends in Grand County

County Indicator	1997	2000	2003
Spending and Employment			
Spending by Traveler (millions)	$100.9	$99.2	$100.1
Travel and Tourism Related Employment (jobs)	1,853	1,878	1,999
Tourism Tax Revenues (000s)			
Local Tax Revenue from Traveler Spending	$2,098	$2,063.0	$2,095
Gross Taxable Room Rents	$25,557	$26,674	$25,148
Transient Room Tax	$754.8	$800.2	$754.4
Restaurant Tax	$29.3	$205.8	$222.4
Car Rental Tax	$2.9	$25.1	$14.2
Gross Taxable Retail Sales (millions)	**$136.7**	**$162.9**	**$163.6**

Source: Utah Division of Travel Development 2004.

It is important to note that on January 1, 2003, Grand County relinquished its portion of the city of Green River to Emery County. The annexation led to the loss of tourist revenue and tourism related employment because Green River serves as an important thoroughfare, with gasoline stations and lodging, for people traveling along I-70.

Visitation data can also be used to illustrate tourism and recreation trends in the Grand County area. According to a BLM, MFO report, the BLM hosted at least 1.6 million visitors to its public lands (Goldhor-Wilcock and Stevens 2003). The most recent data out of the MFO suggests that visitors to BLM lands have increased and in 2004 visitation to the area is estimated at 2 million (personal communication between Bill Stevens, BLM – MFO and Laura Burch, SWCA on January 6, 2006).

Visitation to the Grand County area, outside of BLM lands, follows the traveler-spending trend, as it increased throughout the 1990s and has leveled off in the new century. The following table shows visitation numbers for several locations in Grand County that can be used as indicators for visitation to the area.

Table 3.36. Visitation Trends

Regional Visitation Counts	1997	2000	2003
I-70 UT/CO Traffic Count	1,888,875	2,314,830	2,459,005
Thompson Springs Welcome Center	108,212	97,896	93,905
Glen Canyon N.R.A.	2,504,986	2,568,111	1,842,942
Arches N.P.	856,016	786,429	757,781
Canyonlands N.P.	447,527	401,558	386,985
Dead Horse Point S.P	202,452	173,680	161,774
Green River S.P	110,921	138,531	83,951

Source: Utah Division of Travel Development 2004.

Budget and Fee Collection for Programs

The Moab BLM Recreation Program is important to the local economy. Of the nearly $100 million in sales revenue in Grand County, approximately $45 million is attributable to recreation on public lands.

Due to a relatively flat base budget, the MFO has come to rely on user generated fees for needed funds to support intensive public use. Services to the public are provided from these fee monies, such as campground maintenance and expenses related to the Westwater Canyon permit system. Maintenance and operation of facilities is costly and requires a commitment of funds to provide safe and proper facilities. Given the large number of visitors to BLM lands and the lack of Federal funding to support the visitors, the MFO has had to become much more self-sufficient than typical BLM offices in order to provide for public safety and enjoyment. Table 3.37 describes the current (2003) budget and fee programs and their allocations for the MFO.

Table 3.37. Budget and Fee Collections for Programs in the MPA, 2003

Revenue Generated on BLM Lands	YR 2003
Base recreation from non-fee accounts	$208,000
Annual recreation fees collected	$512,000
Total recreation budget (base and fees)*	**$720,000**

*Excludes Sand Flats Recreation Area

Source: BLM 2005i.

Recreation fees on BLM land also provide an economic benefit for Grand County. The county collected $236,498 in 2004 and $236,607 in 2005 for the Sand Flats Recreation Area. The revenue is used by the county to maintain and manage this area and employ local Grand County residents. None of the fees collected in this recreation area go to the MFO.

Agriculture and Grazing

The agriculture industry has declined dramatically in the last three decades. In 1970, total net income from farming and ranching in Grand County was $901,000. By 1985, that number had dropped to $88,000. In 2000 this number had dropped to $-830,000. Negative income means that expenses outweighed revenue for farming and ranching operations. Most agricultural income (approximately 80%) is from cash receipts from livestock and crops, while the remaining 20% is from government payments. Employment based on farming and agricultural services accounts for only 2.6% of people working in Grand County in 2000 and this percentage has decreased since 1970 when it was 3.6%.

The composition of livestock and crops has also shifted in the last decade. In 1970, 73% of gross farm income was from livestock, while 9% was from crops. By 2000, 47% of gross income was from livestock, and 32% from crops. Figure 3.9 below shows trends in agriculture as it relates to farm income since 1970.

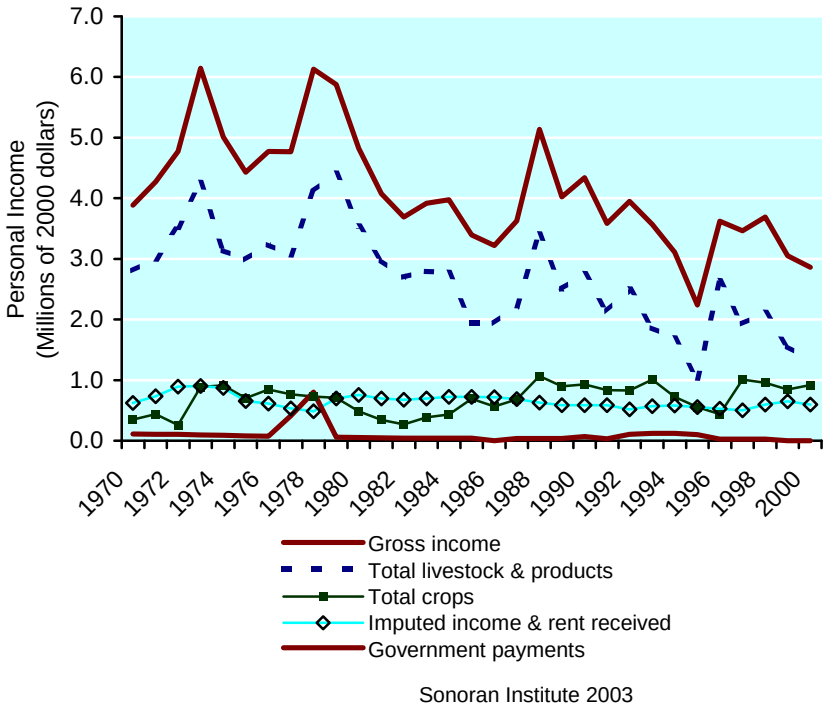


Figure 3.9. Farm income by category.

While the income generated from farming and ranching has decreased significantly in past decades, the number of farms has actually increased. In 1982 the number of farms was 59 and in 2002 the number grew to 94. It is important to note that even with the numerical growth of farms, the amount of lands in farms decreased nearly 66% over the twenty-year span from 156,557 in 1982 to 52,729 acres in 2002. The increase in the number of smaller farms may represent the rise in both long-time and new residents in the area who choose to have a farm as a hobby or for land conservation purposes, but who do not solely make their living on the agriculture industry. Table 3.38 shows the agricultural trends in Grand County.

Table 3.38. Grand County Agricultural Data

	1982	1987	1992	1997	2002
Farms (Number)	59	81	88	85	94
Land in Farms (Acres)	156,557	169,325	63,116	75,801	52,729
Average Size of Farm	2,654	2,090	717	892	561
Farms by Size					
1 to 9 Acres	10	19	26	23	36
10 to 49 Acres	17	26	26	22	20
50 to 179 Acres	14	12	14	13	17
180 to 499 Acres	8	10	10	14	10
500 to 999 Acres	2	5	4	2	5
1,000 Acres or More	8	9	8	11	6

Table 3.38. Grand County Agricultural Data

	1982	1987	1992	1997	2002
Market Value of Ag Products Sold	1,183	1,870	2,347	2,289	2,176
Operators by Principal Occupation-Farming	25	33	42	41	51
Operators by Principal Occupation-Other	34	48	46	44	43

Source: USDA 2002.

The MPA provides livestock grazing opportunities for local ranchers through the administration of livestock grazing on public land allotments. These leases generate local income and employment benefits to ranchers and their employees as well as other economic benefits to the county, including sales, income tax revenue, and indirect expenditures made by ranchers to local service or industry. Changes in MFO grazing practices could potentially affect the local economy. Currently, 71% of the 42 livestock permittees in the planning area live outside of Grand or San Juan Counties.

Livestock grazing allotments occur on approximately 95% of all lands located within the MPA. A total of 83 allotments occur within the boundaries of the MPA. Of this total, 77 are permitted for use by domestic livestock, and 6 allotments were unavailable to grazing by domestic livestock in 1995 and 1996. Reasons for closing the 6 allotments to grazing by domestic livestock included enhancement of wildlife, improvement of riparian vegetation, watershed benefits, and recreation values.

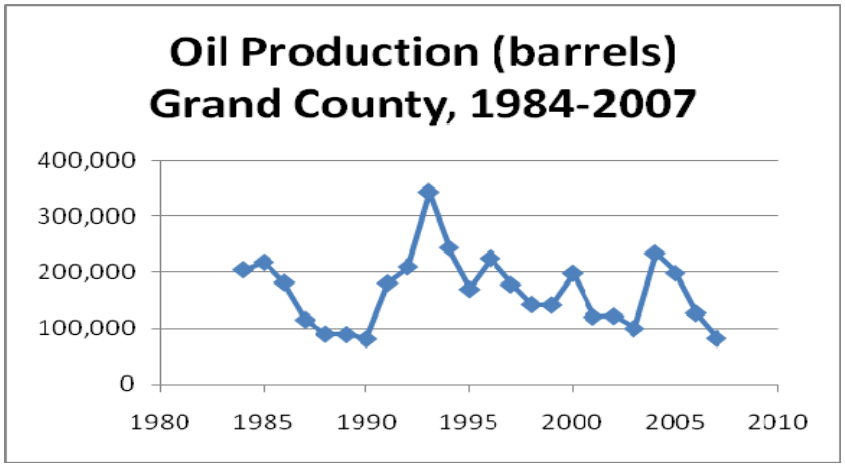
Of the total 83 allotments within the MPA boundary, 73 are administered by the MFO. The Vernal Field Office administers 4 allotments, and 6 allotments are administered by the Grand Junction, Colorado, Field Office.

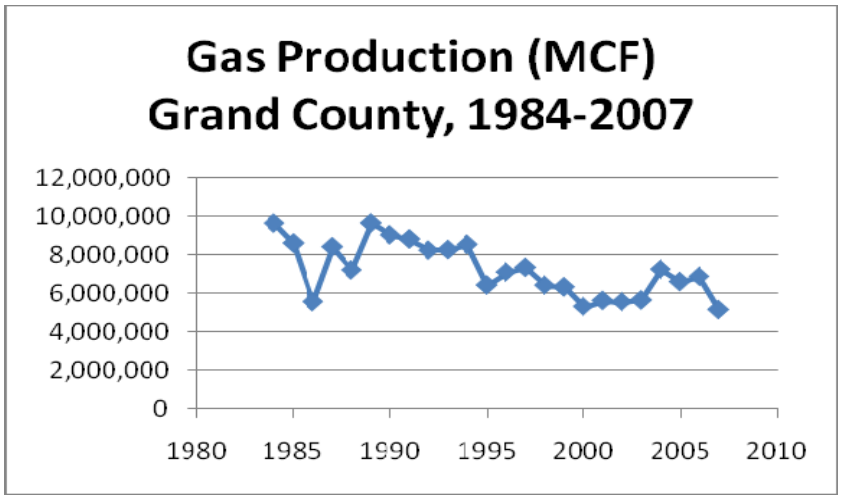
A total of 107,931 animal unit months (AUMs) are currently active within boundaries of the MPA. Of the total authorized AUMs, 87,097 (81%) are used by cattle, 18,466 (17%) are used by sheep, and 485 (less than 1%) are used by horses. Through agreement with permittees, 1,883 AUMs (2%) are held inactive due to conservation purposes. An additional 25,972 AUMs are allowed through exchange of use other ownership. Grazing is discussed in detail in section 3.5 of this RMP.

Mineral Resources

In the second half of the twentieth century, mineral extraction served as the foundation for population and economic growth in Grand County. The minerals industry, including uranium, potash, oil, and gas, generated more than 62% of all income received by county residents in 1980. In 2003 that number has fallen to 2% (Grand County 2004). Today, recreation and tourism has replaced resource extraction as the primary revenue and employment generator.

According to the Utah Division of Oil, Gas and Mining, oil production peaked in 1994, but dropped to approximately 200,000 barrels in 2000 (Figure 3.10). Gas production has fallen since 1984, from approximately 10 million cubic feet (mcf) to under 6 million mcf in 2000.





Source: UDOGM,2008

Figure 3.10. Oil (barrels) and gas production (mcf) in Grand County, 1984–2007.

Over the last 100 years, a large number of oil and gas wells have been drilled in Grand County. Most of these, however, are no longer producing and have been long since abandoned. The following table (Table 3.39) summarizes the current production situation in Grand County.

Table 3.39. Current Oil and Gas Activity on Lands Administered by the MFO

Activity	Number
Producing gas wells	244
Producing oil wells	30
Shut-in gas wells	113
Shut-in oil wells	51
Acres under lease (BLM lands only)	490,079

Source: BLM 2004e

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The economic benefit to Grand County of oil and gas activities comes primarily in the form of mineral lease payments and royalties from the state of Utah to Grand County. The state of Utah collects payments from a variety of sources, including lease and royalty payments made to the BLM and to the Minerals Management Service of the Department of the Interior. Royalties are based on the sale of oil and gas and increase or decrease based on quantity of production and prices. Approximately one-half of the payments received by these agencies are remitted to the state of Utah, which in turn distributes about one-half to the counties. The state of Utah payments to the counties are based very closely on actual leasing and production activities within each county. In Fiscal Year 2003, Grand County received $312,000 in mineral lease monies from the state of Utah, most of which was the product of oil and gas activities on BLM lands in Grand County. Corresponding figures for FY 2001 and FY 2002 were $373,000 and $647,000, respectively. The decline in recent years has been due primarily to lower production in Grand County, according to the state of Utah.

A potential benefit to Grand County from oil and gas production is in the jobs created, both in direct production activities and associated services; however, there are currently relatively few people employed in these areas in Grand County. Most of the current oil and gas activity is in the far eastern part of the county, which provides employment primarily to residents of western Colorado, who are located much closer to the activities. Goods and services are purchased in adjoining towns, including Grand Junction and Green River, by oil field workers. There is some employment provided to Grand County residents who work in the Lisbon Valley area, located south of Moab in San Juan County. There is also some oil and gas production occurring in San Juan County that is currently managed by the MFO. The revenue generated from this activity is difficult for the BLM to track because it goes directly to San Juan County.

3.13.2 TRIBAL INTERESTS

Grand County comprises 198,339 acres (8.4%) of lands owned by Native Americans all of which are located in the northwest corner of the county on the Uintah and Ouray Indian Reservation. The Reservation is home to the Ute Indian Tribe and is located in a three-county area in Northeastern Utah, known as the Uintah Basin. The Uintah and Ouray Reservation covers a large potion of western Uintah and eastern Duchesne Counties, and at approximately 4.5 million acres it is the second largest Indian Reservation in the United States. The Reservation is home to the Whiteriver, Uintah, and Uncompahgre bands of Utes (UDTD 2004).

According to the U.S. Census there are 19,182 people living on the Uintah and Ouray Indian Reservation. Of the people who identified themselves as residents of the Reservation, 2,780 (14%) identified themselves as American Indian or Alaska Native (GOPB 2002). The majority of people living on the Reservation reside in Uintah and Duchesne Counties. Given the high elevation and rugged terrain of the Reservation in Grand County, it is unlikely that anyone lives on the Reservation in the county.

The interaction with Tribes on the Uintah and Ouray Reservation and the MFO is minimal. There is no road in Grand County that leads to the Reservation and given that, minimal activity occurs on the Reservation that prompts BLM involvement in Grand County, there is very little

communication between the tribes and the MFO. The Vernal Field Office handles the tribal issues pertaining to the Reservation in Uintah and Duchesne County.

According to the 2000 Census, 327 Native Americans live in Grand County and it is assumed that few live in the city of Moab and most live in the unincorporated areas of the county.

The Navajo Nation Reservation comprises 1.2 million acres (26%) of San Juan County. The entire Reservation also includes land in Arizona and New Mexico and totals nearly 14 million acres. Population on the Navajo Nation has grown steadily over the last two decades. In 1980 population on the Reservation was 4,554, 5,252 in 1990 and 6,280 in 2000. Interactions between the Navajo Nation and MFO are minimal given that the Reservation is several hundred miles south of the MFO.

3.13.3 Environmental Justice

3.13.3.1 Background and Regulatory Guidance

"Environmental justice" refers to the fair and equitable treatment of individuals regardless of race ethnicity, or income level, in the development and implementation of environmental management policies and actions. In February 1994, President Clinton issued Executive Order (EO) 12898, "Federal Actions to Address Environmental Justice in Minority and Low Income Populations." The objective of this EO is to require each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of it programs, policies, and activities on minority and low income populations" (EO 12898).

Convened under the auspices of the EO, the Interagency Working Group defines Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut and other non-white persons as minority populations. Low-income populations are defined as persons living below the poverty level based on total income of $13,359 for a family household of four based on the 2000 census. Minority populations are identified as either: (1) the minority population of the affected area exceeds 50%, or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate geographic area (BLM 2002c).

3.13.3.2 Minority and Low-Income Populations

Minority populations in Grand County have increased slightly since 1990. Of the total population in 1990, 95.8% of residents identified themselves as "White" as did 92.6% in 2000. Grand County is ranked eighth in the state in terms of minority percentage and minorities make up only 10.8% of the county's population compared to 14.7% of the state population as a whole. As mentioned earlier, Grand County poverty levels are higher than the state as a whole (13.9% for Grand County vs. 10.0% for Utah). Table 3.40 illustrates the slight growth in minority populations in Grand County.

As mentioned earlier within the context of "poverty" as an economic indicator for the economic well being, persons in Grand County living below the poverty line in 2003 was higher than the

state average (13.9% vs. 10%). While Grand County poverty trends show a decrease over time they remain higher than the state average. The poverty level established by the by the Census Bureau in 2000 for a family of four is $18,244. In 2000 15.2% of Grand County residents were living below the poverty level.

Table 3.40. Grand County Population by Race and Ethnicity

	1990		2000	
	Total Population	Percent of Total	Total Population	Percent of Total
Race				
White	6,341	95.8%	7,861	92.6%
Black	7	0.1%	21	0.2%
American Indian	203	3.1%	327	3.9%
Asian	19	0.3%	19	0.2%
Hawaiian/Pacific Islander	5	0.1%	4	0.0%
Other	45	0.7%	141	1.7%
Two or more races	NA	0.0%	112	1.3%
Total	**6,620**	**100.0%**	**8,485**	**100.0%**
Ethnicity				
Hispanic	291	4.4%	471	5.6%
Non-Hispanic	6,329	95.6%	8,014	94.4%
Total	**6,620**	**100.0%**	**8,485**	**100.0%**

NOTE: Population is broken out by is broken out by both race and ethnicity because Hispanics can be of any race.
Source: GOPB 2002.

San Juan County: Unique to any other Utah county, populations typically known as "minority" comprise more than half of the population in San Juan County. San Juan County ranks first in the state for Native American/Alaskan Native population. San Juan County is home to 27% of the state's Native American population and at 55.7% of the county's total population, Native Americans are not the minority. In Utah, 93.8% of the entire population identify themselves as white and 1.3% of the population identify themselves as Native American/Alaskan Native (GOPB 2002). Therefore, when considered state or region-wide, Native Americans are considered a minority race. Despite the population data that indicates non-minority status within San Juan County, Native Americans are considered a minority group for the purposes of achieving environmental justice during this RMP process.

The number of people in San Juan County living below the poverty line in 2003 was higher than the state average (22.6% vs. 10%). While San Juan County poverty trends show a decrease over time they remain higher than the state average. In 2003 the poverty level established by the by the Census Bureau for a family of four was $18,810 and in that year 31% or 4,443 people in San Juan County were living below the poverty level (U.S. Census Bureau 2005). In terms of race, the Native American population has the highest poverty level in the county at 48% or 3,809 individuals.

3.14 Soil and Water

3.14.1 Watersheds

3.14.1.1 Delineated Watersheds

The USGS has divided and subdivided the United States into successively smaller hydrologic units which are classified into 6 levels: regions (largest), sub-regions, accounting units, sub-basins, watersheds and sub-watersheds. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to fourteen digits based on the level of classification (UGS 2003. The MPA, located within the Upper Colorado Region, has portions of 8 sub-basins and 39 watersheds in the planning area.

3.14.1.2 Critical Watersheds and Sole Source Aquifers

A critical watershed is a planning designation for a watershed with a high percentage of sensitive soils such as highly saline soils and/or highly erodible soils. (See Map 2-13, Moderate to High Saline Soils). These watersheds need special management prescriptions to protect resources at risk. Some critical watersheds were delineated in the 1985 RMP.

3.14.1.3 Municipal Watersheds

The Federal Safe Drinking Water Act requires protection of underground sources of drinking water. The State of Utah requires owners of drinking water supplies to establish 2 levels of protection zones around their water sources and must obtain an agreement with the landowner if the applicants do not have complete ownership of the watershed or recharge area. Protection Zone 1 is a circle of a 100-foot radius from the well or margin of collection area. Protection Zone 2 has a two-mile radius or is a variable area based on recharge characteristics. This protection zone can extend up to 15 miles above the source and 300 feet from each stream bank.

The municipalities of Moab, Castle Valley, Thompson, Crescent Junction, and LaSal have water supplies that are wells and/or springs with recharge areas on adjacent BLM lands. There are several small public water supply systems within the planning area, including Hole 'n the Rock Rest Area, Windwhistle Campground, and Pack Creek Ranch. Thompson, Hole 'n the Rock Rest Area, and Pack Creek Ranch filed water source protection plans with the State of Utah that include adjacent BLM lands.

A sole source aquifer designation is a Federal acknowledgement that an aquifer system is the sole source of drinking water available to the community. This acknowledgement supports efforts to keep the aquifers free from contamination. The designation requires that Federally financially assisted projects in the review area of the sole source aquifer undergo an EPA environmental review for compliance with the goals of the regulation.

Both Moab and Castle Valley have filed for sole source aquifer designation. A total of 24,000 acres in and around Castle Valley has been designated as the sole source aquifer recharge area (EPA 2003d). The city of Moab has requested 76,000 acres as its sole source aquifer recharge area.

3.14.2 Soils

3.14.2.1 General

Soils are the medium for plant growth, and provide nourishment for nearly all terrestrial organisms. They support a wide variety of plant and animal communities within the planning area. Soils have developed in bedrock, sedimentary ocean deposits, materials washed down by rivers and streams, and windblown sands and silts known as loess, residuum, colluvium, alluvium, eolian sands, and loess. They are derived primarily from the sedimentary geologic deposits that occur throughout the planning area. Soil temperature regimes are predominantly vary from mesic (moderate, mean annual soil temperatures are 46 to 59 F) at lower elevations to but may be cryic (cold, mean annual soil temperatures are less than 46 F, and they don't warm significantly in the summer) at higher elevations. Soil moisture ranges from aridic (very dry) to ustic (dry, but with some moisture in the growing season) throughout the MPA, with hydric (wet) soils occurring in riparian and wetland areas.

There are a variety of soil types in the planning area, including highly saline and erodible soils. Sensitive soils need special management to protect resources at risk. This includes management of highly saline and/or highly erodible soils, biotic crusts, steep slopes, drought intolerant soils, dust source, and sink areas. Soils that are highly saline, highly erodible, have low water holding capacity (drought intolerant) may be especially vulnerable to impacts and harder to reclaim or restore after disturbance. Certain biological crust communities provide significant protection from wind and water erosion for some soils. Disturbance of soil biological crusts affects most soils, but some more than others, depending on the type of soil and biotic community.

3.14.2.2 Sensitive Soils

"Sensitive soils" are those identified as having characteristics that make them extremely susceptible to impacts or they may be more difficult to restore or reclaim after disturbance -- characteristics such as high wind or water erosion hazard, moderate to high salinity, low nutrient levels, high runoff, limitations to grazing, or very steep slopes. In this document, a *sensitive soils* designation refers to highly erodible soils, saline soils, drought intolerant soils, biotic soil crusts, and steep slopes. Sensitive soils are difficult to reclaim or restore. Once they are disturbed, the impact usually is long-lasting (BLM 1993c:11). These soils need special management to protect resources at risk.

3.14.2.2.1 HIGHLY ERODIBLE SOILS

There are soils in the planning area that are highly susceptible to wind and water erosion. Although these soils have naturally high rates of erosion, the erosion rates are easily accelerated by surface-disturbing activities. Best management practices to protect soil stability include limiting surface-disturbing activities such as grazing, off road travel, and mineral exploration and development.

Wind erosion strips the surface horizon of soil and nutrients necessary for seed germination and plant recruitment. Wind erosion and subsequent deposition can result in the formation and expansion of sand dunes. These soils are especially susceptible to wind erosion when plant cover and/or biological soil crust cover is removed. In the planning area, moderately wind erodible soils occur over 1,303,433 acres based on SSURGO data. Highly wind erodible soils occur on 39,350 acres of BLM-managed lands. Approximately 15,900 acres of soils with high water erosion ratings occur in the MPA. Potential for water erosion is commonly estimated using a combination of slope and k-factor (an erodibility constant or measure of how easily particles detach from one another). Soils considered to have a high potential for water erosion have a slope over 10% and a *K*-factor (erodibility constant) greater than or equal to 0.37; or a slope greater than 30% and a K-factor between 0.20 and 0.36. Accelerated erosion causes the formation of rills and gullies, and can contribute to excess sedimentation in streams and reservoirs.

3.14.2.2.2 SALINE SOILS

Soil salinity can affect erosion levels and reclamation potential. Erosion of saline soils impacts the water quality of downstream watersheds. Highly saline soils are soils with electrical conductivity levels of greater than 16 mmhos/cm. Moderately saline soils fall between 8 and 16 mmhos/cm. The planning area contains approximately 314,901 acres of saline soils, primarily confined to the Mancos lowlands along I-70 are shown in Map 2-13, Moderate to Saline Soils as determined from SSURGO data (BLM 2000).

Specifically, The Greater Sagers Wash watershed (153,200 acres) was identified as one of the major salt production watersheds in the planning area (BLM 1993d). Approximately 60% of the watershed has Mancos Shale derived soils, which are naturally high salt producers. In addition to natural geologic processes, land uses that contribute to accelerated erosion include grazing, OHVs, mineral exploration and development, and road building (BLM 1993d). Areas undergoing accelerated erosion make up 64% of the watershed and contribute 29% of the potential salt yield (BLM 1993d:3).

3.14.2.2.3 DROUGHT INTOLERANT SOILS

Certain soil types are severely impacted during drought conditions. The Grand County, Central Part Soil Survey (NRCS 1989) identified a number of soil units as drought intolerant. These soils and associated vegetation may be severely affected by drought. Severe drought may adversely affect the production of perennial vegetation.

3.14.2.2.4 BIOTIC SOIL CRUSTS

Many of the vegetative communities found in the MPA have evolved with the presence of biological soil crusts. Biotic soil crusts are made up of mats or filaments of cyanobacteria, lichens and mosses. Development of biotic soil crust is strongly influenced by soil texture, soil chemistry and soil depth. Crusts are more developed in shallow, sandy, non-saline soils, but can also be found throughout saline soil areas. They tend to be commonly found associated with soils high in gypsum. Although soil crusts can be found throughout the MPA, there are areas with high density or well-developed crusts or unusual crust components.

Biotic soil crusts play a major role in reducing water and wind erosion and in preventing the establishment of invasive annual grasses (BLM 2001d). They fix atmospheric nitrogen and carbon, retain soil moisture, and provide surface cover. Crust composition and level of abundance can be used to determine the ecological history and condition of a site (BLM 2001d).

Loss of biotic soil crust leads to reduced soil productivity, decreased plant cover and vigor, and increased wind and water erosion. Severity, size, frequency, and timing of a surface-disturbing activity affect the degree of impacts to biotic soil crusts. Fine-textured soils have faster crust recovery rates than coarse-textured soils (BLM 2001d). Aeolian deposition of sediments can bury and kill biological soil crusts by prohibiting photosynthesis.

3.14.3 SURFACE WATER

There are three large rivers in the planning area: the Colorado, Green and Dolores Rivers. One thousand sixty-two miles of perennial stream flow year-round in at least some reaches. In addition, there are 8,995 miles of intermittent stream systems that flow at least part of the year (more than just storm runoff, UDEQ 2002). Major reservoirs include Ken's Lake. Perennial stream segments in the MPA include all or portions of:

Beaver Creek	Floy Creek	Muleshoe Creek	Seven Mile (north)
Burkholder	Granite Creek	Nash Wash	Spring Creek
Castle Creek	Green River	Negro Bill Creek	Ten Mile
Coates Creek	Hatch Wash	Onion Creek	Thompson Wash
Colorado River	Hatch Ranch Wash	Pack Creek	Three Mile Wash
Cottonwood (Books)	Hunter Creek	Poverty Creek	Trough Springs Creek
Cottonwood (Black R.)	Kane Creek	Professor Creek	Tusher (Books)
Cowskin Canyon	La Sal Creek	Rattlesnake Creek	Westwater Creek
Diamond Creek	Little Dolores	Rill Creek	
Dolores River	Little Water	Ryan Creek	
Fisher Creek	Mill Creek	Salt Wash	

3.14.3.1 WATER QUANTITY

BLM cannot hold instream flow rights in the state of Utah, but can protect senior water rights as needed. This is an issue in Thompson Wash, as the Thompson Special Service District has diverted most of the flow in Thompson Creek for municipal use.

Another area with water quantity issues is Mill Creek. Water from Mill Creek is diverted to Ken's Lake to provide irrigation water to Spanish Valley. The diversion structure is on BLM lands, and is authorized with a Right of Way grant. BLM requires the Right of Way holder to maintain a minimum of 3 cfs in the stream downstream of the diversion.

Many perennial streams in the MPA have diversions for agricultural use (Mill Creek, Thompson Wash, Granite Creek, Cottonwood Wash, Beaver Creek, Castle Creek, Buck Hollow, and Pack Creek.)

3.14.3.2 WATER QUALITY

3.14.3.2.1 GENERAL

The BLM monitors surface water quality conditions by conducting both water chemistry and macroinvertebrate studies. BLM participates in a cooperative program with the Utah Department of Environmental Quality (Utah DEQ) to sample sites for water chemistry. BLM personnel take field measurements and samples. The State of Utah provides lab analysis and data management (including maintaining the STORET database, EPA 2003e). When necessary, BLM uses other EPA certified labs for analysis (i.e., American West Analytical Labs).

The Utah DEQ also conducts an intensive sampling program every 5 years. This was conducted from July 2002 through June 2003. Sampling is conducted every 6 weeks on major streams and other requested sites. The next intensive survey will be held in 2007-2008.

With sufficient data it can be determined if a stream is meeting state standards. If a problem is documented, that stream segment will be included by the State of Utah on the List of Impaired Waters of Utah (303d list) submitted to the EPA every 2 years. A schedule for a Total Maximum Daily Load study (TMDL) is set. This study determines how to reduce pollutants and restore all beneficial uses. The TMDL also establishes the amount of a pollutant allowed in the water.

In 2000, the State of Utah identified Onion Creek, Mill Creek, Castle Creek and Ken's Lake as impaired. The TMDLs were completed in 2002 for Mill Creek, Onion Creek and Ken's Lake. The Castle Creek TMDL was completed in 2004.

The Mill Creek TMDL entails an assessment of total dissolved solids (TDS) and stream temperature problems. The TMDL states the main sources of TDS are natural groundwater inflow and irrigation return flow, from the Pack Creek watershed. Impairments to temperature are related to riparian health and stream flow levels. The TMDL recommended riparian improvements and increased stream flow levels to improve temperature impairments.

The Onion Creek TMDL entails an assessment of TDS and stream temperature levels. State standards for TDS may not be achievable due to high TDS input from natural sources. The TMDL also states high stream temperatures are a result of poor riparian conditions. The TMDL recommends better management of vehicle travel, restricting travel in the stream as much as possible. Other recommendations include riparian and floodplain improvements to reduce stream temperature.

The Castle Creek TMDL addressed water quality impairments in 2002. The report concluded that impairments were a combination of natural conditions and low stream flows due to irrigation diversions.

The Ken's Lake TMDL entails an assessment of water temperature conditions. The report concluded temperature impairment is a result of natural causes, and is not an impairment to the fish habitat.

3.14.3.2.2 SALINITY

High salinity levels in water are a surface water quality concern of national significance recognized in the Colorado River Basin Salinity Control Act of 1974. Salinity contributions are from both point sources and nonpoint sources. During low flow periods, salt contribution comes solely from seeps, springs, and groundwater flow. During high flow periods, erosion of saline soils becomes a major contributor to salinity problems.

Point sources for salinity include discharge of saline groundwater from natural springs, seeps, flowing wells and gaining streams. The primary nonpoint sources of salinity are the diffuse overland runoff from saline soils and erosion and transport of saline soils during flow events.

The Mancos Shale is recognized as the largest contributor of salinity in the Upper Colorado River Basin (Laronne 1977). There are approximately 314,900 acres of Mancos Shale-derived soils in the planning area. Any surface disturbance on these soils increases erosion and associated salinity contribution.

3.14.3.3 GROUNDWATER

Groundwater occurs in both consolidated and unconsolidated rock aquifers. The main consolidated rock aquifer is known as the N aquifer, and includes the Wingate and Navajo Sandstones. Water from the N aquifer is generally of good quality and suitable for drinking. Unconsolidated rock aquifers are an important source of groundwater in Spanish Valley and Castle Valley. Recharge is from infiltration of precipitation and stream flow, primarily from the La Sal Mountains.

There are five other potential aquifers in the planning area: Entrada, Morrison, Dakota, Wasatch, and Parachute Creek aquifers. These aquifers are not laterally or vertically homogenous (Eisinger and Lowe 1999). Shallow aquifers are better sources as they usually contain higher quality water and are more easily accessible.

Due to evaporite deposits in the Paradox formation underlying much of the planning area, there is a significant occurrence of briny groundwater, with TDS concentrations exceeding 10,000 milligrams per liter (mg/L). Groundwater quality below the N aquifer is generally saline. The unconsolidated aquifers have the potential for mixing with high saline groundwater, due to no confining layer in between.

Groundwater use in the planning area is not fully documented, due to unreported withdrawal from industry and domestic wells. Groundwater is diverted from both springs and wells. The primary uses of groundwater within the planning area are for potable drinking water supply and industrial supply (UDWRe 2000). In 2002, municipal water suppliers provided approximately 2,850 acre-feet of groundwater for potable supply (includes Moab, Thompson, Grand, and Arches National Park; UDWRi 2003). In 1996, 940 acre-feet of water were used for industrial purposes (UDWRe 2000).

3.15 Special Designations

For the purposes of this analysis, Special Designations fall into three categories: Areas of Critical Environmental Concern (ACECs), Wild and Scenic Rivers (WSRs), and Wilderness Study Areas (WSAs). Special designations may be given to areas meeting certain eligibility criteria. Descriptions of each of these areas and the criteria they meet are given below.

3.15.1 Areas of Critical Environmental Concern (ACECs)

3.15.1.1 Resource Overview

FLPMA defines an ACEC as an area "within the 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."

The Federal Land Policy and Management Act (FLPMA) states that the Bureau of Land Management (BLM) will give priority to the designation and protection of Areas of Critical Environmental Concern (ACECs) in the development and revision of land-use plans.

With ACECs, there is no one method of management for all areas. Special management is designed specifically for the relevant and important values, and therefore varies from area to area. The one exception is that a mining plan of operation is required for any proposed mining activity that would create surface disturbance greater than casual use within a designated ACEC (43 CFR 3809 Regulations).

A total of 35 nominated areas (many of which overlap with each other in area) were evaluated for relevance and importance as part of the Moab land-use planning process. These evaluations have been completed in accordance with guidance provided in BLM regulations at 43 CFR part 1610.7-2 and *BLM Manual 1613-Areas of Critical Environmental Concern*, which identify relevance and importance criteria that must be met for a nominated area to be considered as a potential ACEC. The boundaries of the potential ACECs were crafted by the BLM

interdisciplinary team and its cooperators to best incorporate the relevant and important values of each nomination. The proposals included areas previously nominated, nominations received from the public as part of scoping, and areas nominated, refined, or expanded by BLM staff specialists. As a result of work completed by the BLM ACEC interdisciplinary team and its cooperating agencies, 14 potential ACECs that meet both the relevance and importance criteria have been identified. A summary of these 14 potential ACECs are listed in Table 3.41 and are shown in Map 2-14. A description of the potential ACEC nomination along with its relevance and importance criteria follows Table 3.41.

Table 3.41. Summary of Potential Areas of Critical Environmental Concern

Area Name	Relevant and Important Values, Resources, Natural Processes or Systems, or Natural Hazards	Acres
Behind the Rocks	Scenic values, sensitive plant species, cultural values	17,836
Book Cliffs Wildlife Area	Wildlife resources	304,252
Canyon Rims	Scenic values	23,400
Cisco White-tailed Prairie Dog Complex	Wildlife resources	125,620
Colorado River Corridor	Scenic, and cultural values, wildlife resources, rare plants, natural systems	50,483
Cottonwood-Diamond Watershed	Natural hazards and natural systems	35,830
Highway 279 Corridor/ Shafer Basin/ Long Canyon	Scenic values and wildlife resources	13,500
Labyrinth Canyon	Scenic and historic values	8,528
Mill Creek Canyon	Scenic and cultural values, natural systems, fish resources	13,501
Ten Mile Wash	Cultural values, wildlife resources, natural systems, natural hazards	4,980
Upper Courthouse	Historic values, natural systems, rare plants	11,529
Westwater Canyon	Scenic values and fish resources	5,069
White Wash	Natural systems	2,988
Wilson Arch	Scenic values	3,700

More detailed information on the designation process, the ACEC team, and MFO relevance and importance evaluations can be found in Appendix I – Relevance and Importance Evaluations of Area of Critical Environmental Concern (ACEC) Nominations.

3.15.1.2 Description of Area and Relevance and Importance Criteria for Potential ACECs

The following descriptions and relevance and importance criteria are taken from the Relevance and Importance Evaluations of Area of Critical Environmental Concern (ACEC) nominations (BLM 2004f).

3.15.1.2.1 Behind the Rocks (17,836 acres)

Description of Area: Behind the Rocks is located west of the city of Moab and east of Kane Creek Canyon. It is an area of sandstone fins and deeply entrenched canyons, with arches and other features. Various boundaries were proposed by the several nominators**.** From these, BLM crafted the boundary of the potential ACEC to include all of the relevant and important cultural, wildlife, plant and scenic resources of the area.

Relevance Criteria: The area contains significant cultural resources, including rock art and habitation sites. The scenic values are outstanding in the area, with slickrock domes and fins present on a grander scale than in Arches National Park. There are also several large natural arches in the area. The area contains habitat for several special-status wildlife species, including the peregrine falcon, southwest willow flycatcher, spotted bat and big free-tailed bat. Three special-status plant species occur in the area: the Canyonlands biscuitroot, alcove rock daisy and alcove bog orchid. The area is one of only three major population centers (and of these, the least imperiled) for the Canyonlands biscuitroot. Two narrowly distributed plants, the western hop-hornbeam and alcove death camas also occur. In addition, there are relict plant communities within the area that are valuable for scientific study.

Importance Criteria: Within the area, cultural sites are distinctive and of special worth. Scenic values are nationally significant; Behind the Rocks is the best example of Navajo sandstone fins in the world, and provides the scenic backdrop to the town of Moab. The rare and endemic plants are fragile, rare and irreplaceable. Behind the Rocks is one of only 12 known areas with occurrences of the alcove rock daisy, and one of three areas in which the Canyonlands biscuitroot is found. The area also contains plant communities and soils that have been little disturbed or altered, providing an uncommon remnant of the presettlement landscape.

3.15.1.2.2 Book Cliffs Wildlife Area (304,252 acres)

Description of Area: The Book Cliffs Wildlife Area ACEC is located on the southern flanks of the Book Cliffs from the Green River to Hay Canyon and from the Book Cliffs terraces north to the MPA boundary. (The boundary proposed by the Southern Utah Wilderness Alliance differed from that of BLM staff. BLM staff adjusted the boundary of the area with the assistance of data from the Utah Division of Wildlife Resources).

Relevance Criteria: The Book Cliffs Wildlife Area nomination meets the relevance criteria for wildlife and cultural values. The Book Cliffs area contains habitat essential for maintaining species diversity, including that of endangered, threatened and Utah sensitive animal species. In addition, the Book Cliffs provides important habitat for the following big game species: Rocky

Mountain bighorn sheep, mule deer, Rocky Mountain elk, mountain lion and black bear. Crucial fawning and calving grounds and crucial winter ranges for elk and deer are within the area. The Book Cliffs are essentially a natural system encompassing unfragmented, contiguous habitat for a great diversity of plant and animal communities. The area is also rich in cultural resources, and includes rock art, camp sites, cave excavations and brush structures.

Importance Criteria: The Book Cliffs wildlife habitat is of more than local significance. There are no areas in the Western United States (outside of Alaska) that offer such a large, contiguous, unfragmented, and undisturbed habitat for such a large variety of animal species. This extensive habitat promotes biological and genetic diversity that is unavailable in most wildlife habitat areas. The remote areas of the Book Cliffs are important scientific reference sites. Human disturbance and/or development would permanently alter the unfragmented, remote and undisturbed nature of this wildlife habitat. This makes the Book Cliffs proposed ACEC highly vulnerable to adverse change. The habitat is also irreplaceable, exemplary and unique due to the rareness of large, unfragmented and undisturbed habitat for both plants and animals.

In addition, cultural sites within the Book Cliffs have special worth because their remoteness has left them largely undisturbed, and thus of great importance to scientific study.

3.15.1.2.3 Canyon Rims (23,400 acres)

Description of Area: The Canyon Rims ACEC nomination consists of the western rims of the Canyon Rims Recreation Area. This encompasses Needles, Anticline, Canyonlands and Minor Overlooks, which are developed recreation sites within the recreation area.

Relevance Criteria: The scenic values of the western portions of the Canyon Rims Recreation Area are outstanding in quality and due to location, highly visible to the recreating public.

Importance Criteria: The scenic values of the western portions of Canyon Rims are important to regional, national, and international visitors who view this area from developed overlooks. The Canyon Rims views are some of the most spectacular in the Western United States. They have special worth and consequence to many visitors, many of whom comment that the views are "more spectacular than the Grand Canyon."

The threats to these scenic resources include oil and gas development and off highway vehicle use, making them subject to adverse change.

3.15.1.2.4 Cisco White-tailed Prairie Dog Complex (125,620 acres)

Description of Area: The ACEC boundary proposal from the Center for Native Ecosystems has been refined with the help of the Utah Division of Wildlife Resources data to include public lands on both sides of I-70 from the Colorado State Line to the Cisco area.

Relevance Criteria: The area meets the relevance criterion for wildlife values. White-tailed prairie dog is a Utah sensitive species, and has been nominated as threatened under the

Endangered Species Act. UDWR has mapped historic and current prairie dog towns and their habitat. The habitat within this area is essential for maintaining this species.

Importance Criteria: White-tailed prairie dogs are a Utah sensitive species; conservation plans are being developed to avoid the need to list them. The population of this species is declining throughout the West, including the area managed by the MFO. Large tracts of land are needed to maintain populations of this animal and of the predator species that depend on it. White-tailed prairie dog habitat is fragile and very sensitive to damage from OHV use, heavy grazing, drought and oil and gas disturbance.

3.15.1.2.5 COLORADO RIVER CORRIDOR (50,483 ACRES)

Description of Area: The Colorado River Corridor area lies along Utah Highway 128 east of Moab, Utah. It includes the entire Richardson Amphitheater (including Fisher Towers, Onion Creek and Castle Rock), the canyon of Negro Bill and the Slickrock Bike Trail on the south side of the Colorado River. On the north side of the river, Dry Mesa, Cache Valley and other lands east of Arches National Park are included. (Boundary proposals by various nominators were adjusted by BLM staff and cooperators to determine the potential ACEC boundary.)

Relevance Criteria: This area meets the relevance criteria for scenic, fish and wildlife, and rare and endangered plants. The scenery in the area is of outstanding quality**,** and as it is traversed by Utah State Scenic Byway 128, the scenery is accessible to all types of visitors. The area contains such scenic western icons as Fisher Towers, the Colorado River and Castle Rock.

The potential ACEC includes crucial habitat for mule deer and desert bighorn sheep. It includes crucial bighorn lambing and rutting areas for desert bighorn sheep (particularly in the lands east of Arches National Park). The Colorado River is home to the razorback sucker, bonytail chub, humpback chub and the Colorado pikeminnow, all endangered species. Several birds on the state sensitive list, including yellow-breasted chats and Lewis woodpeckers, have known occurrences within the potential ACEC. State sensitive animals occurring in the area include river otter, spotted bat and big free-tailed bat.

Three rare plants occur within the Richardson Amphitheater section of the area: the Jones cycladenia (Threatened), the Shultz stickleaf (Sensitive), and the Dolores rushpink (Sensitive). Relict plant communities also occur in the proposed ACEC. Two BLM sensitive plants (alcove rock daisy (*Perityle specuicola*) and alcove bog orchid (*Habenaria zothecina*) occur in Negro Bill Canyon. In addition, the endemic alcove columbine is also found. The hanging gardens of Negro Bill in which these plants are found range in size from a few square meters to huge classic alcoves. The Colorado River corridor is rich in rare and endangered plants.

Importance Criteria: This area meets the importance criteria for scenic, fish and wildlife and rare and threatened plants. The entire area possesses Class A scenery of widely recognized value. It is internationally renowned for scenery, and has been the location site for 88 film permits from 1998-2002. This area has some of the most significant, internationally recognized scenery in the Western United States. People throughout the world recognize the scenic resources contained within the area. The visual resources in this area are very rare, and do not exist anywhere else in

the world. At the same time, the area is subject to intense visitation, making the area susceptible to inadvertent damage.

The wildlife habitat in the area is of more than local significance, and is rare and irreplaceable. The very presence of the Colorado River provides wildlife habitat that is unique in the arid West. The rare and endangered fish in the Colorado River (razorback sucker, bonytail chub, humpback chub and the Colorado pikeminnow) are unique and irreplaceable. Lands crucial to desert bighorn sheep lambing and rutting (in Cache Valley east of Arches National Park) are similarly unique and vulnerable to adverse change. Several birds on the state sensitive list, including yellow-breasted chats and Lewis woodpeckers, have known occurrences within the proposed ACEC. State sensitive animals occurring in the area include river otter, spotted bat and big free-tailed bat.

The potential ACEC contains the only known location in the world of the sensitive Schultz stickleaf. Although only on the BLM state sensitive plant list (and not on the endangered species list), the Schultz stickleaf grows nowhere else in the entire world but in the proposed ACEC because of the special combination of soils in the area. The potential ACEC also contains threatened Jones cycladenia plants. This makes the area of special worth and consequence to these rare species. Although it is only listed as sensitive, the population of Shultz stickleaf plants is unique and irreplaceable as it is known to grow nowhere else in the world; the presence of other special species, both plant and animal, make the area unique and exemplary.

The rare plants found in the hanging gardens of Negro Bill Canyon area also rare, fragile and exemplary. The cave primrose, alcove bog orchid, alcove columbine and alcove rock daisy are of far more than local significance, given their rarity.

The heart of Negro Bill Canyon was designated an Outstanding Natural Area in the 1985 Grand RMP to protect both scenery and these sensitive plants. The scenery is of more than local significance, both in the canyon, and from the Slickrock and Porcupine Rim Trails above it.

3.15.1.2.6 COTTONWOOD-DIAMOND WATERSHED (35,830 ACRES)

Description of Area: This area is located in the Cottonwood-Diamond drainage of the Book Cliffs area. The area to be considered in this ACEC proposal is the area that was severely burned in 2002.

Relevance Criteria: The area meets the relevance criteria for natural processes and for natural hazards. Due to severe fire damage in July 2002, the functioning of the natural system is at risk. Riparian areas and stream channels are the most at risk. This area is extremely susceptible to (and has experienced) dangerous flooding and landslides as a result of the large fire. Because of major vegetation loss and damage to soils (hydrophobic) and steep rocky slopes, storm runoff is at extreme levels and is causing peak flood levels and massive erosion. This area was identified by the Burned Area Emergency Rehabilitation (BAER) team in 2002 as posing significant hazards to life and property. In 2007, the floodplains and stream channels continue to substantially erode with each flood, making canyon bottoms unstable and unsafe. Restoring riparian vegetation and stable stream channels and floodplains is crucial to a functioning natural

process. Watershed health is not expected to return for another 4 to 10 years, requiring special management in the interim.

Importance Criteria: The area meets the importance criteria for natural hazards and natural processes. The Burned Area Emergency Rehabilitation report highlights significant hazards from floods, mudflows, and landslides that have already occurred, and are expected to reoccur. The severely burned area has qualities that warrant highlighting in order to satisfy concerns about human life and safety. BLM has spent significant amounts of money to date on emergency stabilization (reseeding, hydro-mulching, and monitoring) to help restabililize the area to reduce these threats to human life and safety.

3.15.1.2.7 Highway 279 Corridor/Shafer Basin/Long Canyon (13,500 acres)

Description of Area: The area is a corridor along Utah Highway 279, including the extension of that road into the Shafer Basin. The Shafer Basin provides the viewshed from Dead Horse Point State Park. In addition, Long Canyon to the Dead Horse Mesa is included in this proposal. BLM has modified the boundary of the SUWA nomination to better incorporate the resource values that were found relevant and important in this area.

Relevance Criteria: The area meets the relevance criteria for scenic, plant and wildlife resources. Utah Highway 279 is a state scenic byway; its scenery is enjoyed by over 250,000 thousand visitors per year as they drive along the Colorado River. The Shafer Basin provides the spectacular foreground scenery as viewed from the road and from Dead Horse Point State Park. Long Canyon also provides a scenic backcountry drive just off Utah Highway 279. The scenery is classified as Class A.

A Utah BLM sensitive plant, Jane's globemallow, is found in the Shafer Basin. In addition, both the Shafer Basin and Long Canyon are important habitat to the desert bighorn sheep. As a result, the uplands north of Dead Horse Point State Park were found to have relevant values for wildlife and plants.

Importance Criteria: The nomination meets the importance criteria for scenery, plant and for wildlife values only within the modified boundary. The stunning scenery within Shafer Basin and Long Canyon as viewed from State Scenic Byway 279 and Dead Horse Point State Park is internationally renowned. Highway 279, Shafer Basin and Long Canyon are also venues for many film permits**,** due to their spectacular scenic backdrops. Thus, these portions of the nominated area were found to meet the importance criterion for scenery, as they have more than local significance.

Jane's globemallow, a BLM sensitive plant species, is rare and unique and is susceptible to harm. The presence of this plant in the Shafer Basin area meets the importance criteria.

The wildlife values within the adjusted boundary also meet the importance criteria, as the Shafer Basin is primary habitat for desert bighorn sheep, which also utilize Long Canyon. These distinctive animals are unique and of more than local significance. Indeed, it is the Shafer Basin habitat that enabled the dwindling desert bighorn herd to survive. This bighorn herd is one of

only two indigenous native desert bighorn herds in the state of Utah, and the Shafer Basin herd has provided stock for restoring desert bighorns to other environments. The wildlife values in the uplands portion (north of Dead Horse Point) were not found to be of more than local significance, and thus did not meet the importance criterion.

3.15.1.2.8 LABYRINTH CANYON (8,528 ACRES)

Description of Area: Labyrinth Canyon is located along the Green River, and extends from Ruby Ranch to the border of Canyonlands National Park. This proposal is for the eastern side of that canyon. It complements that of the Price Field Office, which has an ACEC proposal for the western side of Labyrinth Canyon. BLM staff has modified the boundary to better incorporate those resource values identified as both relevant and important.

Relevance Criteria: This nomination meets the relevance criteria for scenic, historic, fish and natural processes. The scenery in Labyrinth Canyon is outstanding, and is enjoyed by many river runners. Historic sites are prevalent along the Green River, and these meet the historic criterion. The Green River is home to four endangered fish species: Colorado pikeminnow, razorback chub, bonytail chub and humpback chub. The upland regions east of the river corridor do not meet the relevance criteria for scenic, historic, fish or natural processes. The wildlife relevance criterion is met for these upland regions, as the area is habitat to many animals, including desert bighorn sheep.

Importance Criteria: The nomination meets the importance criteria for scenery and for historic values only in the Green River Canyon corridor. The scenery and the history along the river is of far more than local significance, which give it special worth and meaning. The Green River is nationally and internationally famous for its high cliff walls and outstanding scenery. It is an internationally recognized destination for canoe touring. The historic resources are unique and irreplaceable, telling the story of the early settlement of this region (and dating back to the time of the fur trappers). The importance criterion is also met for fish resources, as the endangered fish species live only in the Colorado River system, and are rare, irreplaceable and unique. The importance criteria for terrestrial wildlife values involving the upland regions east of the river corridor are not met, as these wildlife values are only of local significance. While the river corridor is a unique resource for endangered fish species, the upland regions are duplicated in many places across the Colorado Plateau.

3.15.1.2.9 MILL CREEK CANYON (13,501 ACRES)

Description of Area: Mill Creek Canyon is located directly east of Moab. It consists of both the North Fork and South Fork drainages of Mill Creek from the National Forest boundary to Spanish Valley.

Relevance Criteria: This nomination meets the relevance criteria for scenery, cultural values, fish and wildlife resources and natural systems. Mill Creek Canyon has significant scenic values, with Class A scenery and high sensitivity. The outstanding visual resources of the canyon are stunning, and of rare scenic quality.

Cultural resources (including rock art, campsites, rock shelters, alcoves and special activity areas) are exceptional in the forks of Mill Creek, and have been the subject of several scientific studies. Mill Creek is one of five coldwater trout fisheries in the Colorado River system. Due to its perennial water, many wildlife species depend on Mill Creek. A rare and especially high quality riparian area, Mill Creek's ecological condition requires special management. The Mill Creek watershed is the municipal watershed of Moab and Grand County, providing water that sustains the human population.

Importance Criteria: Mill Creek Canyon meets the importance criteria for scenery, cultural resources, natural riparian systems and fish and wildlife values. The scenery in Mill Creek Canyon is of national quality, and is far more than locally significant. Cultural resources are extensive and span the entire prehistoric context, giving these resources special worth and consequence. Both the scenic and cultural values in Mill Creek Canyon are easily damaged and in need of protection. Cultural resources are especially sensitive, irreplaceable and exemplary; similar cultural resources exist nowhere else. Mill Creek Canyon's cultural resources have also been identified as being of exceptional importance to Native Americans. Protection of these rich archeological areas is a national priority concern. The proximity of Mill Creek to Moab makes the drainage particularly vulnerable to adverse change.

Fish and wildlife values meet the importance criteria, as the stream is one of the few cold water fisheries in the region. The wildlife importance criterion is met, as Mill Creek Canyon provides a migration corridor from the mountain range to the desert; the richness of the Mill Creek riparian habitat provides for a diversity of species not often found in a desert environment. The rarity of this type of habitat gives importance to this value.

The water resource is a significant factor in the municipal water supply; the watershed is crucial to the public welfare of Moab and Grand County.

3.15.1.2.10 Ten Mile Wash (4,980 acres)

Description of Area: Ten Mile Wash is located northwest of Moab; it drains into the Green River just downstream of White Wash and upstream of Spring Canyon. The nominated area is composed of the Ten Mile drainage from the Green River to two miles upstream of Dripping Spring.

Relevance Criteria: Ten Mile Wash meets the relevance criteria for scenic, cultural, wildlife, natural processes and natural hazards. Ten Mile Wash contains high quality scenery related to sandstone buttes, cliffs, side canyons and alcoves; the scenery is enhanced by the presence of a riparian greenbelt. Ten Mile Wash contains significant cultural resources, including important habitation sites and unusual artifacts.

Ten Mile Wash contains perennial and intermittent flows that maintain ecological diversity in upland and riparian/wetlands-dependent wildlife within extremely arid portions of the basin. Ten Mile Wash contains a rich mixture of riparian, wetland and hydrologic resources. Perennial segments support well-developed wetlands that are rare and unusual in arid regions. Ten Mile Wash is subject to extreme flooding, increasing potential safety hazards to vehicle and camping

activities. The potential for flooding is great because the Ten Mile Wash watershed basin drains 175,185 acres, making it the second largest tributary drainage in the MPA.

Importance Criteria: This nomination meets the importance criteria for cultural, wildlife values, natural systems and natural hazards. Cultural resources in Ten Mile Wash are of more than local significance, and are fragile, rare and exemplary. Ten Mile Wash is wildlife habitat of extremely important consequence in the driest portion of the MPA, because it provides water and habitat to wildlife from a large geographic area.

Riparian/wetland resources comprise less than 1% of the 22 million acres of public land within Utah. Within the MPA, just over 1,000 acres have been identified with wetland potential, of which Ten Mile Wash contains textbook examples. Riparian/wetland ecosystems in Ten Mile Wash are rare, sensitive resources vulnerable to degradation from surface disturbances. These wetland ecosystems are exemplary and rare; they serve as attractors for wildlife and for human activities, making the wash extremely susceptible to adverse impact. Riparian/wetland ecosystems are a national priority concern, and are managed for health and diversity as required by the Clean Water Act, Floodplain and Wetland Executive Orders, Rangeland Standards and Guidelines, and the National Riparian Area Policy. Ten Mile Wash contains extreme seasonal flooding potentials that warrant special management regarding public access and camping within the drainage.

3.15.1.2.11 UPPER COURTHOUSE (11,529 ACRES)

Description of Area: The area of the Upper Courthouse proposal is immediately south of the Blue Hills Road, 16 miles north of Moab. It includes Courthouse, Mill, Tusher and Bartlett Canyons, as well as the tops of various isolated mesas, including Big Mesa.

Relevance Criteria: This nomination meets the relevance criteria for historic, paleontological, natural systems and rare plants. Courthouse Springs is a known location on the Old Spanish Trail, a National Historic Trail. This location later became the Halfway Stage Station, a significant historic resource. The area contains significant paleontological resources, and includes deposits of surface dinosaur bone

Two rare plants occur within the area: the stage station milkvetch and Trotter oreoxis, both of which are on the state sensitive list. In addition, several of the mesa tops within the proposed ACEC have been little altered by direct human influences and thus support relict plant communities and well-developed, mature cryptobiotic soil crusts. Big Mesa is the largest of these untouched areas. It has never been grazed, nor has it been driven upon.

Importance Criteria: This nomination meets the importance criteria for historic, rare plant and natural systems. The area has special worth due to the rare plant species and relict plant communities. The area contains almost all of the stage station milkvetch plants known in the entire world. This stage station milkvetch population is unique and irreplaceable, as is that of the Trotter oreoxis. Areas of relict vegetation on the mesa tops are representative of conditions on surrounding lands; these uncommon remnants of the presettlement landscape are extremely vulnerable and valuable for scientific study.

Historical resources in the area (including a known watering spot on the Old Spanish Trail) are distinctive and irreplaceable. Increasing recreation activity in the area makes these resources vulnerable to adverse change. The richness of its paleontological resources are of more than local significance, as the variety of dinosaur bone in the area rivals that found in Dinosaur National Park.

3.15.1.2.12 WESTWATER CANYON (5,000 ACRES)

Description of Area: Westwater Canyon is along the Colorado River six miles downstream from the Colorado border.

Relevance Criteria: This nomination meets the relevance criteria for scenery and for endangered fish. The dramatic, scenic canyon is rated as Class A scenery, as well as VRM inventory Class I. Visiting the canyon and viewing the scenery is a highly sought experience. The most dramatic scenery within the canyon is the contrast of jet black Precambrian rock with the red sandstones above. These two rock layers are in rare juxtaposition in Westwater, making the scenic experience unique. In addition, four endangered fish inhabit the Colorado River, the Colorado pikeminnow, humpback chub, razorback sucker and bonytail chub. The upland regions surrounding Westwater Canyon do not meet the relevance criteria, as they do not have significant values.

Importance Criteria: This nomination meets the importance criteria for scenery and for endangered fish. The inner gorge of Westwater Canyon is visually unique, with the primordial black Precambrian schist layer overlain by the red rocks of the Wingate sandstone. This irreplaceable canyon is a one-of-a-kind visual experience, which visitors from all over the world vie to enjoy. Westwater Canyon is rare, exemplary and unique in terms of its scenic values. Westwater Canyon has been described as the most scenic one day river trip in the entire United States. The endangered fish that inhabit its waters are also unique and found only in the Colorado River system.

3.15.1.2.13 WHITE WASH (2,988 ACRES)

Description of Area: White Wash is located 30 miles northwest of Moab. It consists of active sand dunes interspersed with cottonwood trees, surrounded by a intermittent wash that drains to the Green River.

Relevance Criteria: White Wash meets the relevance criteria for scenery, cultural, wildlife and natural systems. The high quality scenery is related to the active sand dunes, Entrada sandstone buttes and a unique cottonwood riparian ecosystem. White Wash also contains significant sensitive cultural resources, including habitation sites.

White Wash contains intermittent and ephemeral flows vitally important to support wildlife diversity within this extremely arid region. A small resident desert bighorn sheep population relies on upper White Wash for habitat and for water. White Wash contains a unique ecological/geological system related to cottonwood riparian woodlands located within the active

dune field and supported by localized subsurface moisture. This population of cottonwoods represents a relict ecosystem and is a rare riparian feature.

Importance Criteria: This nomination meets the importance criteria for natural systems. Riparian resources comprise less than 1% of the 22 million acres of BLM land within Utah. Riparian resources in similar combination are not known elsewhere within the region. The White Wash Sand Dunes is a unique ecosystem with sensitive soils that are highly mobile and active. This ecosystem is highly unusual, rare, sensitive and vulnerable to degradation from surface disturbances, especially OHV riders using the cottonwood trees as slalom poles, adversely impacting soil and moisture patterns which support the reproduction and sustainability of the riparian ecosystem.

Riparian/wetland ecosystems are national priority concerns and are managed for health and diversity as mandated by the Clean Water Act, Floodplain and Wetland Executive Orders, Rangeland Standards and Guidelines, and the National Riparian Area Policy.

The area does not meet the importance criterion for cultural, scenery or for wildlife. Cultural sites in the area are not unique; similar wildlife habitat is available across the Colorado Plateau.

3.15.1.2.14 WILSON ARCH (3,700 ACRES)

Description of Area: Wilson Arch is located approximately 25 miles south of Moab on the east side of U.S. Highway 191. The nominated area includes the red rock basin that contains Wilson Arch.

Relevance Criteria: Wilson Arch has significant scenic value.

Importance Criteria: Located immediately adjacent to U.S. Highway 191, Wilson Arch is viewed and photographed by many visitors to the Colorado Plateau. This makes the scenic value of the arch more than locally significant, due to its extreme visibility.

3.15.2 WILD AND SCENIC RIVERS

The Wild and Scenic Rivers Act of 1968 (WSRA) established legislation for a National Wild and Scenic Rivers System (NWSRS) to protect and preserve designated rivers throughout the nation in their free-flowing condition and to protect and preserve their immediate environments. The WSRA includes policy for managing designated rivers and created processes for designating additional rivers for the NWSRS. Section 5(d) of the Act directs Federal agencies to consider the potential for national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources. A wild and scenic river (WSR) review is being conducted as part of the current planning process.

The first phase of the WSR review is to inventory all potentially eligible rivers within the planning area to determine which of those rivers are eligible for consideration as part of the NWSRS. To be eligible, rivers must be free-flowing and possess at least one outstandingly remarkable value (ORV). ORVs are evaluated in the context of regional and/or national

significance and must be river-related. Each river/segment determined to be eligible is then given a tentative classification based on the current level of human development associated with that river/segment. The tentative classification is based on the criteria listed in the classification table from *Wild and Scenic River Review in the State of Utah* (BLM 1996) as noted below.

- A *Wild* river is free of impoundments, with shorelines or watersheds essentially primitive, and with unpolluted waters.
- A *Scenic* river may have some development, and may be accessible in places by roads.
- A *Recreational* river is accessible by road (or railroad), may have more extensive development along its shoreline, and may have undergone some impoundment or diversion in the past.

The MFO ID Team has established WSR eligibility determinations and tentative classifications for 29 rivers/segments and they are summarized along with their ORVs in Table 3.42. For detailed information on MFO's WSR eligibility review, please see Appendix J – Wild and Scenic Rivers Review Eligibility Determination.

The second phase of WSR review is to determine suitability through the planning process for this DEIS. The 29 eligible segments will be furthered reviewed as to their suitability for congressional designation into the National System. Please see Chapter 4, Envionmental Consequences of Proposed Plan and Draft Alternatives.

It is BLM policy (8351 Manual, Section .32C) to manage eligible segments to protect their free-flowing nature, outstandingly remarkable values, and tentative classifications to the extent that BLM has the authority to do so. Until the ROD for the Moab RMP is signed, such protection involves case-by-case review and mitigation of any actions proposed that might affect the eligible river. Protective management will continue for any segments determined suitable in the ROD for the Moab RMP. For each suitable river, the ROD will identify specific management conditions that are in keeping with a suitability decision. Management that would apply, should any rivers be designated by Congress, is identified in BLM's 8351 Manual, Section .51.

3.15.3 Wilderness Study Areas and Designated Wilderness

3.15.3.1 Resource Overview

In 1964 Congress passed the Wilderness Act, establishing a national system of lands for the purpose of preserving a representative sample of ecosystems in their natural condition for benefit of future generations. With the passage of FLPMA in 1976 Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated wilderness.

Between 1979 and 1980, BLM inventoried approximately 22 million acres of public land in Utah for wilderness characteristics including the appearance of naturalness, outstanding opportunities for solitude or primitive, unconfined recreation, and adequate size. With the completion of the inventory and resolutions of appeals, the BLM designated about 3.3 million acres of wilderness study areas (WSAs) statewide. Eleven of these WSAs (349,824 acres) are located completely or partly within the MPA. They are currently being managed to preserve their wilderness

characteristics until Congress either designates them as wilderness or releases them for other uses. Table 3.43 summarizes these areas, and Map 2-16, Wilderness Areas and Wilderness Study Areas shows their location.

Table 3.42. River Segments in the MPA Meeting Wild and Scenic River Eligibility

River/Segment Name	Segment Description and Approximate Length in Free-Flowing BLM River Miles (BLMRM), Total River Miles (TRM)*	Outstandingly Remarkable Value(s)	Tentative Classification
Colorado River TRM segments 1-6 is 99.5	(1) Colorado/Utah Stateline to Westwater Canyon (BLMRM 1) (TRM 6.7)	Scenery, recreation, wildlife, fish, cultural, ecological	Scenic
	(2) Westwater Canyon, Mile 125, to River Mile 112 (BLMRM 11.8) (TRM 13)	Scenery, recreation, wildlife, fish, cultural, geology, ecological	Wild
	(3) River Mile 112 to confluence with the Dolores River (BLMRM 11.2) (TRM 15.7)	Recreation, wildlife, fish, cultural, ecological	Scenic
	(4) Confluence with the Dolores River to mile 49 near Potash (BLMRM 32.6) (TRM 53.5)	Scenery, recreation, wildlife, fish, cultural, geology, ecological	Recreational
	(5) River Mile 44.5 to Mile 38.5 State land boundary (BLMRM 6.1) (TRM 6.8)	Scenery, recreation, wildlife, fish, cultural, ecological	Scenic
	(6) River Mile 37.5 State land to Mile 34 Canyonlands NP (BLMRM 3.8) (TRM 3.8)	Scenery, recreation, wildlife, fish, cultural, ecological	Wild
Cottonwood Canyon	Source near Cottonwood Point to Private land boundary including the first half mile of Horse Canyon (BLMRM 10.4) (TRM 13.6)	Scenery, wildlife, ecological	Scenic
Onion Creek	(1) Source to Onion Creek road (BLMRM 3.5)	Scenery, geology, ecological	Wild
	(2) Beginning of Onion Crk Rd to Colorado River (BLMRM 9) (TRM13.22)	Scenery, geology	Recreational
Professor Creek (Mary Jane Canyon)	Forest Service and State land boundary to Diversion near private land (BLMRM 7.4) (TRM 7.7)	Scenery, recreation	Wild
Salt Wash	Arches NP boundary to the Colorado River (BLMRM 33) (TRM 6.33)	Scenery, recreation, wildlife, fish, geology	Wild
Negro Bill Canyon	(1) From state land below rim to ¼ mile from Colorado River (BLMRM 7.2)	Scenery, recreation, ecological	Wild
	(2) Last ¼ mile to Colorado River (BLMRM .25) (TRM 7.45)	Scenery, recreation, ecological	Recreational
Mill Creek (Upper)	(1) Forest boundary to private property below the diversion (BLMRM 1.4)	Scenery, recreation, fish, cultural, ecological	Recreational
(Middle)	(2) T.26 S. R. 23 E., Sec. 19 to Power Dam (BLMRM 4.6) (TRM 12.6)	Scenery, recreation, fish, cultural, ecological	Scenic
North Fork Mill Crk	Forest boundary near Wilson Mesa to Mill Crk (BLMRM 11.2) (TRM 11.7)	Scenery, recreation, cultural, ecological	Wild

Table 3.42. River Segments in the MPA Meeting Wild and Scenic River Eligibility

River/Segment Name	Segment Description and Approximate Length in Free-Flowing BLM River Miles (BLMRM), Total River Miles (TRM)*	Outstandingly Remarkable Value(s)	Tentative Classification
Dolores River	(1) Colorado-Utah Stateline to Fisher Creek (BLMRM 5.9)	Scenery, recreation, wildlife, fish, geology, ecological	Scenic
	(2) Fisher Creek to Bridge Canyon (BLMRM 6.2)	Scenery, recreation, wildlife, fish, geology, ecological	Wild
	(3) Bridge Canyon to Colorado River (BLMRM 9.9) (TRM 23.63)	Recreation, wildlife, fish, geology, ecological	Scenic
Beaver Creek	(1) FS boundary to 1 mile from Dolores River (BLMRM 6.7)	Scenery, recreation, fish, ecological	Wild
	(2)One mile to Dolores River (BLMRM 1) (TRM 9)	Scenery, recreation, geology	Scenic
Thompson Canyon	Source of Thompson to Fisher Creek (Cottonwood Cyn) (BLMRM 5.5)(TRM 5.5)	Scenery, ecological	Wild
Green River**	(1) Coal Creek to Nefertiti Boat Ramp (TRM 6)	Scenery, recreation, wildlife, fish, cultural/historic, geology, ecological	Wild
	(2) Nefertiti Boat Ramp to Swasey's Boat Ramp (TRM 8)	Scenery, recreation, wildlife, fish, cultural/historic, geology, ecological	Recreational
	(3) Swasey's Boat Ramp to I-70 bridge (TRM 13)	Scenery, recreation, wildlife, fish, cultural/historic, geology, ecological	Recreational
	(4) I-70 Bridge to river mile 91 below Ruby Ranch (TRM 28)	Scenery, recreation, fish, cultural/historic, paleontology	Scenic
	(5) Mile 91 below Ruby Ranch to Hey Joe Canyon (TRM 15)	Scenery, recreation, fish, cultural/historic	Wild
	(6) Hey Joe Canyon to Canyonlands NP boundary (TRM 29)	Scenery, recreation, fish, cultural/historic	Scenic
Rattlesnake Canyon	Source to Green Rvr (including Flat Nose George Trib) (BLMRM 31.6) (TRM 36)	Scenery, wildlife, geology, ecological	Wild

Source BLM 2004g.

* Total River Miles (TRMs) are estimated. Segment 4 of the Colorado River TRM includes river along the Potash Plant.

** The Price Field Office (in coordination with the MFO) reviewed the Green River as part of the Price Field Office RMP. The Moab RMP will carry forward eligibility findings for the Moab side of the Green River.

Table 3.43. BLM Wilderness Study Areas under Jurisdiction of the MFO[1]

Name	Acreage
Behind the Rocks	12,635
Black Ridge	52 [2]
Coal Canyon	60,755
Desolation Canyon	81,603 [3]
Floy Canyon	72,605
Flume Canyon	50,800
Lost Spring Canyon	1,624 [4]
Mill Creek Canyon	9,780
Negro Bill Canyon	7,820
Spruce Canyon	20,990
Westwater Canyon	31,160
Totals	**349,824**

[1] Except as noted, all acreage figures are from Utah BLM Statewide Wilderness Final Environmental Impact Statement (BLM 1990).

[2] Acres remaining after creation of Black Ridge Wilderness

[3] Desolation Canyon WSA spans three field offices; acreage shown is for MFO only

[4] Acres remaining after transfer of part of this WSA to National Park Service

A discussion of the current resource values and uses in each WSA, established in 1980 under the authority of Section 603(c) of FLPMA, can be found in the *Utah BLM Statewide Wilderness Final Environmental Impact Statement* (BLM 1990). Those values and resources described in the 1990 document have not changed significantly since that time, as documented in monthly WSA monitoring reports available in the MFO.

Although WSAs are by definition roadless, several of the WSAs in the MPA do include inventoried ways or known impairments (Table 3.44). During the 1979-1980 Utah Wilderness Inventory, it was necessary to divide routes used by motorized vehicles into "roads" and "ways." To be considered a road, three criteria had to be met: (1) constructed; (2) maintained by mechanical means; and (3) regular and continuous use. All other motorized routes were defined as ways, which could be left open to motorized travel as long as their use did not "impair" the suitability of the area for wilderness designation.

Within the MPA, there is a portion (5,200 acres) of the congressionally designated Black Ridge Wilderness Area. The Black Ridge Canyons Wilderness is a Congressionally designated wilderness that is part of the McInnis Canyon National Conservation Area. It was established under the Colorado Canyons National Conservation Area and Black Ridge Canyons Wilderness Act of 2000 (P.L. 106-353 of the 106th Congress). It was approved on October 24, 2000.

Table 3.44. Inventoried Ways and Known Impairments within WSA in the MPA

WSA Name	Acres	Inventoried Ways (miles)[1]	Known Impairments
Behind the Rocks	12,635	3.55	
Coal Canyon	60,755	8.0	
Desolation Canyon (MFO)	81,603	8.2[2]	
Floy Canyon	72,605	23.5	
Flume Canyon	50,800	12.5	
Lost Spring Canyon	1,624	0.25	
Mill Creek Canyon	9,780	1.83	
Negro Bill Canyon	7,820	3.54[3]	
Spruce Canyon	20,990	1.0	
Westwater Canyon	31,160	22.5	
Black Ridge	52	0	Agriculture trespass with irrigation pivots
Total	**353,615**	**84.62**	

Except as noted, motorized travel routes identified in the October, 1991, *Utah Statewide Wilderness Study Report (BLM 1991c)*

[2] Described in above document, but mileage not stated; estimated from GIS.

[3] Motorized travel routes (estimate) as depicted on the WSA legislative map submitted to Congress. No summary available in *Utah Statewide Wilderness Study Report*

3.15.3.2 Guidance and Management for WSAs and Designated Wilderness

FLPMA Section 603 (c) directs the BLM to manage the lands under wilderness review in a manner that will preserve their suitability for congressional wilderness designation. This language is referred to as the "nonimpairment" mandate or standard, and will remain in effect until Congress acts on the President's wilderness recommendation for WSAs in Utah.

BLM policies and guidance providing for management of existing WSAs and consideration of values associated with wilderness characteristics in land-use planning are detailed in:

- Manual Handbook H-1601-1, Land-use Planning Handbook
- Manual Handbook H-8550-1, Interim Management Policy and Guidelines for Lands Under Wilderness Review (IMP)

The BLM's IMP (BLM 1995) provides specific policy and guidance for management of most resource values and uses in WSAs. However, visual resource management decisions and off highway vehicle designations and route designations are made during land-use planning. A summary of some aspect of WSA management are as follows:

- This standard applies to all uses and activities except those specifically exempted from this standard by FLPMA (grandfathered uses and valid existing rights).

- Activities that are permitted in WSAs (except valid existing rights and grandfathered uses) must be temporary, create no new surface disturbance, and not involve the permanent placement of structures. There are exceptions to this standard.
- Grazing, mining, and mineral leasing uses that existed as of the passage of FLPMA (October 21, 1976) may continue in the same manner and degree, even if this would impair wilderness suitability.
- WSAs may not be closed to location under the mining laws in order to preserve their wilderness character (although the wilderness character of the area cannot be impaired through actions to perfect claims located after October 21, 1976). Valid existing rights will be recognized.
- WSAs will be managed to prevent unnecessary and undue degradation, as required by law.
- The Black Ridge Wilderness Area is managed under the Management Plan for McInnis Canyons National Conservation Area and Black Ridge Canyons Wilderness. This plan was approved October 28, 2004.

3.16 Special Status Species

Special status species occur in a variety of cover types across the planning area. For BLM management purposes, special status species include species listed as endangered, threatened, proposed, and/or candidate under the Endangered Species Act, as well as those species listed as sensitive in the State of Utah by the BLM.

Species listed as threatened or endangered are afforded protection under the Endangered Species Act (ESA) (BLM Manual 6840). The BLM is required to consult with the USFWS on potential impacts to Federally listed species. The USFWS does not consult on candidate species, although they are included for informational purposes in consultation documents and USFWS may provide information and suggestions regarding them during consultation. Periodic review of the special status species list allows for additions and/or removals depending on the status of populations, habitats, and potential threats. A total of 10 Federally listed species were identified as having the potential to occur within Grand and San Juan Counties. These include 1 plant, 5 wildlife and 4 fish species.

Sensitive species shall be managed to prevent further listing, with the same level of protection as candidate species (BLM Manual 6840). BLM sensitive species are designated by the State Director under 16 U.S.C. 1536 (a) (2). The BLM has identified 43 Sensitive Species as having the potential to occur within Grand and San Juan Counties. These include 14 plant, 18 wildlife, 4 fish, 6 reptiles and amphibians and 1 invertebrate species. (It should be noted that some of the TES species listed in Table 3.45 may occur on lands managed by agencies or organizations other than the BLM.)

3.16.1 Threatened, Endangered, and Candidate Species

The U.S. Fish and Wildlife Service (USFWS) has identified the following Threatened, Endangered and Candidate plant, wildlife and fish species as occurring in the MPA in the last ten years. Discussions of each species follow Table 3.45.

Table 3.45. U.S. Fish and Wildlife Service Threatened, Endangered and Candidate Species Occurring in the MPA, Utah

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence in Utah**	**Designated Critical Habitat Within MPA**
Plants				
Cycladenia humilis var. *jonesii* Jones cycladenia	Gypsiferous or saline soils on the Chinle, Cutler, and Summerville Formations. Barren slopes of the Moenkopi Formation. Mid-May to June. 4,400-6,000'.	Threatened	Emery County, Garfield County, Grand County, and Kane County.	None
Wildlife				
Mustela nigripes Black-footed ferret	Prairie dog towns associated with open grassland and prairies.	Endangered	May occur throughout eastern Utah, only known population occurs in the Uinta Basin.	None
Haliaeetus leucocephalus Bald eagle[1]	Roosts and nests in tall trees near bodies of water,	Threatened	Throughout Utah.	None
Strix occidentalis lucida (Mexican) spotted owl	Steep rocky canyons.	Threatened	Southern and eastern parts of Utah.	55,645 acres
Empidonax traillii extimus Southwestern willow flycatcher	Low scrub, thickets, or groves of small trees, often near watercourses.	Endangered	Throughout southern Utah.	None
Coccyzus americanus occidentalis (Western) yellow-billed cuckoo	Riparian habitats.	Candidate	Throughout Utah.	None
Gymnogyps californianus (California Condor)	Roosts and nests in cliff habitat. Forages in open areas.	Endangered, Experimental	Very rarely throughout Utah. Usually south of Interstate 70.	None
Fish				
Gila elegans Bonytail	Eddies, pools, and backwaters near swift current in large rivers	Endangered	Mainstem of the Colorado and Green rivers	205 km

Table 3.45. U.S. Fish and Wildlife Service Threatened, Endangered and Candidate Species Occurring in the MPA, Utah

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence in Utah**	**Designated Critical Habitat Within MPA**
Ptychochelius lucius Colorado pikeminnow	Adults can be found in habitats ranging from deep turbid rapids to flooded lowlands. Young prefer slow-moving backwaters	Endangered	Mainstem of the Colorado, Green, and San Juan rivers	408 km
Gila cypha Humpback chub	Fast, deep, white-water areas	Endangered	Mainstem of the Colorado and Green rivers	257 km
Xyrauchen texanus Razorback sucker	Slow backwater habitats and impoundments	Endangered	Mainstem of the Colorado and Green rivers	345 km

[1] Bald eagle was removed from federal list of threatened and endangered species on August 8, 2007.

3.16.1.1 JONES CYCLADENIA

Jones cycladenia is endemic to Utah and Arizona, and has been identified as occurring in Grand County, Utah, near lower Castle Valley. Jones cycladenia grows on barren slopes of the Chinle, Cutler and Summerville Formations in gypsiferous, saline soils. This species occurs in Eriogonum-ephedra, cool desert shrub and juniper communities at elevations ranging from 4,400 to 6,000 feet. Blooming takes place from mid-May through June (Utah Native Plant Society 2005; personal communication between Daryl Trotter, BLM and Susan Kammerdiener, SWCA on January 6, 2006).

3.16.1.2 CALIFORNIA CONDOR

The California Condor is an federally-listed endangered species with non-essential, experimental status in Utah south of Interstate 70 and west of Highway 191. Under Section 10(j) of the Endangered Species Act (ESA; 16 USC 1536[c]), this means that the species is treated as though it is proposed for federal listing, rather than as endangered. No condors are known to nest in the MPA, however, they have the potential to move through the area and potentially suitable nesting habitat does exist there. A few condors have been sighted throughout Utah since being released in northern Arizona in 1996 (USFWS 1996a). Any condors that leave the experimental population area will be considered as endangered. The agreement includes provisions for the capture and return of condors to the experimental population area should they be found outside of it (61 FR 54043 54060). California Condors prefer mountainous country at low and moderate elevations, especially rocky and brushy areas near cliffs. Condor colonies often roost in snags, tall open-branched trees, or cliffs, often near important foraging grounds (UDWR 2007). This species lays a single egg between late January and early April. The California Condor feeds only on the carcasses of dead animals and it prefers to do so in relatively open areas (USFWS 1996b).

3.16.1.3 BLACK-FOOTED FERRET

The endangered black-footed ferret is considered the rarest mammal in North America; once common throughout the Great Plains now all native population have been extirpated. Successful captive breeding programs and reintroduction efforts are returning small population to their native ranges. Because the majority of their diet is comprised of prairie dogs, recent declines in prairie dog numbers have put reintroduced populations at risk. Within the MPA, no known populations occur, but historical native ranges exist.

3.16.1.4 BALD EAGLE

Utah's wintering bald eagle population is typically found near rivers, lakes, and marshes where unfrozen, open waters offer the opportunity to prey on fish and waterfowl. The Colorado and Green River corridors are used frequently by Utah's wintering bald eagles. The eagles begin to arrive in November and head north by March. Utah also hosts a small population of desert bald eagles that can be found in desert valleys, far from any water. These eagles feed primarily on carrion such as road and hunter kill. There are only eight known nest sites in Utah, three of which occur on the Colorado River within the MPA. Nesting bald eagles in the planning area return to their nesting territories in early spring. Egg laying and incubation occurs from February through May with eaglets hatching during May and early June and fledging by early July.

The bald eagle was removed from the federal list of threatened and endangered species on August 8, 2007. It continues to be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

3.16.1.5 Mexican Spotted Owl (MSO)

Steep slopes and canyons with rocky cliffs characterize much of the Mexican spotted owl (MSO) habitat in Utah. Within the Colorado Plateau, owls are known to nest in steep-walled canyon complexes and rocky canyon habitat within desert scrub vegetation. The owl exists in small isolated subpopulations and is threatened by habitat loss and disturbance from recreation, overgrazing, road development, catastrophic fire, timber harvest, and mineral development. The MPA contains 55,645 acres of designated critical habitat for this species (Map 2-18, Mexican Spotted Owl Habitat). Within the planning area, one known nesting territory has been identified and is located approximately 0.5 miles outside the designated critical habitat. No known nesting territories have been identified within the planning area designated critical habitat. Nesting and breeding begins in March and eggs are laid in late March or early April and are incubated for approximately 30 days. The eggs usually hatch in early May. Nesting owls fledge from early to mid-June and disperse out of the natal area in the fall.

3.16.1.6 Southwestern Willow Flycatcher (SWFL)

The southwestern willow flycatcher (SWFL) utilizes and breeds in patchy to dense riparian habitats along streams and wetlands near or adjacent to surface water or saturated soils. These dense patches are often interspersed with small openings, open water, and/or shorter/sparser vegetation, creating a mosaic habitat pattern. Historically, nests were constructed in native willow species but currently the SWFL will utilize both native and exotic species, such as tamarisk and Russian olive that provide desired habitat requirements (Sogge et al. 1997). Nesting season typically begins in May when males arrive to establish breeding territories. The females arrive a week or two later and nest building begins. Eggs are laid and incubated from late May through July. Chicks fledge 12 to 15 days after hatching during July and August and migrate south in late August through early fall. Population declines are attributed to numerous, complex, and interrelated factors such as habitat loss and modification, invasion of exotic plants into breeding habitat, brood parasitism by cowbirds, vulnerability of small population numbers, and winter and migration stress. The MPA contains potential riparian habitat for this species. The exact amount of potential habitat is unknown and will require further field habitat evaluations.

3.16.1.7 (Western) Yellow-billed Cuckoo

The yellow-billed cuckoo is a Federal Candidate species that has been listed due to loss of riparian habitat from agricultural use, water use, road development and urban development. No known population of this species exists at present within the MPA. The yellow-billed cuckoo, however, is a neotropical migrant that utilizes riparian valleys throughout the state. Migrant or nesting populations may occur within the Book Cliffs, but there is inadequate sampling of potential habitat at this time UDWR). The planning area contains potential riparian habitat for this species. The exact amount of potential habitat is unknown and will require further field habitat evaluations.

3.16.1.8 Bonytail Chub

The bonytail chub has drastically declined in numbers since the 1960s and little is known about its biological requirements. Historically it was once widespread throughout the Colorado River Basin. Today it is thought to be found in large river reaches of the Colorado and Green Rivers. The MPA contains both possible populations and designated critical habitat for this species. The designated critical habitat within the planning area is found on the Green River between the Yampa River and the Colorado River (74,644 m) as well as between the Desolation area and the Gray canyons area (130,729 m) (USFWS 1990b).

3.16.1.9 Colorado Pikeminnow

Natural populations of the Colorado pikeminnow are restricted to the upper Colorado River Basin in Wyoming, Colorado, Utah, and New Mexico. The main stem of the Colorado River from Palisade, Colorado to Lake Powell has known population within this region (UDWR 2005b). Flow regulations, migration barriers, habitat loss/alteration, and introduced non-native fish have all been identified as causes for population decline (UDWR 2005b). The MPA contains both populations and designated critical habitat for this species. The designated critical habitat within the planning area is found on the Green River between the Yampa River and the Colorado River (74,644 m), between the Desolation area and the Gray canyons area (130,729 m), the Dolores River 2km from the Colorado River (63,183 m), the Colorado River from I-70 to the boundary with the Monticello Field Office (13,210 m), and the Colorado River from the Westwater Canyon Area (125,972 m) (USFWS 1991).

3.16.1.10 Humpback Chub

Populations of humpback chub have been identified in the Upper Colorado River Basin with the highest concentrations found in the Black Rocks and Westwater Canyon reaches of the Colorado River near the Colorado/Utah state line (UDWR 2005b). The presences of juvenile population suggest spawning may occur in the Upper Colorado River at Black Rocks, Westwater Canyon, Cataract Canyon, and Desolation/Gray Canyon (UDWR 2005b). Flow alterations have been identified as a significant cause of decline. The MPA contains both populations and designated critical habitat for this species. The designated critical habitat within the planning area is found on the Green River between the Desolation area and the Gray canyons area (130,729 m), and the Colorado River from Westwater Canyon Area (125,972 m) (USFWS 1990a).

3.16.1.11 Razorback Sucker

The Green River has the only known spawning areas (UDWR) for the razorback sucker, some of which are found in the MPA. Populations have been identified in the Colorado River from Rifle Colorado to Lee's Ferry Arizona and also in areas of the Green, Gunnison, and Yampa Rivers (UDWR 2005b). The planning area contains both populations and USFWS designated Critical Habitat for this species. The designated critical habitat within the planning area is found on the Green River between the Yampa River and the Colorado River (74,644 m), between the Desolation area and the Gray canyons area (130,729 m), the Colorado River from I-70 to the boundary with the Monticello Field Office (13,210 m), and the Colorado River from Westwater Canyon Area (125,972 m) (USFWS 1999).

3.16.2 BLM SENSITIVE SPECIES

3.16.2.1 BLM SENSITIVE WILDLIFE SPECIES

The BLM Sensitive Fish and Wildlife Species presented in Table 3.46 have been detected in the MPA in the past ten years. A discussion of each of these species follows.

Table 3.46. BLM Sensitive Species Occurring in the MPA

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence**
Wildlife			
Idionycteris phyllotis Allen's big-eared bat	Rocky and riparian areas in woodland and scrubland regions, roosts in caves or rock crevices.	BLM Sensitive [b]	Throughout southern Utah.
Nyctinomops macrotis Big free-tailed bat	Rocky and woodland habitats, roosts in caves, mines, old buildings, and rock crevices.	BLM Sensitive [a/b]	Throughout southern Utah.
Myotis thysanodes Fringed myotis	Desert and woodland areas, roosts in caves, mines, and buildings.	BLM Sensitive [b]	Throughout southern Utah.
Euderma maculatum Spotted bat	Found in a variety of habitats, ranging from deserts to forested mountains; roost and hibernate in caves and rock crevices.	BLM Sensitive [b]	Throughout Utah.
Corynorhinus townsendii Townsend's big-eared bat	Occur in many types of habitat, but is often found near forested areas; roosts and hibernates in caves, mines, and buildings.	BLM Sensitive [a/b]	Throughout Utah.
Vulpes macrotix Kit fox	Semi desert grasslands and open shrublands	BLM Sensitive	Throughout Utah.
Cynomys gunnisoni Gunnison's prairie dog	Grasslands, semidesert and montane shrublands	BLM Sensitive	Throughout southeastern Utah
Cynomys leucurus White-tailed prairie dog	Semi desert grasslands and open shrublands	BLM Sensitive	Throughout northcentral Utah.
Pelecanus erythrorhyanchos American white pelican	Along lakes, ponds, creeks, and rivers.	BLM Sensitive [b]	Throughout Utah.
Dolichonyx oryzivorus Bobolink	Riparian or wetland areas.	BLM Sensitive [a/b]	Throughout Utah.
Athene cunicularia Burrowing owl	Open grassland and prairies.	BLM Sensitive [a]	Throughout Utah.
Buteo regalis Ferruginous hawk	Flat and rolling terrain in grassland or shrub steppe; nests on elevated cliffs, buttes, or creek banks.	BLM Sensitive [c]	Throughout Utah.

Table 3.46. BLM Sensitive Species Occurring in the MPA

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence**
Centrocercus minimus Gunnison sage-grouse	Sagebrush and sagebrush/grassland habitats.	BLM Sensitive [a/b]	Southeastern Utah.
Centrocercus urophasianus Greater sage-grouse	Sagebrush plains, foothills, and mountain valleys.	BLM Sensitive [a/b]	Throughout Utah.
Melanerpes lewis Lewis's woodpecker	Burned-over Douglas-fir, mixed conifer, pinyon-juniper, riparian, and oak woodlands, but is also found in the fringes of pine and juniper stands, and deciduous forests, especially riparian cottonwoods	BLM Sensitive [a/b]	High and mid-elevation mountain ranges of Utah.
Accipiter gentilis Northern goshawk	Mature mountain forest and riparian zone habitats.	Conservation Agreement Species	High and mid-elevation mountain ranges of Utah.
Asio flammeus Short-eared owl	Grasslands, shrublands, and other open habitats.	BLM Sensitive [a]	Throughout Utah.
Picoides tridactylus Three-toed woodpecker	Engelmann spruce, sub-alpine fir, Douglas fir, grand fir, ponderosa pine, tamarack, aspen, and lodgepole pine forests.	BLM Sensitive [b]	High and mid-elevation mountain ranges of Utah.
Oreohelix yavapai Yavapai Mountainsnail	Coves and valleys.	BLM Sensitive [b]	Navajo and Abajo Mountains.
Fish			
Oncorhynchus clarki pleuriticus Colorado River cutthroat trout	Cool clear water, high-elevation streams and lakes	Conservation Agreement Species	Upper Colorado River drainage
Catostomus discobolus Bluehead sucker	Fast flowing water in high gradient reaches of mountain rivers	BLM Sensitive [a] Conservation Agreement Species	Tributaries of the Colorado and Green rivers
Gila robusta Roundtail chub	Large rivers, and is most often found in murky pools near strong currents	BLM Sensitive [c] Conservation Agreement Species	Mainstem and tributaries of the Colorado and Green rivers
Catostomus latipinnis Flannelmouth sucker	Large rivers, where they are often found in deep pools of slow-flowing, low gradient reaches	BLM Sensitive [a] Conservation Agreement Species	Mainstem and tributaries of the Colorado and Green rivers

[a] Listed by the State of Utah as a species of special concern due to declining population sizes within the state.

[b] Listed by the State of Utah as a species of special concern due to its limited distribution within the state.

[c] Listed by the State of Utah as Threatened

Sources: BLM 2002d; Atwood et al. 1991; Welsh et al. 2003.

Table 3.47 contains BLM Sensitive Species, which may occur within the MPA, but have not been detected in the MPA in the past ten years.

Table 3.47. State/BLM Sensitive Wildlife Species Potentially Occurring in the MPA, though Not Detected in the Last 10 Years

Scientific Name Common Name	Habitat	Status	Area of Potential and/or Known Occurrence
Amphibians and Reptiles			
Bufo microscaphus Arizona toad	Streams, washes, irrigated croplands, reservoirs, and uplands adjacent to water.	State Sensitive (SP)	Throughout Southern Utah
Sauromalus ater Common chuckwalla	Predominantly found near cliffs, boulders, or rocky slopes, where they use rocks as basking sites and rock crevices for shelter.	State Sensitive (SP/SD)	Along the Colorado River in Southern Utah
Elaphe guttata Cornsnake	Near streams, or in rocky or forest habitats	State Sensitive (SP/SD)	Throughout Southeast Utah
Xantusia vigilis Desert night lizard	Extremely secretive, spending much of its time hiding under desert shrubs.	State Sensitive (SD)	Throughout Southeastern Utah
Opheodrys vernalis Smooth greensnake	Moist grassy areas and meadows.	State Sensitive (SP/SD)	Occurs in the Wasatch, Uinta, Abajo, and La Sal Mountains.
Bufo boreas Western toad	Slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands	State Sensitive (SP)	Throughout most of Utah.
Invertebrates			
Oreohelix Eurekensis Eureka Mountainsnail	Forested areas.	State Sensitive (SD)	East Tavaputs Plateau

SP: Listed by the State of Utah as a species of special concern due to declining population sizes within the state.
SD: Listed by the State of Utah as a species of special concern due to its limited distribution within the state.

3.16.2.1.1 Allen's Big Eared Bat

Allen's big eared bat is listed as a BLM Sensitive Species because of limited distribution within the state. Southern Utah is the northern extreme of this species distribution. It occurs in various habitats including riparian, desert shrub, pinyon-juniper and mixed forest (Oliver 2000).

3.16.2.1.2 BIG FREE-TAILED BAT

The big free-tailed bat is listed as a BLM Sensitive Species because of declining population sizes and limited distribution within the state. It is a migratory species and is known from the southern half of Utah although it may range further north. The big free-tailed bat has been captured in riparian, desert shrub and montane forest habitat types (UDWR 2005b).

3.16.2.1.3 FRINGED MYOTIS BAT

The fringed myotis bat is listed as BLM Sensitive Species because of limited distribution within the state. This species occurs predominantly in southern Utah although records of this species occur throughout the state. Fringed myotis occur in a variety of habitat including riparian, desert shrub, pinyon-juniper, mountain meadow, ponderosa pine, and montane forest (UDWR 2005b).

3.16.2.1.4 TOWNSEND'S BIG-EARED BAT

The Townsend's big-eared bat is a BLM Sensitive Species, and USFS-listed Sensitive species due to limited distribution and a declining population (Oliver 2000). The Townsend's big-eared bat is a cave-roosting species that moves into man-made caves such as mines and buildings. Unlike many other bats, they are unable to crawl into crevices and usually roost in enclosed areas where they are vulnerable to disturbance. The Townsend's big-eared bat is quite sensitive to human disturbance, and this appears to be the primary cause of population decline for this species. This bat is colonial during the maternity season, when compact clusters of up to 200 individuals might be found. Maternity roosts form in the spring and remain intact during the summer. Site fidelity is high, and if undisturbed, the bats will use the same roost for many generations (Brown 1996).

3.16.2.1.5 SPOTTED BAT

The spotted bat is listed as a BLM Sensitive Species and is considered rare in Utah (though the spotted bat's distribution ranges throughout the western states from British Columbia to Mexico). The spotted bat has a very low reproductive potential, and therefore once populations are reduced they rebuild very slowly. Several sightings were reported to the UDWR in the southern portion of the MPA in 1959 and 1965, though no current populations are known today (UDWR 2005b).

3.16.2.1.6 KIT FOX

The kit fox is listed as a BLM Sensitive Species. It opportunistically eats small mammals (primarily rabbits and hares), small birds, invertebrates, and plant matter. The species is primarily nocturnal, but individuals may be found outside of their dens during the day. The kit fox mates in late winter, with a litter of four to seven pups being born about two months later. Young first leave the den about one month after birth, in late spring or early summer. The species most often occurs in open prairie, plains, and desert habitats.

3.16.2.1.7 GUNNISON'S PRAIRIE DOG

The Gunnison's prairie dog is listed as a BLM Sensitive Species. This species is highly susceptible to sylvatic plague and has a low ability to repopulate once the plague has decimated a colony. Mortality from plague frequently exceeds over 99% within colonies. Additional threats include poisoning, agricultural conversion and urbanization and development (UDWR 2005b).

3.16.2.1.8 WHITE-TAILED PRAIRIE DOG

The white-tailed prairie dog is listed as a BLM Sensitive Species. This species has declined by an estimated 84% in southern Utah. The decline can be attributed to this species' high susceptibility to sylvatic plague. Population numbers rarely rebound to previous numbers and occupied acreage once the plague has decimated a colony. Additional threats include poisoning, grazing, fire suppression, agricultural conversion, urbanization and oil and gas development (UDWR 2005b).

3.16.2.1.9 AMERICAN WHITE PELICAN

The American white pelican is listed as a BLM Sensitive Species. This species' preferred nesting habitats are islands, especially those associated with fresh water lakes. Preferred foraging areas are shallow lakes, marshlands, and rivers. In Utah, the only known breeding colonies are located in the northern portions of the state specifically within the Utah Lake/Great Salt Lake ecological complex (Parrish et al. 2002).

3.16.2.1.10 BOBOLINK

The bobolink is listed as a BLM Sensitive Species and a State Sensitive Species because of (range-wide) declining populations and limited habitat. Wet Meadow habitats have been decreased and fragmented in Utah due to many of the same factors that impact riparian areas, e.g., agricultural encroachment, urban encroachment, road development, water development (reservoirs and in-stream flow depletions) and channelization. (Parrish et al. 2002).

3.16.2.1.11 BURROWING OWL

The burrowing owl is listed as a BLM Sensitive Species to recent decreases in population size. Burrowing owls are neotropical migrants, nest underground in burrows, and are typically found in open desert grassland and shrubland areas that are level and well drained (Gleason and Johnson 1985). They depend on burrowing mammals for nest sites and are often associated with prairie dog colonies (Konrad and Gilmer 1984). The decline of the owl's population across its range appears to be due primarily to agricultural practices, use of pesticides, and the decline of prairie dog colonies (Haug et al. 1993).

3.16.2.1.12 FERRUGINOUS HAWK

The ferruginous hawk, BLM Sensitive Species, is the largest of the North American buteos. It is a neotropical migrant breeding from southwestern Canada to central Arizona, New Mexico, and

northern Texas and wintering in California to northern Mexico. It is a year-round resident from Nevada through western and southern Utah, northern Arizona, and New Mexico to eastern Colorado and South Dakota. In Utah, the ferruginous hawk nests at the edge of juniper habitats and open, desert and grassland habitats in the western, northeastern, and southeastern portions of the state. Within the MPA they are found through the Cisco Desert, along the Colorado and the Green Rivers and the Potash area. Ferruginous hawks are highly sensitive to human disturbance and are also threatened by habitat loss from oil and gas development, agricultural practices, and urban encroachment. They have experienced a decline across much of their range and have been extirpated from some of their former breeding grounds in Utah (UDWR 2005b).

3.16.2.1.13 GUNNISON SAGE-GROUSE

Sage-grouse require a variety of habitats found in large expanses of sagebrush (*Artemisia* spp.) communities below 9,800 feet, with a diversity of grasses and forbs and healthy riparian ecosystems. Their habitat requirements differ both seasonally and for sex and age classes. The presence of each habitat type in healthy condition in close proximity to winter, lek, nest and brood-rearing habitat is essential. A large percent of each seasonal habitat must be in later seral stage ecological condition to meet the requirements of the grouse. Population declines are attributed to several factors, including habitat loss and fragmentation resulting from increased roads, housing developments, uranium mill tailings remedial action, power lines, and loss of riparian areas. Other issues decreasing habitat quality are livestock grazing, drought, land treatments, increased elk and deer populations, and herbicides. The MPA contains habitat for this species and has had documented populations through the mid-1990s. No sightings have been reported in the past ten years (UDWR 2005b).

3.16.2.1.14 GREATER SAGE-GROUSE

The greater sage-grouse is listed as a BLM Sensitive Species because of their limited distribution within the state and because of recent decreases in population size. Greater sage-grouse are found in the sagebrush foothills and plains of the Intermountain Region. Since 1967, the abundance of male grouse on known breeding grounds in Utah has declined approximately 50%. Brood counts and harvest data show a similar downward trend. Habitat loss and fragmentation from agricultural encroachment, urbanization, and overgrazing are the primary threats to the greater sage-grouse (UDWR 2005b).

3.16.2.1.15 LEWIS'S WOODPECKER

The Lewis's woodpecker is listed as a BLM Sensitive Species and USFWS Candidate species because of its limited distribution within the state and because of recent decreases in population size. This woodpecker is a permanent resident to western North America and, in Utah, is found primarily in the riparian habitats of the Uinta Basin and along the Green River. Formerly common in several areas of the state, the species distribution is currently reduced, and the species is experiencing a range-wide decline. This woodpecker usually feeds on flying insects in open areas interspersed with trees in the spring and summer. It feeds primarily on fruits and nuts in the fall and winter. It is adversely affected by loss of habitat from water development and

agricultural practices and may be increasingly affected by competition for nest cavities from non-native bird species (UDWR 2005b).

3.16.2.1.16 NORTHERN GOSHAWK

The goshawk is a neotropical migrant raptor that can be found in mature mountain forests and valley cottonwood habitats. In the winter months goshawks are known to move into lower elevation to forage (Squires and Reynolds 1997). Due to low population densities, loss of timber habitat and development in riparian areas, populations have declined across the Colorado Plateau (UDWR). A Conservation Agreement has been developed for the Northern Goshawk to maintain and restore habitat for the northern goshawk on the National Forests in Utah and in small portions of Wyoming and Colorado. Threats that might lead to listing under the Endangered Species Act of 1973, as amended, will be eliminated or reduced through implementation of the Conservation Agreement and Conservation Strategy. The goals of the Agreement are to assure the long-term population viability of goshawks by maintaining adequate connected nesting and foraging habitat throughout the State of Utah. This will be accomplished through management that mimics the variability of size, intensity, and frequency of native disturbance regimes within the full historic range of variation, including extreme events. Within the MPA there is habitat and the possible presence of goshawk along the interface between BLM lands and the Manti La National Forest.

The goshawk is a neotropical migrant raptor that can be found in mature mountain forest and valley cottonwood habitats. In the winter months goshawks are known to move into lower elevation to forage. Due to low population densities, loss of timber habitat and development of riparian areas, populations have declined across the Colorado Plateau (UDWR 2005b).

3.16.2.1.17 SHORT-EARED OWL

The short-eared owl is listed as a BLM Sensitive Species. This owl is usually found in grasslands, shrublands, and other open habitats. There is some concern that short-eared owl populations are declining. It is an uncommon breeder in the northern half of the Utah, mostly in the northwestern portion of the state (UDWR 2005b).

3.16.2.1.18 THREE-TOED WOODPECKER

The three-toed woodpecker is listed as a BLM Sensitive Species because of their limited distribution within the state. Because this species requires snags for feeding, perching, nesting, and roosting, it is threatened by activities such as logging and fire suppression which remove or eliminate snags. Salvage logging in beetle infested areas also reduces both food and nesting sites for Three-toed Woodpeckers. Salvage logging after a fire reduces or eliminates high quality foraging habitat. Fire suppression that eliminates fire-killed trees are also a threat (Parrish et al. 2002).

3.16.2.1.19 YAVAPAI MOUNTAINSNAIL

The Yavapai mountainsnail is listed as a BLM Sensitive Species. It has not been detected in Utah since the original discoveries in 1919. This species has been reported only from 2 localities in Utah, one on Navajo Mountain and one in the Abajo Mountains near Monticello, both in San Juan County (UDWR 2005b).

3.16.2.1.20 COLORADO CUTTHROAT TROUT

There is a Conservation Agreement concerning the Colorado cutthroat trout (CRCT Task Force 2001) to expedite implementation of conservation measures in Colorado, Utah, and Wyoming as a collaborative and cooperative effort among resource agencies. Threats that warrant CRCT listing as a special status species by state and Federal agencies and might lead to listing under the Endangered Species Act of 1973, as amended, will be eliminated or reduced through implementation of the Conservation Agreement and Conservation Strategy. The goals of the Agreement are to assure the long-term prosperity of CRCT throughout their historic range and to maintain areas which currently support abundant CRCT and manage other areas for increased abundance, to maintain the genetic diversity of the species, and to increase the distribution of the CRCT where ecologically, sociologically, and economically feasible. Within the MPA there is habitat and possible presence of CRCT is both La Sal Creek and Beaver Creek (according to the UDWR). The MFO manages approximately 0.08 miles of La Sal Creek and 6.6 miles of Beaver Creek as CRCT habitat (the upper two miles of Beaver Creek is considered native CRCT habitat) (UDWR 2005b).

3.16.2.1.21 BLUEHEADED SUCKER

The blueheaded sucker is listed as a BLM Sensitive Species, as it has been extirpated from 55% of its historical distribution. Within the MPA, populations can be found in the mainstream rivers and tributaries to the headwater reaches of the Colorado and Green Rivers and in the Dolores River. Declines in populations are attributed to hybridization, altered hydrological regimes, in-stream habitat loss and degradation and predation of non-native fish (UDWR 2005b).

3.16.2.1.22 ROUNDTAIL CHUB

The roundtail chub is listed as a BLM Sensitive Species as it has been extirpated from 45% of its historical distribution in the Colorado River Basin. Within the MPA, populations are known to occur in the Colorado River from the Utah border to Moab and in the Green River from the Colorado-Green confluence upstream to Echo Park. Declines in populations are attributed to hybridization with other chub, habitat loss and degradation due to dam and reservoir construction, competition and predation of non-natives, parasitism, and dewatering activities (UDWR 2005b).

3.16.2.1.23 FLANNELMOUTH SUCKER

The flannelmouth sucker is listed as a BLM Sensitive Species, as it now occupies only 50% of its historical range within the Upper Colorado River Basin. Within the MPA, populations are known

to occur in the Colorado, Green and Dolores Rivers. Populations have declined since the 1960s due to impoundment of the mainstem of the Green and Colorado Rivers. (Flannelmouths have been extirpated from portions of the Gunnison River.) This fish is also susceptible to altered thermal and hydrological regimes, hybridization and competition of non-native fish (UDWR 2005b).

3.16.2.1.24 ARIZONA TOAD

The Arizona toad is listed as a BLM Sensitive Species. It occurs in isolated areas of the southwestern United States. In Utah, the Arizona toad is found only in the southwestern portion of the state. This species inhabits streams, washes, irrigated crop lands, reservoirs, and uplands adjacent to water (UDWR 2005b).

3.16.2.1.25 COMMON CHUCKWALLA

The common chuckwalla is listed as a BLM Sensitive Species. It occurs in the southwestern United States and in parts Mexico. In Utah, the species occurs only in the southern portion of the state. It is included on the *Utah Sensitive Species List* because of habitat modification and other threats. Chuckwallas are predominantly found near cliffs, boulders, or rocky slopes (UDWR 2005b).

3.16.2.1.26 CORNSNAKE

The cornsnake is listed as a BLM Sensitive Species because of limited distribution and its potential for genetic uniqueness from the cornsnakes east of the Continental Divide. The cornsnake is associated with the Colorado and Green River corridors and population declines are attributed to habitat degradation, vegetative changes, and illegal collection (UDWR 2005b).

3.16.2.1.27 DESERT NIGHT LIZARD

The desert night lizard is listed as a BLM Sensitive Species. In Utah, the desert night lizard occurs only in a few small areas of the southern portion of the state, and it is included on the *Utah Sensitive Species List*.

3.16.2.1.28 SMOOTH GREENSNAKE

The smooth greensnake is listed as a BLM Sensitive Species because of its special habitat requirements, making it susceptible to habitat loss. The smooth green snake is associated with meadows and stream margins and habitat threats include livestock grazing, recreational activities, loss of wetlands, and human development (UDWR 2005b).

3.16.2.1.29 WESTERN TOAD

The western toad is listed as a BLM Sensitive Species. It occurs throughout most of Utah, and can be found in a variety of habitats, including slow moving streams, wetlands, desert springs, ponds, lakes, meadows, and woodlands (UDWR 2005b).

3.16.2.1.30 EUREKA MOUNTAINSNAIL

The Eureka mountainsnail is BLM Sensitive Species and is endemic to Utah and only four populations have been documented, one of which was located in northern Grand County in 1964. The precise location of this population is unknown and it has not been relocated since its discovery 39 years ago (UDWR 2005b).

3.16.2.2 BLM SENSITIVE PLANT SPECIES

The current BLM special status plant species list was updated in August 2002. The 14 sensitive plant species known in the project area are listed and discussed in Table 3.48.

Table 3.48. BLM Sensitive Plant Species with the Potential to Occur in the MPA

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence**
Astragalus pubentissimus var. peabodianus Peabody's milkvetch	Entrenched channels of escarpments draining south and west flanks of Tavaputs Plateaus. Pinyon-Juniper and mixed desert shrub. 4,300-5,800'. Blooms May-early July.	BLM Sensitive	Grand County (type from Thompson Spring). Endemic to Grand and Emery Counties.
Astragalus sabulous var. *sabulous* Cisco milkvetch	Salt desert shrub in Mancos Shale Formation in Grand River Valley (Cisco desert). Selenophyte. Blooms late March-May. 4,260-5,250.	BLM Sensitive	Endemic. To Grand County (Thompson east to Cisco Mesa).
Astragalus sabulous var. *vehiculus* Stage-station milkvetch	Salt desert shrub in Morrison Formation. Selenophyte. Blooms April-May. 4500- 4,800'. Considered geographically isolated from var. *sabulous.*	BLM Sensitive	Endemic to Upper Courthouse Wash, Grand County.
Gilia latifolia var. *imperialis* Cataract Canyon gilia	Shadscale and other mixed desert shrub communities, esp. wash bottoms and ledges. 3,800-5,215'. Blooms June-October.	BLM Sensitive	Southeastern Utah Endemic.
Habenaria zothecina (syn. *Platanthera zothecina*) Alcove bog orchid	Moist streambanks, seeps, hanging gardens, in mixed desert shrub, pinyon-juniper, and oakbrush, associated with cottonwood and willow. Mid June-Aug. 4,360-8,690'.	BLM Sensitive	Emery, Garfield, Grand, San Juan and Uintah Counties, Utah and Coconino, Arizona.

Table 3.48. BLM Sensitive Plant Species with the Potential to Occur in the MPA

Scientific Name **Common Name**	**Habitat**	**Status**	**Area of Potential and/or Known Occurrence**
Lomatium latilobum Canyonlands lomatium (*C. biscuitroot*, or C. desert-parsley)	Sandy soil or crevices in Entrada sandstone. Slot canyons. (Found in Navajo sandstone that weathers like Entrada in Sand Flat and Mill Creek.) Prefers the sheltered, cool habitat on all slopes and aspects. April-June. 4,800-6,855'.	BLM Sensitive	Endemic to San Juan County, Grand County (Wilson Mesa, Mill Creek Canyon, Burkholder Draw, Rill Creek) Southeastern Utah (and adj. Mesa County Colorado)
Lygodesmia grandiflora var. *doloresensis* Dolores rushpink	Reddish alluvial soil, juniper-grassland, sagebrush. June. 4,500-4,700'.	BLM Sensitive	Endemic to Grand County, Utah and Mesa County, Colorado.
Lygodesmia grandiflora var. *entrada* Entrada rushpink (or skeletonweed)	Juniper, mixed desert shrub communities. June. 4,400-4,800'.	BLM Sensitive	Endemic to Grand County, Emery Co and San Juan County. Type from Courthouse Wash.
Mentzelia shultziorum Shultz' stickleaf (or blazing star)	Shadscale, eriogonum, ephedra communities in Cutler Formation. Moderate to very steep slopes of Paradox and Moenkopi Formations. Silty clay loam or silty loam. 4,200-6,000'. Blooms from mid-June to September.	BLM Sensitive	Grand County (type along Onion Creek). Eight known populations southeast of Colorado River. Endemic to Emery and Grand Counties.
Oreoxis trotteri Trotter's oreoxis (spring-parsley)	Mixed juniper and warm desert shrub. Slickrock or Main Body Entrada sandstone on eastern slope of Courthouse Rock and Navajo sandstone below on flats. Most abundant on Moab Tongue white sandstone of Entrada. Late April-mid-June. 4,750-5,000'.	BLM Sensitive	Grand County (type Courthouse Rock, northwest of Moab). Endemic.
Pediomelum aromaticum var. *tuhyi* Paradox breadroot	Pinyon-juniper and mixed desert shrub on Entrada, Kayenta and Mossback Formations. 5,600-6,500'. Blooms May-June.	BLM Sensitive	San Juan County endemic.

Table 3.48. BLM Sensitive Plant Species with the Potential to Occur in the MPA

Scientific Name Common Name	Habitat	Status	Area of Potential and/or Known Occurrence
Perityle specuicola Alcove rock-daisy	Drier crevices in seasonally wet hanging gardens, and alcove communities. Navajo and Windgate sandstone and Rico Formation, but not substrate specific. Blooms mid-July-late Sept. 3,690-4,000'.	BLM Sensitive	San Juan County, Grand County (type north of Moab). Narrowly endemic to Colorado Plateau (from confluence of Colorado River with the Dolores and Dark Canyon.
Sphaeralcea janeae *(or S. leptophylla var. janeae)* Jane's Globemallow	Sandy soils of weathered white rim and Organ Rock members of Cutler Formation. Warm and salt desert shrub. 4,000-4,600'. Blooms May-June.	BLM Sensitive	San Juan County (type near White Rim road), Grand County (questionable). Endemic to the Canyonlands in San Juan and Wayne Counties.
Sphaeralcea psoraloides San Rafael globemallow	Eastern and southeastern footslopes of the Swell. Saline and gypsiferous substrates. Zuckin-ephedra communities of Entrada siltstone. Blooms mid-May-June. 4,000-6,000'.	BLM Sensitive	Grand County Endemic to San Rafael Swell (Wayne and Emery Counties).

Sources: BLM 2002d; Atwood et al. 1991; Welsh et al. 2003. Utah Native Plant Society 2005; personal communication between Daryl Trotter, BLM and Susan Kammerdiener, SWCA on January 6, 2006.

3.16.3 Conservation Agreement Species

There are Conservation Agreements among resource agencies in Arizona, Colorado, New Mexico, Utah and Wyoming to expedite the implementation of conservation measures concerning the following species: Colorado cutthroat trout, the blueheaded sucker, the roundtail chub, the flannelmouth sucker and the northern goshawk.

3.17 Travel

3.17.1 Overview

In the past, travel management has focused on motor vehicle use; however, travel management encompasses all forms of transportation, including mechanized vehicles such as bicycles, motorcycles, and four-wheeled all-terrain vehicles, cars, and trucks.

Off-highway vehicles (OHVs) (also known as off-road vehicles) include all-terrain vehicles (ATVs), off-highway motorcycles, and snowmobiles. These are vehicles capable of, or designated for, travel on or immediately over land, water, or other natural terrain. The current

1985 RMP included designations for Open, Closed, and Limited OHV areas. Areas designated as Open are open to cross-country motorized travel. Areas designated as Closed are entirely closed to motorized travel. Areas designated as Limited restrict motorized travel to either existing or designated routes, with Limited designations applying to both existing and designated roads and trails. Since 1992, the MFO has instituted several revisions to the original 1985 RMP (through plan amendments) as well as Federal Register notices regarding OHV use. These changes have resulted in changes from Open to Limited to Existing Roads and Trails, and in some cases from Open to Limited to Designated Routes. These changes attempted to reduce natural and cultural resource damage produced by unrestricted cross-country travel.

The increase in the use of OHVs has created numerous issues within the MPA. The speed and increasing capability of OHVs allows easier access to remote parts of the planning area, makes management of this activity more difficult, and increases the potential range of adverse impacts to natural resources. Cross-country OHV use, in particular, is creating additional resource damage and is an important issue for the MFO. Also, the popularity of OHV-related activities continues to grow, both in private use and through special events, which exacerbates the management and resource impacts issues.

3.17.2 Vehicular Routes

The MFO administers approximately 277 miles of roadway. The MFO also maintains the main entrance roads in the Canyon Rims Recreation Area (the Needles Overlook and Anticline Overlook Roads, both of which are State Scenic Backways). Other routes, which are primarily used for vehicular recreation, are those that are marked by the MFO, often in conjunction with OHV user groups.

Many motorized routes within the MPA are used for recreational purposes. The most popular motorized routes include any of the 785 miles of the Jeep Safari Route system (this figure includes dirt roads within the planning area that are permitted for Jeep Safari use) (see Section 3.10 – Recreation).

There are no routes solely dedicated to OHV use. These activities take place on the same routes as used by four-wheel drive vehicles, motorcycles, and mountain bikes, and often occur on Jeep Safari routes. Additionally, there is an informal, user-made network of motorcycle routes in the White Wash Dunes area (see below).

3.17.2.1 Mountain Bike Routes

As mentioned above, mountain bike use occurs on many of the Jeep Safari routes as well as on other routes. Popular mountain bike routes include Gemini Bridges, Porcupine Rim, the Slickrock Bike Trail, Amasa Back, Flat Pass, Klondike Bluffs, Kokopelli's Trail, Poison Spider, Lower Monitor and Merrimac, Bartlett Wash, Moab Rim, Kane Creek Canyon Rim, Bar M, Hurrah Pass and Onion Creek.

3.17.2.2 EAST OF HIGHWAY 191

The area south of I-70 and east of U.S. Highway 191 borders Arches National Park. This area of public land includes the Klondike Bluffs Trail, the Copper Ridge, and the Bar M Loop Bike Trail. Cross-country OHV travel is prohibited in most of this area through a Federal Register notice.

3.17.2.3 WEST OF HIGHWAY 191

This area includes scenic driving and several motorized and non-motorized trailheads. U.S. Highway 191 from I-70 to its intersection with Utah Highway 128 is part of the National Prehistoric Highway National Scenic Byway. Although off-road driving is prohibited by Federal Register notice, substantial cross-country OHV travel is occurring. This off-road damage includes hill climbs, alternate route choice, play around OHV campsites and other forms of resources damage. The current vehicle designation (Limited to Existing Roads and Trails) is in effect until the approval of the proposed RMP.

The area west of 191, south of I-70 and east of the Green River has seen substantial growth in recreation since the time of the 1985 RMP. This recreational growth includes motorized and non-motorized recreation that often competes for the same locations. Motorized recreation includes jeeping and OHV use; non-motorized recreation includes mountain biking. The area west of Highway 191 has seen the largest growth in recreational user conflicts within the MPA (see Section 3.10 – Recreation).

3.17.2.4 UTAH HIGHWAY 313

Utah Highway 313 is also known as the Dead Horse Mesa Scenic Byway (a State Scenic Byway), providing access to Canyonlands National Park, to Dead Horse Point State Park, and to Seven Mile Canyon. Off-highway vehicle restrictions implemented for this area are a result of two Federal Register Notices published in 2001, and are in effect until the completion of the proposed RMP. Resource damage is currently occurring in this area from OHV travel.

3.17.2.5 KOKOPELLI'S TRAIL

Kokopelli's Trail is a 140-mile multiple use trail connecting Loma, Colorado and Moab, Utah. Mountain bikers use this route heavily, although most portions are also suitable for OHVs and full-sized four-wheel drive vehicles. The route passes through lands administered by the MFO, the BLM Grand Junction Field Office, and the USDA Forest Service (Manti-LaSal National Forest), and was established for multi-day bike trips.

3.17.2.6 WHITE WASH SAND DUNES/TEN MILE CANYON

White Wash Sand Dunes are located east of the Green River and south of I-70. White Wash is very popular with OHV users, especially on spring and fall weekends. Off-highway vehicle riders also visit other sites in this area, including Ten Mile Canyon, Crystal Geyser, Red Canyon, Rainbow Rocks, and Duma Point.

Off-Highway Vehicle use categories in this area are mixed. The current RMP has designated the northern part of the area as Limited to existing roads and trails. The southern portion of the area is limited to existing roads and trails through a Federal Register Notice (January 2001) and is in effect until the proposed RMP is approved. A middle portion of the area is Open to cross-country travel. Extensive resource damage is occurring from unrestricted vehicle travel. Resource damage from OHV use includes damage to soils, scenic quality, vegetation, cultural, and paleontological resource degradation as well as damage to riparian resources.

3.17.2.7 UTAH RIMS

Utah Rims Recreation Area is a 15,400-acre area immediately west of the Colorado border and south of I-70. This area is primarily used for day use by western Colorado residents. Dirt biking is the primary recreational activity but the area is also popular with mountain bikers. Currently, resource damage is occurring as a result of OHV travel.

3.17.2.8 THE COLORADO RIVERWAY

The Colorado Riverway includes the public lands managed by the BLM in the following areas:

- Utah Highway 128 from Dewey Bridge to U.S. 191. Utah Highway 128 is a State Scenic Byway, and is also a portion of the Prehistoric Highway National Scenic Byway.
- Utah Highway 279 from Moab Valley to Canyonlands National Park. Utah Highway 279 is a State Scenic Byway.
- Kane Creek Road from Moab Valley to the block of state land south of Hunter Canyon, including Amasa Back.

The Colorado Riverway is the most popular destination of MPA visitors, with recent annual visitation estimated to be over 1 million people. Visitors engage in four-wheel driving, scenic auto touring, mountain biking, and numerous other recreational activities. Since the approval of the current RMP, resource use problems within the Colorado Riverway have been addressed and corrected by the actions taken through the 1992 Colorado Riverway Management Plan (see Section 3.10 – Recreation); however, there are still some remaining resource use problem areas. Cross-country OHV travel restrictions were addressed through a Federal Register Notice (July 1992), which is in effect only until the completion and approval of the proposed RMP.

3.17.3 CURRENT MANAGEMENT

The current 1985 (Grand) RMP provides the framework for planning in the area. The RMP was completed prior to the rapid expansion of recreational vehicle use and visitation on public lands in the MPA. The RMP specifically addresses the Colorado and the Dolores Rivers, and the issuance of recreation permits as well as a few travel routes; however, most of the issues and locations that are now important to management of resources within the planning area were not addressed. The guidance given in the current RMP for management of roads, trails, and cross-country-vehicle use lacks the specificity needed to manage the current burgeoning use of vehicle within the planning area.

The 1985 RMP made the following OHV travel decisions:

1. Designate 1,183,660 acres as open to OHV use;
2. Designate 596,234 acres limited to existing roads and trails;
3. Designate 24,454 acres as closed to OHV use;
4. Designate 15,206 acres as in Mill Creek and East Mill Creek as limited to designated roads and trails.

3.18 VEGETATION

3.18.1 RESOURCE OVERVIEW

Vegetation in the MPA provides direct economic benefits such as livestock grazing, as well as indirect benefits such as wildlife cover, browse, and nesting habitat for a variety of wildlife species. Vegetation also functions in the hydrologic cycle as a dynamic interface between the soil and atmosphere. It intercepts precipitation, retards overland flow, retains soil water and nutrients (root absorption), and transports water and nutrients back to the atmosphere via stems and leaves (evapotranspiration). Vegetation is also an integral part of what makes the Moab area an aesthetically pleasing destination for visitors.

The State of Utah is divided into five major eco-regions determined by geographic and climatic similarity. The MPA occurs entirely within the Colorado Plateau ecological province. The unique climate and geology of the Colorado Plateau allow for the growth of many endemic and rare plant species and, thus, a substantial amount of biodiversity. The variety of elevations and precipitation zones within the planning area only enhances the area's biodiversity.

3.18.2 DOMINANT VEGETATION COMMUNITIES

Vegetation across the MPA has been identified using Utah Gap Analysis data (Edwards et al. 1995). Gap vegetation data were developed using multi-spectral satellite imagery in conjunction with image processing and classification software. The relationship between spectral signatures and a given vegetation type was further refined via development of models that incorporated a variety of topographic and distributional information for that given vegetation type. Utah Gap Analysis vegetation data were intended to be used for depicting the distribution of the state's various vegetation types at scales of 1:100,000 or smaller. While adequate for characterizing vegetation over large areas, this data is less accurate when viewed for smaller project areas. Utah Gap Analysis data indicate the following cover types and acreages in the planning area (Table 3.49). Similar cover types have been grouped together and are described in the sections following Table 3.49. The cover types that do not have significant native vegetation (water, urban, barren and agriculture) are presented in the table, but not discussed in the document.

Table 3.49. Acres of Land by GAP Cover Type in the MPA

Cover Type	Acres
Desert Shrub (includes salt desert scrub, grassland, blackbrush and greasewood)	1,302,389
Sagebrush and perennial grassland (includes sagebrush and sagebrush/perennial grass)	248,461
Oak/mountain shrub	310,673
Pinyon-juniper (includes juniper, pinyon-juniper and pinyon)	841,077
Conifer and mountain shrub (includes ponderosa pine, ponderosa pine/ mountain shrub, spruce-fir and fir/shrub, aspen and aspen-conifer)	117,916
Alpine	3,014
Riparian and wetland	4,948
Water	8,508
Urban	4,153
Barren	6,233
Agriculture	6,133

The distribution of vegetation types in the project area is primarily influenced by soil type, elevation, precipitation, and topography, but also by land management activities such as livestock and wildlife grazing, road and minerals development, and OHV use. Additionally, vegetation communities were impacted by severe drought conditions existing in the area from 1998 through 2004. See Map 3-15, Vegetation Types for the distribution of vegetation across the planning area.

3.18.2.1 Desert Shrub

This vegetation type accounts for 41.1% of the cover in the MPA. Areas supporting desert shrub vegetation receive relatively low annual precipitation (5 to 10 inches), which results in very little soil moisture available for plant growth. Elevations range is from 4,000 to 5,400 feet. Soils are often very saline or alkaline and vary in moisture availability, from drier, well-drained areas to areas where the water table is near the surface (MacMahon 1988). Dominant shrub species include shadscale (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), blackbrush (*Coleogyne ramosissima*), four-wing saltbush (*Atriplex canescens*), Nuttall's saltbush (*Atriplex nuttallii*), mat saltbush (*Atriplex corrugata*), Mormon tea (*Ephedra* spp.), spiny hopsage (*Grayia spinosa*), horsebrush (*Tetradymia canescens*), and rabbitbrush *Chrysothamnus spp*.). Dominant forb species include snakeweed (*Gutierrezia sarothrae*) and buckwheat (*Eriogonum* spp.). Dominant grass species include saline wildrye (*Leymus salinus*), galleta (*Hilaria jamesii*), Indian ricegrass (*Stipa hymenoides*) and sand dropseed (*Sporobolus airoides*). These communities are generally associated with Mancos-derived clay soils, which are extremely susceptible to wind and water erosion following surface disturbances (see Section 3.13 – Soils for more information).

3.18.2.2 Sagebrush and Perennial Grassland

This vegetation type accounts for approximately 7.8% of the cover in the MPA. The landscapes that support this vegetation community have moderately deep soils and precipitation totaling 11 to 16 inches per year. Elevation ranges from 5,500 to 7,300 feet with little localized relief. Big sagebrush (*Artemisa tridentata*) dominates the vegetation in this community type. Elevation and soil depth influence the species composition and density, which may include horsebrush, rabbitbrush, spiny hopsage, saltbush, Mormon tea, and winterfat (*Krascheninnikovia lanata*) (MacMahon 1988). Principle grass species include sand dropseed (*Sporobolus cryptandrus*), western wheatgrass (*Elymus smith*ii), Indian ricegrass and galleta.

Land treatments, including crested wheatgrass (*Agropyron cristatum*) seedings, have historically occurred within this community type, and are considered altered ecological sites. Additionally, significant percentages of sagebrush have also been converted to monotypic stands of exotic cheatgrass (*Bromus tectorum*) or Russian thistle (*Salsola kali*) as a result of wildfires, drought, and improper grazing management practices. Appropriate re-vegetation methods can be effective in restoring diverse community compositions in this zone, but large-scale rehabilitation has yet to be implemented successfully within the MPA (personal communication between Daryl Trotter, BLM and Susan Kammerdiener, SWCA on January 6, 2006).

3.18.2.3 Oak/Mountain Shrub

This vegetation type accounts for approximately 9.8% of the cover in the MPA. Deciduous shrubland principally dominated by alder-leaf mountain-mahogany (*Cercocarpus montanus*), cliff-rose (*Purshia mexicana*), bitterbrush (*Purshia tridentata*), serviceberry (*Amelanchier utahensis* and *Amelanchier alnifolia*), buckbrush (*Ceanothus* spp.), chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpos* spp.), point-leaf manzanita (*Arctostaphylos pungens*) and bearberry (*Arctostaphylos uva-ursi*). Primary associated shrub species include gambel oak (*Quercus gambelii*), palmer oak (*Quercus chrysolepis*), Tucker's oak (*Quercus welshii*) Turbinella live-oak (*Quercus turbinella*), sagebrush and maple (*Acer* spp.) Primary associated tree species include quaking aspen (*Populus tremuloides*) and curl-leaf mountain-mahogany (*Cercocarpus ledifolius*).

3.18.2.4 Pinyon - Juniper Woodlands

This vegetation type accounts for approximately 26.5% of the cover in the MPA. These woodland species generally grow at elevations between 4,700 and 8,600 feet where precipitation totals 12 to 18 inches per year. The supporting landscape varies in topography from level to steep slopes (0% to 80%). Dominant tree species include pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Primary associated shrub species include sagebrush, Mormon tea and blackbrush. Dominant grass species include saline wildrye. Pinyon dominates the overstory as stands reach the upper limits of the elevational range, whereas juniper dominates at lower elevations. As elevation increases within this zone, stand structure changes from open overstory with a sparsely vegetated under-story to more dense with a greater variety of species. Land treatments followed by crested wheatgrass seedings have historically occurred within this community type and are considered altered ecological sites.

3.18.2.5 Conifer and Mountain Shrub

This vegetation type accounts for approximately 3.7% of the cover in the MPA. The annual precipitation ranges from 14 to 25 inches in areas that support this vegetation community. Elevations range from 6,000 to 9,000 feet, and slopes are often extremely steep. The soils are more fertile than those in other areas. Due to the extreme slopes and often rocky terrain, these community types are generally managed for wildlife habitat (Grand County Soil Survey, NRCS 1981). This vegetation community is defined as a conifer forest or woodland with Douglas fir, ponderosa pine, or quaking aspen dominate/associate or co-dominate with mountain shrub. The principle tree species are Douglas fir (*Pseudosuga menziesii*), ponderosa pine (*Pinus ponderosa*) and quaking aspen. Principle shrub species include Gamble oak, bitterbrush, bigtooth maple (*Acer grandidentatum*), snowberry, serviceberry, manzanita and ninebark (*Physocarpus* spp.). Primary associated tree species include subalpine fir (*Abies lasiocarpa*), white fir (*Abies concolor*), Englemann spruce (*Picea engelmannii*) and limber pine (*Pinus flexilis*). Primary associated shrub species include common juniper (*Juniperus communis*), sagebrush, rabbitbrush and curlleaf mountain mahogany (*Cercocarpus ledifolius*).

3.18.2.6 Alpine

This vegetation type accounts for approximately 0.1% of the cover in the MPA. It is comprised of high elevation tundra vegetation, including grasses, forbs, sedges and shrubs. Principle species include Ross' avens (*Geum rossii*), sedges (*Carex* spp.), tufted hair grass (*Deschampsia caespitosa*), Colorado fescue (*Festuca brachyphylla*), American bistort (*Polygonum bistortoides*), and willow (*Salix* spp.). The primary associated tree species is Engelmann spruce-krummholz (*Picea engelmannii*).

3.18.2.7 Riparian and Wetland

This vegetation type accounts for approximately 0.2% of the cover in the MPA. Riparian and wetland areas contain vegetation associated with surface or subsurface moisture. Wetlands require prolonged saturation of soils and contain certain vegetative species dependent upon soil saturation. Less than 2% of the MPA area is riparian; these areas are located along major rivers, drainages, or spring sites. Riparian vegetation in the project areas is generally located in areas with an elevation of less than 5,500 feet. Principal woody species include Fremont cottonwood (*Populus fremontii*), salt-cedar (*Tamarix chinensis*), coyote willow (*Salix exigua*) and squawbush (*Rhus aromatica* var. *trilobata*). Principal wetland species include cattail (*Typha latifolia*), bullrush (*Scirpus* spp.) and sedge (*Carex* spp.)

More detailed information concerning riparian and wetland species are located in Section 3.11 – Riparian of this EIS.

3.18.3 Special Status Plant Species

Special status plant species include all Federally listed threatened and endangered species and BLM sensitive species. Special status plant species with potential to occur in the MPA are listed and discussed in Section 3.15 – Special Status Species.

3.18.4 INVASIVE SPECIES AND NOXIOUS WEEDS

The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time." Noxious weeds are defined in *Rangeland Health Standards and Guidelines* (BLM 1997a) as non-native plants that are especially undesirable because they have no forage value and are sometimes toxic, or are capable of invading plant communities and displacing native species. The BLM recognizes noxious weed invasions as one of the greatest threats to the health of rangelands nationwide.

Invasive species include plants able to establish on a site where they were not present in the original plant composition. Invasive species aggressively out-compete native species within a community and often alter the physical and biotic components enough to affect the entire ecological community. Invasive species are of particular concern following a disturbance. They are often exotic species that do not have naturally occurring, local predators.

Noxious and invasive species have been identified by county for the State of Utah. Russian knapweed (*Centarea repens*), salt-cedar (*Tamarix chinensis*), and Russian olive (*Elaeagnus angustifolia*) are all problematic species occurring in riparian areas of the MPA. Salt-cedar channelizes rivers with its deep roots and chokes out other vegetation. Purple loosestrife (*Lythrum salicaria*) has also been documented throughout the Colorado River system, from Westwater to Potash (personal communication with Daryl Trotter, BLM; field notes from site visit, December 2-6, 2002). In addition to noxious weed and invasive species encroachment along the river corridors, large areas of uplands and rangelands are being converted to invasive annual species including cheatgrass (*Bromus tectorum*), halogeton (*Halogeton glomeratus*), and Russian thistle (*Salsola tragus*). Those species of management concern for the MPA are included in Table 3.50.

Table 3.50. Noxious and Invasive Species of Grand County, Utah

Common Name	Scientific Name
Bermudagrass	*Cynodon dactylon*
Bindweed	*Convolvulus* spp.
Black henbane	*Hysocyamus niger*
Buffalobur	*Sloanum rostratum*
Canada Thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Dalmation toadflax	*Linaria dalmatica*
Diffuse Knapweed	*Centaurea diffusa*
Dyer's Woad	*Isatis tinctoria*
Halogeton	*Halogeton glomeratus*
Hog millet	*Panicum miliaceum*
Houndstongue	*Hyoscyamus niger*
Jointed goatgrass	*Aegilops cylindrica*

Table 3.50. Noxious and Invasive Species of Grand County, Utah

Common Name	Scientific Name
Johnson Grass	*Sorghum halepense*
Perennial Sorghum	*Sorghum almum*
Musk Thistle	*Carduus nutans*
Poison hemlock	*Conium maculatum*
Perennial Pepperweed/Whitetop	*Lepidium latifolium*
Phragmites	*Phragmites* spp.
Puncturevine	*Tribullus terrestris*
Purple loosestrife	*Lythrum salicaria*
Quackgrass	*Elytrigia repens*
Russian Knapweed	*Centarea repens*
Russian Olive	*Elaeagnus angustifolia*
Russian thistle	*Salsola tragus*
Salt-cedar	*Tamarix chinensis*
Scotch Thistle	*Onopordium acanthium*
Silverleaf nightshade	*Solanum elaeagnifolium*
Spotted Knapweed	*Centaurea maculosa*
Squarrose Knapweed	*Centaurea squarrosa*
Water hemlock	*Cicuta douglasii*
Whitetop/Hoary cress	*Cardaria* spp.
Whorled milkweed	*Asclepias subverticillata*
Yellow nutsedge	*Cyperus esculentus*
Yellow toadflax	*Linaria vulgaris*

3.19 VISUAL RESOURCES

3.19.1 RESOURCE OVERVIEW

The MPA is an internationally recognized, world-famous scenic destination. Containing an unusually large number of areas that possess a high degree of scenic quality and a high level of visual sensitivity, the planning area draws an increasing number of visitors each year who come to the area to recreate and sightsee. In general, high scenic quality within the planning area is a product of the extraordinary topography, geology, and cultural history. Scenically diverse vistas and canyon river ways, rare and unusual geological formations, colorful and highly contrasting sandstones, and numerous prehistoric rock art and structures contribute to the area's high visual quality. Areas with high visual sensitivity within the planning area are the result of the high degree of visitor interest in and public concern for a particular area's visual resources, an area's

high degree of public visibility, the level of use of an area by the public, and the type of visitor use that an area receives (BLM 1992b).

The major areas within the MPA that possess both outstanding scenic quality and high visual sensitivity include, but are not limited to: the Wilson Arch area; Canyon Rims (encompassing the area from Harts Draw to Hurrah Pass); the Dead Horse Point/Shafer Trail area; Mill Creek Canyon; an area including Negro Bill Canyon and extending to Porcupine Rim; Beaver Creek; Fisher Creek and its tributaries, the area around Mill and Tusher Canyons; and the Fisher Tower/Onion Creek area. Visually scenic and sensitive river areas include: the Colorado River (from Dewey Bridge to the border of Canyonlands National Park); the Westwater Canyon/Dolores River area; and Labyrinth Canyon (the Green River and its tributaries).

Areas of high scenic quality and visual sensitivity that are associated with travel corridors include: the Kane Creek area (from U.S. Highway 191 to its confluence with the Colorado River); the non-paved portion of the Potash Road (Shafer Basin) from Utah Highway 279 to the border with Canyonlands National Park; and the State Highway 313/Seven Mile Canyon/Monitor-Merrimac Buttes area. Other major scenic travel corridors within the MPA include U.S. Highway 191 and State Highways 128, 279, and 313, which have been designated as State Scenic Byways, as well as Canyon Rims and the Manti-LaSal Loop Road that are designated as State Scenic Backways. The MPA also contains thousands of miles of jeep, bike, and foot trails that are traveled as scenic routes, many of which are internationally recognized.

3.19.2 CURRENT MANAGEMENT PRACTICES

Under the current RMP, a visual resource inventory was completed, but no management objectives were identified for VRM, and no management classes were established for the MPA. Visual resource inventory classes were considered in the EIS prepared for the RMP but the RMP did not recognize visual resources as a program requiring specific management actions. Visual resource management classes and objectives were established for Canyon Rims in 2002, through the Canyon Rims Recreation Area Management Plan (BLM 2003b). With the exception of Canyon Rims (which has VRM management objectives), site-specific mitigation of impacts to visual resources is being implemented through project-specific NEPA documents, with reference to the 1985 RMP visual resource inventory.

Impacts to the landscape within the planning area are being produced by the tremendous increases in recreation and tourism, vehicular travel, the increasing number and length of roads and trails, and the increasing numbers of sightseers attracted to the planning area because of its extraordinary scenic qualities. Additional impacts are resulting from the development of utility corridors, from oil and natural gas exploration and development, from seismic exploration, and from other land-use disturbances. The greatest impacts are being created by recreational activities and OHV use (personal communication between Rob Sweeten, Visual Resource Specialist, BLM – MFO, and David Harris, SWCA, March 26, 2003).

Recreational activities and OHV use are impacting visual resources most intensely in the areas surrounding the city of Moab north to I-70, south to Lisbon Valley, east to the Colorado state line, and west to the Green River. There have been recent resource conflicts between visual

resources and oil and gas development/exploration in the Big Flat area along State Scenic Byway 313 and in the Dome Plateau area. A conflict with visual resources also exists with the utility corridor along U.S. Highway 191. Commercial cinematography, rights-of-way, and range improvements are other sources of conflict with visual resources.

The increased number of visitors attracted by the area's scenic quality has prompted the MFO to designate more roads for scenic drives and recreational use (see Section 3.10 – Recreation). The increasing number of roads being utilized by recreationists in the MPA is having indirect affects on visual resources. Seldom Seen zones (those areas that are not visible from major travel routes) are decreasing within the MPA, and an increase in the number of vehicles and people on BLM roads are creating changes in foreground and middleground views, and changes in visual sensitivity. An increasingly utilized network of two-track roads and routes are creating conditions that allow OHV users, campers, and woodcutters to expand surface disturbances and impact visual resources.

Resource monitoring is occasional and intermittent, but monitoring does confirm the increased recreational use, the tendency for visitors to seek out new places to drive and to camp, and the associated land disturbances created by these activities.

The tourist industry within the planning area is increasing, based on increased recreational and vehicular use within the planning area, and the increase in the number of visitors to Arches and Canyonlands National Parks who subsequently recreate on BLM-administered lands (see Section 3.10 – Recreation). These increases in visitor use of recreational and tourist resources within the planning and within the nearby national parks are contributing to the impacts on visual resources.

The increased use of OHVs, the increase in dispersed camping, and increases in trail use are having an impact on visual resources. Under the existing RMP, emergency limitations on off-road vehicle travel and camping have been and may continue to be increased to preserve visual resources. Oil and gas exploration and development are expected to continue within the MPA and will contribute some additional impacts to visual resources. In general, existing trends in recreation, visitation, and sightseeing, as well as continued oil and gas exploration and development, will likely result in increasing impacts to visual resources within the planning area.

In 2003, a VRM inventory was conducted for the MPA, as part of the proposed RMP pre-planning process. Table 3.51 depicts the acreages for each VRM inventory class. The acreages within each of the 2003 VRM inventory classes constitute the baseline by which impacts to visual resources will be analyzed in the EIS (see Map 2-23-A, Visual Resource Management – Alternative A).

Table 3.51. 2003 VRM Inventory Classes

VRM Class	Acres
I	349,029
II	400,978
III	799,836
IV	271,531
Total	**1,821,374**

Source: BLM 2003c.

3.20 WILDLIFE AND FISHERIES

3.20.1 RESOURCE OVERVIEW

The MPA is in the heart of the Colorado Plateau and has a great amount of landscape diversity. This location produces a unique combination of landforms and habitat types. This diversity of habitat in the planning area is reflected in the diversity of terrestrial and aquatic life that occurs within its borders.

Species in the planning area include big game species such as mule deer (*Odocoileus heminonus*), Rocky Mountain elk (*Cervus canadensis*), pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), black bear (*Ursus americanus*) and mountain lion (*Felis concolor*). Additional species of concern in the planning area fall within the general categories of upland game species, raptors, waterfowl, and shorebirds, fish and aquatic species, neotropical migrants and small mammals and reptiles. Management goals for most wildlife populations in the planning area are determined primarily by UDWR, with the exception of the Federally protected wildlife populations, which are determined by USFWS. The current RMP allocates forage for elk, deer and antelope. Resource allocations for raptors, reptiles, amphibians, and other non-game species in the planning area are limited to protecting individuals and the habitat of state and Federally listed species, and designating spatial and temporal barriers for nesting raptors.

BLM's management of wildlife habitat in the MPA has had and will continue to have, an impact on both local communities and those that exist outside the Colorado Plateau. There is considerable regional interest in the overall condition and management of the planning area. In the past, a majority of the local interest has been focused on big-game management and associated recreational activities. In recent years, however, non-consumptive uses in the in the planning area, such as tourism and wildlife viewing have been increasing with the continued expansion of Utah's tourism industry. Because many of the wildlife species found in the planning area regularly cross public, private, and tribal lands, a collaborative effort between all land managers and owners has been essential for effective wildlife management in the planning area.

3.20.2 BIG GAME

3.20.2.1 MULE DEER

Mule deer occupy most ecosystems in Utah but likely attain their greatest densities in shrublands on areas characterized by rough, broken terrain and abundant browse and cover. In the Rocky Mountains, winter diets of mule deer consist of approximately 75% browse from a variety of trees and shrubs and 15% forbs. Grasses make up the remaining 10% of the diet during winter. In the spring, browse is 49% of the diet and grasses and forbs make up approximately 25% each. Summer diets are 50% browse, with forbs consumption increasing to 46%. Browse use increases again in the fall to approximately 60% of the mule deer diet, forb use declines to 30%, and grasses increase to 10% (Fitzgerald et al. 1994). Mule deer summer range habitat types include spruce/fir, aspen, alpine meadows, and large grassy parks located at higher elevations. Winter range habitat primarily consists of shrub-covered, south-facing slopes and often coincides with areas of concentrated human use and occupation. Winter range is often considered a limiting factor for mule deer and Rocky Mountain elk in the Intermountain West. The portions of these acreages managed by the MFO are listed in Table 3.52 and shown on Map 2-27-A, Deer and/or Elk Protected Habitat-Alternative A.

Table 3.52. BLM-managed Mule Deer Habitat in the MPA

		Total Habitat	Crucial Winter	Fawning
Total mule deer habitat in MPA (acres)		1,489,172	757,060	442,714
Total mule deer habitat managed by BLM (acres)	Book Cliffs	534,400	266,787	72,848
	La Sal	313,498	311,271	2,275

Because of learned behavioral use patterns, passed on from one generation to the next, deer migrate for the winter into the same areas every year, regardless of forage availability or condition. These generally are areas lacking in snow depth, which allow easier movement, with pinion-juniper and sagebrush vegetation types. These vegetation types provide deer with both escape and thermal cover. Sagebrush is their primary forage during the winter season.

Over the past five years fawn production has been poor and the overall deer population has been declining in the planning area. Poor range conditions caused by severe drought could be a major factor causing the population decline (UDWR 2005a). Predation, while not within BLM's jurisdiction, can also contribute to deer population declines.

The management goals for mule deer populations located in the MPA are to provide a broad range of recreational opportunities, including hunting and viewing; balance mule deer herd impacts with human needs, such as private property rights, agricultural crops, and local economies; and maintain the mule deer population at a level that is within the long-term capability of the available habitat. The target wintering mule deer herd size and annual harvest for the two wildlife management units associated with the planning area are described in Table 3.53. Current mule deer numbers estimates are listed in Table 3.54. The deer in the Dolores subunit migrate onto this unit and are also hunted in Colorado, but Colorado figures are not known. The harvest figures are generally low for Utah because the deer are typically in Colorado at the time of the Utah deer hunting season.

Mule deer are used as a representative guild species for the following habitats in the district, deciduous woodland, riparian, mountain shrub, pinyon-juniper woodland and sagebrush. Impacts to this species can be partly assessed through the impact to these habitat types.

Table 3.53. UDWR Target Wintering Mule Deer Herd Size and Annual Harvest for the Two WMUs Associated with the Planning Area

Unit Number	Unit Name (subunit)	Winter Population Objective (# animals)*	Postseason Bucks/100 Does Objective**	Classification % Bucks ≥ 3 Points
10	Book Cliffs	15,000	15-20	43%
13	La Sal (Total)	18,100	15-20	
	13A La Sal Mountains			47%
	13B Dolores			50%

Source: UDWR 2008.
*2008 Antlerless Deer Permit Summary and Recommendations
**Utah Annual Big Game Report 2006

Table 3.54. UDWR Current Mule Deer Estimates

Unit Number	Unit Name (subunit)	Population Estimate (# animals)*	Percent of Objective	Current Buck/Doe Ratio**	2007 Harvest **
10	Book Cliffs	7,350	49%	39/100	463
13	La Sal (Total)	11,100	61%		813
	13A La Sal Mountains			15/100	
	13B Dolores			17/100	

Source: UDWR 2008.
*2008 Antlerless Deer Permit Summary and Recommendations
** Utah Annual Big Game Report 2006

3.20.2.2 Rocky Mountain Elk

The Rocky Mountain elk is considered a generalist feeder (Fitzgerald et al. 1994). In the northern and central Rocky Mountains, grasses and shrubs compose most of the winter diet, with the former being of primary importance in the spring months (Kufeld 1973). Forbs become increasingly important in late spring and summer, and grasses again dominate in the fall. These feeding relationships may change somewhat, depending on location. Associated with seasonal changes in diet are seasonal changes in habitat. The season and function of use of these habitats help distinguish various types of winter ranges, production areas (calving grounds), and/or summer range. Production or calving areas are used from mid-May through June and typically occupy higher elevation sites than winter range. Calving grounds are usually characterized by aspen, montane coniferous forest, grassland/meadow, and mountain brush habitats, and are generally in locations where cover, forage, and water are in close proximity (Fitzgerald et al.

1994). In western Colorado, for instance, most females calve within 660 feet of water (Seidel 1977). Along the Wasatch Front, typical Rocky Mountain elk winter range occurs between 5,500 and 7,500 feet elevation and comprises mountain shrub and sagebrush habitats. Crucial winter range is considered to be the part of the local deer and/or elk range where approximately 90% of the local population is located during an average of five winters out of ten from the first heavy snowfall to spring green-up. The middle and higher elevations of the MPA area sustain several large Rocky Mountain elk populations. The portions of these acreages managed by the MFO are listed in Table 3.55 and shown on Map 2-27-A, Deer and/or Elk Protected Habitat-Alternative A.

Table 3.55. BLM-managed Rocky Mountain Elk Habitat in the MPA

		Total Habitat	Crucial Winter	Calving
Total elk habitat in MPA (acres)		1,070,044	246,653	289,781
Total elk habitat managed by BLM (acres)	Book Cliffs	548,634	66,052	42,075
	La Sal	82,594	82,594	0

Rocky Mountain elk populations are associated with the two wildlife management areas found in the MPA. The management goals for Rocky Mountain elk populations are to provide a broad range of recreational opportunities, including hunting and viewing; balance elk herd impacts with human needs, such as private property rights, agricultural crops, and local economies; and maintain the elk population at a level that is within the long-term capability of the available habitat. Rocky Mountain elk goals and numbers for the planning area are displayed in Tables 3.56 and 3.57.

Table 3.56. UDWR Wildlife Management Goals for Rocky Mountain Elk

Unit Number	Unit name subunit	Winter Population Objective (# animals)*	Postseason Bulls/100 Cows Objective***	Age Objective**
10	Book Cliffs	7,500	15/100	5 to 6 years
13	La Sal (Total) 13A La Sal Mountains 13B Dolores	2,650 1,800 700	15/100	5 to 6 years

Source: UDWR 2008.

* Antlerless Elk Permit Summary and Recommendations.

**Utah Annual Big Game Report 2006.

***Elk Management Plan

Table 3.57. UDWR Current Rocky Mountain Elk Estimates

Unit Number	Unit name Subunit	Population Estimate (# animals)*	Percent of Objective	Current Bull/Cow Ratio	2007 Harvest **
10	Book Cliffs (Total)	4,500	60%		338
	10A Bitter Creek			31/100	
	10B South Book Cliffs			74/100	
13	La Sal (Total)	2,500	94%		
	13A La Sal Mountains			24/100†	239
	13B Dolores			40/100†	

Source: UDWR 2008
*Antlerless Elk Permit Summary and Recommendations.
**Utah Annual Big Game Report 2006.
†2005 Data

A large portion of the Book Cliff wildlife management unit is located north of the MPA, in the Vernal Field Office area. Most of the elk associated with this unit winter in the Ten Mile drainage along East Willow Creek, West Willow Creek, and in She Canyon. The MFO administers portions of these areas, but the majority is administered by the State of Utah. Summer and fall livestock grazing along the Willow Creek drainage in the Bogart allotment has been identified as a conflict with elk habitat use. Other allotments or portions of allotments identified as elk winter range include Cottonwood, Crescent Canyon, Diamond Canyon, Floy Canyon, Rattlesnake North, Showerbath Springs and Thompson Canyon. An amendment to the current RMP reallocated forage in the Cottonwood and Diamond Canyon allotments to elk.

Areas within the Cisco Desert contain yearlong elk habitat, and have also been identified as a conflict area between elk and livestock. Forage competition between livestock, other wildlife and elk is increasing in the Cisco Desert. These allotments include all or portions of Bar X, Cisco, Cisco Mesa, Corral Wash, Corral Wash Canyon, Crescent Canyon, Floy Wash, Floy Creek, Harley Dome, Pipeline, San Arroyo and Suphur Canyon. Other allotments containing yearlong elk range include all or portions of Bogart, Coal Canyon, Cottonwood, Diamond, Elgin, Horse Canyon, Lone Cone, Middle Canyon, Prairie Canyon, Rattlesnake North and Showerbath Springs.

A majority of the elk in the La Sal wildlife management unit stay on private and USFS lands year-round; however BLM lands do provide some winter range. The La Sal Mountains elk herds may winter on portions of the Adobe Mesa, Black Ridge, Hatch Point, Lisbon, Mill Creek, North Sand Flat, Professor Valley, and South Sand Flat allotments as well as Polar Mesa and Taylor allotments on the north side of the mountains. The Dolores Triangle provides winter range for elk, which migrate from Colorado to habitat in all or portions of Big Triangle, Buckhorn, Gateway, Granite Bench, Granite Creek, Mountain Island, Sand Flats, Scharf Mesa, Spring Creek, Steamboat Mesa and Taylor allotments. The number of elk within the Dolores Triangle varies from year to year, depending on the severity of the winter; during mild winters, relatively few elk migrate into this area.

Rocky Mountain elk are used as a representative guild species for the following habitats in the district, grasslands, deciduous woodland, riparian, mountain shrub, pinyon-juniper woodland and sagebrush. Impacts to this species can be partly assessed through the impact to these habitat types.

3.20.2.3 Black Bear

In the Intermountain West, black bears are typically associated with forested or brushy mountain environments and wooded riparian corridors. They seldom use open habitats (Zeveloff and Collett 1988). Black bears tend to be nocturnal and crepuscular and are considered omnivorous. Preferred foods include berries, honey, fish, rodents, birds and bird eggs, insects, and nuts. Black bears obtain most of their meat from carrion. From November to April, bears enter a period of winter dormancy. Winter dens are located in caves, under rocks, or beneath the roots of large trees where they are kept nourished and insulated by a several-inch-thick layer of fat (Zeveloff and Collett 1988).

The middle and higher elevations of the MPA sustain several large black bear populations. The planning area contains a total of 605,351 acres of black bear habitat. The BLM manages 146,716 acres of black bear habitat in the Book Cliffs wildlife management unit and 14,957 acres of black bear habitat in the La Sal wildlife management unit.

A black bear management plan for the State of Utah was completed by the UDWR in 2000. This plan outlines the historic and current management of black bears in the State. With respect to black bears, the goal of the wildlife management units in 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 habitat) while considering human safety, economic concerns, and other wildlife species. The management objectives are to maintain bear distribution and increase it in suitable unoccupied or low density areas; maintain current bear populations with a reasonable proportion of older age animals and breeding females; balance bear population numbers with other wildlife species; minimize the loss in quality and quantity of UDWR-identified, crucial and high-priority bear habitat, including migration corridors between occupied areas; reduce the risk of loss of human life and reduce chances of injury to humans by bears; reduce the number of livestock killed by bears; and maintain quality consumptive and non-consumptive recreational opportunities (UDWR 2000b).

Black Bear are used as a representative guild species for old growth conifer habitat in the district. Impacts to this species can be partly assessed through the impact to this habitat type.

3.20.2.4 Pronghorn

Pronghorn can be found throughout the western United States, Canada, and northern Mexico. They are generally associated with open plains where they feed mainly on browse. Pronghorn prefer to occupy areas with large tracts of flat to rolling open terrain where they rely on keen eyesight and swift movement to avoid predators. They also rely on vegetation within the shrub and grassland plant communities for food. Pronghorn are often found in small groups and are usually most active during the day.

There are two pronghorn herds within the MPA: the Hatch Point herd and the Cisco Desert herd. The planning area contains a total of 1,000,537 acres of pronghorn habitat; the BLM manages 743,524 acres of pronghorn habitat in the Book Cliffs wildlife management unit (Cisco Herd) and 78,822 acres of pronghorn habitat in the La Sal (Hatch Point herd) wildlife management unit (Map 2-25-A, Pronghorn Habitat-Alternative A).

In 1971, 172 pronghorn were reintroduced to the Hatch Point area. The population appeared to increase for the first three years following their introduction, but has declined since 1975. Drought, severe winter weather, and predation could be factors in the depletion of this herd.

The current Cisco Desert pronghorn herd originated from 48 animals that were released in Colorado in 1968. In 1983 an additional 150 pronghorn were released. This increased the herd to approximately 250 animals. In 1988, Colorado Division of Wildlife released another 90 pronghorn near the Utah-Colorado state line. The Cisco pronghorn have expanded west and are sometimes seen near Green River and south of I-70. The herd had increased to approximately 1,000 animals. However, pronghorn are responsive to climatic conditions and while mild winters and good moisture conditions prevailed, pronghorn numbers increased and their range expanded. During drought cycles, such as currently being experienced, pronghorn numbers sharply decline. The Cisco herd is currently believed to comprise less than 300 animals.

A pronghorn management plan for the State of Utah is currently being developed by the UDWR. This plan will outline the historic and current management of pronghorn in the state as well as the management goals and objectives for pronghorn populations in the state. Table 3.58 outlines UDWR's management goals for pronghorn.

Table 3.58. UDWR Wildlife Management Goals, Estimates, and Trends for Pronghorn

Unit Number	Unit Name	Aerial Population Counts*	Population Objective	Buck/Doe Ratio**	Age Objective	2007 Harvest **
10	Book Cliffs 10A Bitter Creek 10B South Book Cliffs	 283 644	No Set Objective	 36/100 28/100	No Set Objective	29
13	La Sal	111	No set objective	31/100	No set objective	2

Source: UDWR 2007.
* Aerial Survey counts 2007.
** Utah Annual Big Game Report 2006.

Pronghorn are used as a representative guild species for grasslands and desert shrub habitats in the district. Impacts to this species can be partly assessed through the impact to these habitat types.

3.20.2.5 Desert Bighorn Sheep

Desert bighorn sheep are uniquely adapted to inhabit some of the most remote and rugged areas in the MFO. Desert bighorns are sometimes referred to as a wilderness species because of the

naturally remote and inaccessible areas they inhabit. They prefer open habitat types with adjacent steep rocky areas for escape and safety. Habitat is characterized by rugged terrain including canyons, gulches, talus cliffs, steep slopes, mountaintops and river benches (Shakleton et al. 1999). Desert bighorns generally occur in southern Utah and do not migrate.

The MPA contains 422,192 acres of desert bighorn sheep habitat (Map 2-26-A, Desert Bighorn Sheep Protected Habitat). Of these acres, BLM manages 330,129. There are four herd areas for desert bighorn sheep in the MPA. They are located 1) in the southeast area of Westwater Canyon (the Dolores Triangle herd), 2) in the Potash-Mineral Bottom-Ten Mile area (the Potash herd), 3) on the north side of the Colorado River east of Arches National Park (the Professor Valley herd), and 4) on the south side of the Colorado River along Kane Creek (The Lockhart herd. The Monticello Field Office of the BLM manages the majority of the habitat for the Lockhart herd.) The BLM manages 22,949 acres in the Dolores Triangle herd area and 245,870 acres in the Potash herd area. There are 17,707 BLM acres of desert bighorn habitat in the Professor Valley herd area, and 43,603 acres in the Lockhart herd area. There is also evidence of the animals in the Lockhart area going up the Redd Sheep Trail to Hatch Point.

Desert bighorn sheep (Potash herd) are common within portions of the Shafer Basin-Big Flat-Ten Mile-Arth's Pasture area. Only a small percentage of the Shafer Basin-Big Flat-Ten Mile-Arth's Pasture area is considered to be suitable bighorn habitat. The habitat types preferred by bighorn are areas with steep rough terrain with good visibility (talus slopes and canyons) and flatter valley floors, which have rough terrain or escape cover nearby. Bighorn avoid flatter open terrain and pinion-juniper forests, because of poor visibility and/or lack of escape cover or terrain.

The habitat provided by Shafer Basin-Big Flat-Ten Mile-Arth's Pasture area contributes significantly to the area's overall desert bighorn population. The Potash and adjacent Canyonlands National Park (Island in the Sky) bighorn herd is the only remaining native (meaning not transplanted or reintroduced) self-supporting desert bighorn herd in Utah. The combined population of this herd is estimated at 450-500 bighorn. Approximately 350 of these animals occupy the Island in the Sky and 150 to 200 inhabit adjacent lands managed by the BLM.

The Professor Valley desert bighorn herd's habitat extends to the east of Arches National Park onto BLM-managed land in the Cache Valley and Dome Plateau area. This area is located north of the Colorado River.

A state of Utah management plan for desert bighorn sheep was developed in 1999. This plan assesses current information on bighorn sheep, identifies issues and concerns relating to bighorn sheep management, and establishes goals and objectives for future bighorn management programs in Utah.

Tables 3.59 and 3.60 outline the current desert bighorn sheep estimates in the MPA and the wildlife management goals for desert bighorn sheep in the planning area. Because the Lockhart desert bighorn sheep herd's habitat is primarily in the Monticello Field Office, that herd is not discussed in this table.

Table 3.59. UDWR Current Desert Bighorn Sheep Estimates in the MPA

Unit Number	Unit Name (subunit)	Population Estimate*	Population Objective**	Percent of Objective	2007 Harvest***
13 Desert Bighorn Sheep	**La Sal (Total)** Potash Professor Valley Dolores Triangle	285 230 30 25	595 345 125 125	48% 67% 24% 20%	3 not hunted not hunted
10 Rocky Mountain Bighorn Sheep	**Bookcliff** Rattlesnake	350	525	67%	5

Source: UDWR 2007.

*Utah Bighorn Sheep State-wide Management Plan.

**Utah Bighorn Sheep State-wide Management Plan – Increase all existing herds by 50% with at least a minimum population of 125

***Utah Annual Big Game Report 2006

Table 3.60. UDWR Wildlife Management Goals for Desert Bighorn Sheep in the MPA

Unit Number	Unit Name (subunit)	Objective Ram/Ewe**	Current Ram/Ewe	Age Objective*
13 Desert Bighorn Sheep	**La Sal** Potash Professor Valley Dolores Triangle	No Set objective	52/100 Unknown Unknown	30% of Rams > 6.5 yrs
10 Rocky Mountain Bighorn Sheep	**Bookcliff** Rattlesnake	No Set Objective	67/100	30% of Rams > 6.5 yrs

Source: UDWR 2007.

* Utah Bighorn Sheep State-wide Management Plan.

**Utah Annual Big Game Report 2006.

Bighorn sheep require separation from domestic sheep to prevent the transmission of diseases against which they have no natural defenses. Water and vegetation improvements have also been shown to benefit bighorn sheep populations. Demands on most wildlife and their habitats within the planning unit are projected to increase. Future demands by other land uses are also expected to remain at current levels or increase, resulting in pressure upon existing wildlife habitat.

3.20.2.6 Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep can be found in small herds in northern and central Utah. Rocky Mountain bighorn sheep experienced significant declines in numbers in the early 1900s. Utah has

been involved in an aggressive program for the past 30 years to restore bighorn sheep to their native habitat. Most Rocky Mountain bighorn sheep have seasonal migrations.

Rocky Mountain bighorn sheep were reintroduced into the Uintah-Ouray Indian Reservation in the early 1970s. An additional 13 Rocky Mountain bighorn were obtained from Waterton Lakes National Park, Alberta, Canada in April 1973. A viable population has become established along the eastern portion of the Green River corridor. Rocky Mountain bighorn currently occupy the rugged Book Cliffs terrain, south from the Indian Reservation and eastward to Thompson Springs, Utah.

The MPA contains 593,867 acres of Rocky Mountain bighorn sheep habitat (Map 2-28, Rocky Mountain Bighorn Sheep Habitat). There is one herd area for Rocky Mountain bighorn sheep in the MPA located in the Book Cliffs. This is called the Book Cliffs Rattlesnake herd. The MPA directly manages 424,859 acres in this herd area.

3.20.2.7 MOUNTAIN LION (COUGAR)

The mountain lion, or cougar, likely inhabits most ecosystems in Utah. However, it is most common in the rough, broken terrain of foothills and canyons, often in association with montane forests, shrublands, and pinyon-juniper woodlands (Fitzgerald et al. 1994). Mule deer is the mountain lion's preferred prey species. Consequently, mountain lion seasonal use ranges are likely to closely parallel those of mule deer.

3.20.3 UPLAND GAME

Upland game in the MPA includes populations of blue grouse (*Dendragapus obscurus*), chukar partridge (*Alectoris chukar*), Rio Grande turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*) and sage-grouse (*Centrocercus urophasianus*). Annual fluctuations for most upland game bird and small mammal populations very closely correlate with annual climatic patterns. Mild winters and early spring precipitation during the months of March, April and May are associated with increases in upland game populations. Warm, dry weather, especially during June, is generally considered vital for the survival of newly born young of many upland game species. Ring-necked pheasant and greater sage-grouse are two upland game species that have experienced a long-term decline as a result of degradation and loss of crucial habitat (UDWR 2000a). Table 3.61 shows upland game habitat managed by the BLM.

A Strategic Management Plan for greater sage-grouse was issued by the UDWR in 2002 and is available on the UDWR website (UDWR 2002). Overall habitat conditions within the remaining sage-grouse habitat within Grand and San Juan Counties are consistent with a landscape dominated by agriculture. Undisturbed native sagebrush communities are rare as the area is highly fragmented by cleared fields, roads, power lines and pipelines. Livestock grazing is heavy, non-native noxious weeds have invaded or replaced native shrub and shrub-steppe communities

Table 3.61. BLM-managed Upland Game Habitat in the MPA

Upland Game Species	Total Habitat in MPA (acres)	Total Area Managed by BLM (acres)
Sage-grouse Winter Range	56,688	36,382
Sage-grouse Brooding Range	97,257	42,497
Rio Grande Turkey	189,320	13,8407
Blue Grouse	219,707	31,402
Chukar Partridge	1,738,282	1,328,451
Ring-necked Pheasant	37,225	10,513

on a large scale, and the overall level of human disturbance is relatively high. Furthermore, the ongoing severe drought of 1999–2003 has contributed substantially to habitat deterioration. Therefore, overall habitat conditions are relatively poor and unstable compared to optimal sage-grouse habitat elsewhere. Sage-grouse may be petitioned for Federal listing as either Threatened or Endangered species.

Sage-grouse are used as a representative guild species for sagebrush habitat in the district. Impacts to this species can be partly assessed through the impact to this habitat types.

3.20.4 Raptors

Special habitat needs for raptors include nest sites, foraging areas, and roosting or resting sites. Buffer zones are usually recommended around raptor nest sites during the early spring and summer when raptors are raising their young. The most utilized raptor nesting habitats in the MPA are generally found along riparian areas and cliff faces. Juniper-desert shrub transition areas are identified as being important for nesting ferruginous hawks (*Buteo regalis*). There is one known bald eagle (*Haliaeetus leucocephalus*) nest on BLM land within the MPA; bald eagles use the MPA extensively for winter foraging.

The northern goshawk (*Accipiter gentiles*) is a representative guild species for old growth conifer habitat in the district. The golden eagle (*Aquila chrysaetos*) and the prairie falcon (*Falco mexicanus*) are representative guild species for cliff rock habitat. The ferruginous hawk and burrowing owl (*Athene canicularia*) are representative guild species for grassland habitat. The ferruginous hawk is also a representative guild species for desert scrub habitat. Impacts to these species can be partly assessed through the impact to these habitat types.

3.20.5 Reptile, Amphibian, and Other Non-game Species

The MPA contains a high diversity of reptile, amphibian, and other non-game species, including small mammals, birds, and invertebrates, because of the variety of habitats found within the area. The area contains various riparian, talus slope, marsh, aspen-conifer, pinyon-juniper, and ridgetop habitats. (Special habitat needs for migratory birds include nest sites and foraging areas.) Very little is known about the status of most of these species, but an effort is being made to acquire basic information on those listed by state and Federal agencies as TES species.

3.20.6 RIPARIAN AND AQUATIC SPECIES

The riparian and aquatic habitat in the MPA is associated with the Green and Colorado Rivers and their tributaries. Riparian Species and Avian Riparian Species of Special Concern in the planning area include yellow-billed cuckoo (*Coccyzus americanus*) and southwestern willow flycatcher (*Empidonax traillii*) (SWFL). The Green River sustains the largest breeding population of yellow-billed cuckoo in the state of Utah, with an estimated 10 to 20 pairs. SWFL also potentially occurs within the planning area. It is currently believed that the range of this subspecies extends north to the Sand Wash area of the Green River (near the Uintah-Carbon county line). Many other TES species are highly dependent on riparian areas, and they are also crucial to neo-tropical migrant birds. A primary concern with the riparian areas is the effect of decreased regeneration of cottonwood and willow stands and the invasion of non-native plant species such as salt cedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*) on riparian and aquatic wildlife species.

Aquatic species in the planning area include several TES species such as bonytail (*Gila elegans)*, Colorado pikeminnow (*Ptychochelius lucius)*, humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus)*, roundtail chub (*Gila robusta)*, blueheaded sucker (*Catostomus discobolus)*, Colorado River cutthroat trout (*Onycorhinchus clarki pleuriticus*), and flannelmouth sucker (*Catostomus latipinnis)*. Table 3.62 gives the current UDWR inventories of fisheries within the MPA.

Table 3.62. UDWR Inventory of Fisheries within the MPA

Colorado River	Colorado pikeminnow, humpback chub, bonytail, razorback sucker, flannelmouth sucker, blueheaded sucker, channel catfish, roundtail chub, speckled dace, Plains killifish, fathead minnow, red shiner, sand shiner, smallmouth bass, largemouth bass, carp, black bullhead, walleye
Green River	Colorado pikeminnow, humpback chub, bonytail, razorback sucker, flannelmouth sucker, blueheaded sucker, channel catfish, roundtail chub, speckled dace, fathead minnow, red shiner, sand shiner, smallmouth bass, largemouth bass, carp, black bullhead, yellow bullhead, walleye, northern pike
Dolores River	flannelmouth sucker, blueheaded sucker, channel catfish, roundtail chub, speckled dace, carp, fathead minnow, red shiner, sand shiner
Castle Creek	speckled dace, fathead minnow, red shiner, sand shiner, mountain sucker, bluehead sucker, flannelmouth sucker
Onion Creek	Speckled dace, fathead minnow, red shiner, sand shiner
Kane Creek	speckled dace, fathead minnow, red shiner, sand shiner, mosquitofish, plains killifish
La Sal Creek	Colorado River cutthroat, speckled dace, flannelmouth sucker, blueheaded sucker, mottled sculpin, speckled dace
Beaver Creek	Colorado River cutthroat, mottled sculpin
Negro Bill Canyon Creek	speckled dace, fathead minnow, red shiner, sand shiner, black bullhead, bluegill sunfish, common carp, flannelmouth sucker, green sunfish, largemouth bass, mountain sucker

Table 3.62. UDWR Inventory of Fisheries within the MPA

Mill Creek	Brown trout, black bullhead, bluehead sucker, flannelmouth sucker, sunfish, hybridized bluehead sucker/mountain sucker, largemouth bass, roundtail chub, mottled sculpin
Cottonwood Wash	Fathead minnow, red shiner, sand shiner
Pack Creek	Red shiner

Mallard ducks (*Anas platyrhynchos*) and macroinvertebrates are representative guild species for aquatic areas, marshes and lakes in the district. Yellow-billed cuckoo, southwestern willow flycatcher (SWFL), song sparrow (*Melospiza melodia*), spotted towhee (*Piplio maculatus*), Rocky Mountain elk and mule deer are representative guild species for riparian habitat in the district. Impacts to these species can be partly assessed through the impacts to these habitat types.

3.21 WOODLANDS

3.21.1 RESOURCE OVERVIEW

Woodland resources are generally defined as those tree species that are used as non-sawtimber products and are sold in units other than board feet. The woodland resources within the MPA consist primarily of pinyon pine and juniper; Two-needle pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are the most common woodland species of their type and are widespread throughout the planning area. Most of the pinyon-juniper grows at lower elevations, where precipitation is insufficient for commercial timber species. Annual precipitation typically ranges between 10 and 15 inches in pinyon-juniper woodlands, and tree species in these communities have evolved both cold and drought resistance.

Typically, the pinyon-juniper plant community occupies an elevation zone from approximately 4,500 feet to 7,500 feet. Pinyon dominates at higher elevations within the zone and tends to form closed-canopy stands with a shrub component commonly including oaks (*Quercus* spp.), mountain mahogany (*Cercocarpus* spp.), and some grasses.

Juniper trees tend to grow and dominate at lower elevations, in more arid areas, as its scaled foliage allows it to conserve water more effectively than pinyon pine. Juniper-dominated woodlands tend to include open savannas of scattered trees without accompanying shrub communities, except in areas where sagebrush has become dominant as a consequence of overgrazing. A large transition zone (an ecotone) exists between the juniper and pinyon elevation extremes in which the two species are co-dominant.

Woodland resources are used for firewood, fence posts, and Christmas trees, and also have value for watershed, wildlife habitat, recreation, and visual resources. There is some commercial harvesting (approximately 5% or less) of this resource.

Cottonwood (*Populus deltoides*) is an additional component of woodland resources that grows in riparian areas. Cottonwood is critical to the proper functioning of riparian systems in that it provides shade and wildlife habitat.

Timber resources (tree species that are used as sawtimber products) within the planning area consist of small stands of forest species comprising primarily of ponderosa pine (*Pinus ponderosa*), mountain fir, aspen (*Populus tremuloides*), and an aspen/conifer mix. These stands typically grow at higher elevations of approximately 8,000 to 10,000 feet, where annual precipitation is between 25 and 30 inches. In the planning area, these stands are in the Book Cliffs, in the northernmost portion of the planning area. The quantities of timber in the planning area are both inaccessible and too limited for either private or commercial harvesting.

In general, the woodland and forest resources in the planning area are in a stressed and unhealthy condition. Over the past 100–125 years, grazing and fire suppression have altered the structure and species composition of these woodlands, allowing the development of closed canopies with little understory vegetation, decreasing biodiversity, and often resulting in increased soil erosion. Juniper-pinyon stands have increased in density in some areas, increasing the risk of large-scale crown fires (BLM 2002e). These same land-use management scenarios in the upper Book Cliffs have resulted in the build up of thick fuel ladders and dense ground litter that support large-scale, catastrophic, stand-replacing wildland fires, which indirectly produce devastating floods and losses of topsoil. Anecdotal evidence suggests that pinyon and juniper stand densities have increased, and have expanded upslope into ponderosa pine forests and down-slope into grass and shrub communities.

With the onset of extreme drought conditions throughout much of the southwestern U.S. over the past eight years, drought-related stress has made the woodlands more susceptible to epidemic level disease and insect infestations. The current level of insect infestation of pinyon pine stands by bark beetles throughout many areas of the Southwest is rapidly becoming a concern in the MPA. Presently, it is unknown how rapidly the infestation is spreading or its extent. Based on similar infestations in other resource management areas, the infestation could cause a significant loss of woodland resources in the planning area in a relatively short time. In addition to the loss of individual pinyon-pine, insect infestation has resulted in increased fuel loading in the form of standing dead timber and deadfall. This has further increased the risk of large, potentially catastrophic wildfire.

Cottonwood stands are diminishing within the planning area at an unnaturally rapid rate. The causes for the reduction of this resource are: 1) the spread of tamarisk (*Tamarix* spp.), which indirectly prevents the transplantation of cottonwood seedlings by entrenching river and stream systems; and 2) the preferential use of cottonwood groves by recreationists (who camp near streams and shade) for dispersed camping. In many of these high-use recreation areas, campers have inadvertently started fires, and have sometimes stripped live cottonwood trees (BLM 2002e, personal communication between Lynn Jackson, BLM – MFO and David Harris, SWCA, Salt Lake City, Utah, 11 March 2003).

3.21.2 CURRENT MANAGEMENT

The original management objective for woodland resources under the current RMP allowed the sale of noncommercial woodland harvesting permits to the public "consistent with the availability of woodland products and the protection of sensitive resource values" (BLM 1985a). However, since the approval of the current RMP, woodland management objectives have changed for the MFO: 1) a greater emphasis is now being placed on pinyon-juniper management for long-term sustainability of the resource; 2) the Fire Program is assessing woodland conditions for potential re-treatments in past treatment areas and as part of the hazardous fuels reduction program; 3) infestations of the woodland resource by the Ips engraver beetle (resulting from sustained drought conditions) are being examined; and 4) there is an increase in active management of the resource (Jackson 2003).

The MFO currently manages woodland products by controlling harvests and sales, and sells woodland products in informally designated areas for fuelwood, fence posts, Christmas trees, live pinyon transplants, and landscaping. Fuelwood harvests are limited to dead and down pinyon and juniper, and on-site harvests of woodland resources by recreationists are allowed only in some designated areas.

The MFO has conducted a number of pinyon-juniper treatment projects, primarily completed in the 1960s and 1970s, in which a total of 28,117 acres were treated in 18 separate projects. The projects were conducted to remove pinyon-juniper, and convert woodlands to grasslands for livestock and wildlife forage. Many of these project areas are now in need of re-treatment because of subsequent re-growth of pinyon-juniper, which will be primarily managed through the MFO Fire Program.

The Hazardous Fuels Reduction Program (Program 2823), as part of the MFO Fire Program, is projected to indirectly increase woodland health by approximately 2,500 acres each year for the next five years. This improvement would be in the form of reductions in canopy cover and stand density through thinning, and increases in native vegetation through reseeding (BLM 2002e).

In response to the concerns regarding the loss of woodland resources adjacent to high-use recreation areas, the MFO has initiated wood gathering closures in these areas to allow the vegetation to restore itself. The MFO is also in the process of prohibiting wood gathering from riparian areas, and considering closing these areas to camping, in an attempt to preserve the existing cottonwoods in these areas.

Monitoring of woodland resources is infrequent and limited. Fire personnel occasionally measure fuel loads, but information on the condition of woodland resources in the planning area is extremely limited, as is woodland inventory information.

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