3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The Affected Environment chapter describes the present condition of the physical, biological, social, and economic environment within the U.S. Bureau of Land Management's (BLM) Vernal Planning Area (VPA) prior to the initiation of the Proposed RMP or any alternative. This chapter is organized by existing natural resources and describes the present uses of these resources, fire management, special land designations, and the present socioeconomic conditions. This information provides the basis for evaluating potential changes in the environment due to implementation of the Proposed RMP or any alternative.

3.1.1 GEOGRAPHIC SETTING

The vast area of the VPA covered by this Resource Management Plan (RMP) revision is located in northeastern Utah and includes the Uinta Basin, the East and West Tavaputs Plateaus, the Eastern Uinta Mountains, the Book Cliffs, Diamond Mountain, Nine Mile Canyon, and Browns Park. The area is bounded on the west by the Wasatch Mountains and on the east by the Douglas Creek Arch in Colorado. The Wyoming/Utah state line forms the northern boundary of the VPA, and the Tavaputs Plateau and the Book Cliffs form the southern boundary.

3.1.2 RESOURCE SETTING

Within the VPA, public lands administered by the BLM encompass 1,725,512 acres (approximately 30%) of the land area. Most of the land that the BLM manages is in the eastern and southern portions of the VPA and is generally characterized by habitats associated with the Colorado Plateau. Other government agencies that manage land in the area include the U.S. Forest Service (USFS), U.S. National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), Utah Division of Wildlife Resources (UDWR), and Utah School and Institutional Trust Lands Administration (SITLA). Additional lands are held in private ownership or are located within the boundaries of the Uintah and Ouray Indian Reservation.

The lands of the VPA are characterized by a variety of valuable natural resources, including oil, natural gas, minerals, livestock forage, and unique vistas and land formations that draw both developers and visitors to the area. These user groups place demands on the resources under the jurisdiction of the BLM that either directly or indirectly affect the management of associated resources.

3.2 AIR QUALITY

Air quality within the VPA and its surrounding airshed has the potential to be affected by such activities as emissions from the construction and operation of oil and gas facilities, access roads, and other elements of management activities. This section describes the existing air quality resource of the VPA and the applicable air regulations that would apply to the alternatives.

3.2.1 REGIONAL OVERVIEW

The climate in the VPA is characterized as arid, with cold winters and hot summers. Annual precipitation (rainfall and snowfall) in the VPA ranges from 8 to 35 inches and is dependent largely on elevation and aspect. Temperature inversions, where air temperatures near the ground are colder than the temperatures above, are common in the basins and other lower elevational areas of the VPA. Inversions commonly occur in winter when snow accumulation on the ground combines with short daylight hours. In summer, inversions dissipate rapidly when early morning sunlight warms the air near the ground surface. Inversions can hinder air pollutant dispersion by preventing emissions from mixing with the ambient air in the vertical direction. On average, mean morning mixing heights in the area are approximately 1,000 feet; mean afternoon mixing heights are more than 7,800 feet (Holzworth 1972). Mean morning mixing heights tend to be lowest in summer and fall, and highest in winter.

Air pollutant dispersion in the VPA is also dependent on wind direction and speed. Wind information available from the Western Regional Climatic Center (WRCC) and the BLM as part of their remote automated weather stations (RAWS) project (http://raws.dri.edu/) for 1996 show that although wind direction is highly influenced by the local terrain, the wind direction in the northern portion of the VPA tends to be northwesterly, i.e. blowing from the northwest to the southeast (Kings Point – Dutch John RAWS station). The wind direction in the western and southern portions of the VPA tends to be southwesterly, i.e., blowing from the southwest to the northeast (Five Mile - Duchesne and Winter Ridge RAWS stations, respectively). Figure 3.2.1 presents representative windroses for these locations in the VPA.

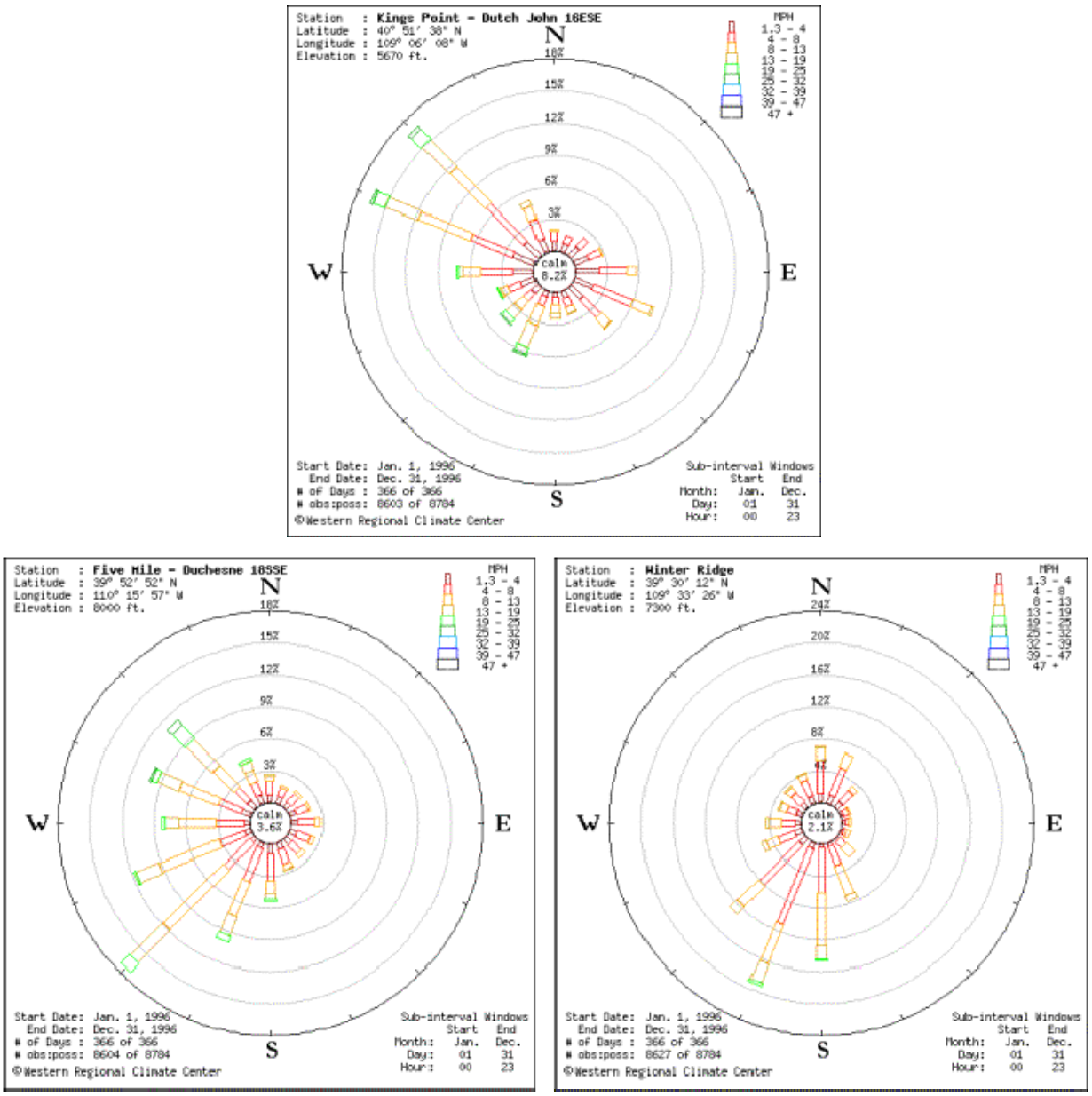

Figure 3.2.1. Representative windroses for the VPA (RAWS data, 1996).

3.2.2 BASELINE AIR QUALITY

The VPA is located in a region designated as unclassifiable for PM_{10} and unclassifiable/attainment for all other airborne pollutants [See 40 CFR Part 81] (L. Svoboda, EPA Region VIII, 2005).

3.2.3 REGULATORY SETTING

The U.S. Environmental Protection Agency (EPA) delegates the authority to manage air resources to the state when a State Implementation Plan (SIP) is approved and implemented. The UDEQ currently has approved SIPs for air quality programs under its jurisdiction, and the EPA has delegated authority for all air quality issues in the State of Utah, excluding Uintah and Ouray Indian Reservation lands. The air quality in Utah is currently regulated by the Utah Division of Air Quality (UDAQ). All stationary sources of air pollution are subject to the air quality regulations and standards under the UDEQ administration.

A portion of the VPA is located within the Uintah and Ouray Indian Reservation. The UDEQ does not have authority to administer air quality programs on Uintah and Ouray Indian Reservation lands. Sources located within Native American Indian Territory are not regulated by any SIP approved programs; and they are subject only to the federal air quality programs under the authority of EPA Region 8.

The Federal Clean Air Act (FCAA) amendments of the 1990s require all states to control air pollution emission sources so that national ambient air quality standards (NAAQS) are met and maintained.

In addition to these requirements, the National Park Service (NPS) Organic Act requires the NPS to protect the natural resources of the lands it manages from the adverse effects of air pollution. In 1978, the US Forest Service (USFS) Air Monitoring Program was established to protect all USFS managed lands from the adverse effects of air pollution. In 1988, the USFS became a primary participant in the national visibility monitoring program titled Interagency Monitoring of Protected Visual Environments (IMPROVE). Starting with the enactment of the Regional Haze Rule, the USFS has provided regional haze monitoring representing all visibility-protected federal VRM Class I areas where practical.

Air quality in a given location is defined by pollutant concentrations in the atmosphere and is generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). One measure of a pollutant is its concentration in comparison to a national and/or state ambient air quality standard. The National Ambient Air Quality Standards (NAAQS) and Utah Air Quality Standards are health-based criteria for the maximum acceptable concentrations of air pollutants (with a margin of safety) at all locations to which the public has access. The NAAQS are established by the EPA and are outlined in the Code of Federal Regulations (40 CRF 50). An area that does not meet the NAAQS is designated as a nonattainment area on a pollutant-by-pollutant basis. The State of Utah has adopted the NAAQS as state air quality standards. In 2004, the EPA passed a suite of actions called the Clean Air Rules of 2004 aimed at improving America's air quality. Two of the rules, the Nonroad Diesel Rule and the Ozone Rules, will potentially improve the future air quality of the VPA.

3.2.4 REGIONAL AIR EMISSIONS

The VPA covers Daggett, Duchesne, and Uintah Counties and part of Grand County. Currently, emission sources within the VPA consist of mostly oil and gas development facilities and mining

sites. There are also fugitive dust sources associated with these sites, construction activities and roadways. A detailed listing of emission sources in and around the VPA, along with information on how specific sources were addressed in the air quality modeling, is available the TSD (Trinity and Nicholls, 2006, tabular source information is found in Appendix C).

3.2.4.1 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) AND CRITERIA

The significant criteria for potential air quality impacts include NAAQS requirements for CO, PM_{10}, $PM_{2.5}$, SO_2, O_3, and NO_2/NO_x. Applicable federal and state criteria are presented in Table 3.2.1.

Table 3.2.1. Applicable Ambient Air Quality Standards

Pollutant	Averaging Period	National Ambient Air Quality Standards ($\mu g/m^3$)	State Ambient Air Quality Standards ($\mu g/m^3$)
CO	1-Hour [a]	40,000 $\mu g/m^3$	
	8-Hour [a]	10,000 $\mu g/m^3$	
PM_{10}	24-Hour [a]	150 $\mu g/m^3$	
$PM_{2.5}$	24-Hour [c]	35 $\mu g/m^3$	
	Annual [b]	15 $\mu g/m^3$	
SO_2	3-Hour [a]	1,300 $\mu g/m^3$	700 $\mu g/m^3$ [d]
	24-Hour [a]	365 $\mu g/m^3$	260 $\mu g/m^3$ [e]
	Annual [b]	80 $\mu g/m^3$	60 $\mu g/m^3$ [e]
O_3	8-Hour	0.075 ppm	
NO_2	Annual [b]	100 $\mu g/m^3$	

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

[b] The 3-year average of the weighted annual mean. PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 ug/m^3.

[c] The 3-year average of the 98th percentile of 24-hour concentrations must not exceed 35 $\mu g/m^3$

[d] Colorado standard, more stringent than the NAAQS.

[e] Wyoming standard, more stringent than the NAAQS.

3.2.4.2 CRITERIA FOR PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The applicable air quality criteria also include the PSD increments, which limit the incremental increase of PM_{10}, SO_2 and NO_2 above the legally defined baseline levels. A PSD Increment is the maximum increase in ambient concentrations that is allowed to occur above a baseline concentration for a pollutant. The increments are evaluated for both the Class I and Class II areas. PSD Increments have not yet been established for $PM_{2.5}$ and are not addressed in increments analysis.

The National Ambient Air Quality Standards (NAAQS) and Utah Air Quality Standards are health-based criteria for the maximum acceptable concentrations of air pollutants at tall locations to which the public has access. All NEPA analysis comparisons to the PSD Class I and II

increments are intended to evaluate a threshold of concern for potential impacts, and do not represent a regulatory PSD Increment Consumption Analysis. The determination of PSD increment consumption is a regulatory agency responsibility conducted as part of the New Source Review process, which also includes a Federal Land Management Agency's evaluation of potential impacts to Air Quality Related Values (AQRV) such as visibility, aquatic ecosystems, flora, fauna, etc.

Although the EPA has revised the $PM_{2.5}$ (particulate matter less than 2.5 microns in effective diameter) Ambient Air Quality Standard, this revised limit will not be enforceable until formally approved. However, due to public concern and possible impacts on human health and visibility, $PM_{2.5}$ is being considered in this analysis. Current NAAQS and Utah Air Quality Standards, and PSD Class I and II increments are discussed below. The increment standards addressed in this study are listed in Table 3.2.2.

Table 3.2.2. Increment Standards for Class I and Class II Areas

Pollutant	Averaging Period	Class I Increment ($\mu g/m^3$)	Class II Increment ($\mu g/m^3$)
PM_{10}	24-Hour	8	30
	Annual	4	17
SO_2	3-Hour	25	512
	24-Hour	5	91
	Annual	2	20
NO_2	Annual	2.5	25

The PSD Class I Areas included in the analysis are listed in Table 3.2.3. Limitations on the additional amount of air pollution allowed in these areas from major emitting facilities are strict. The remainder of the project area is classified a PSD Class II, where similar but less stringent incremental pollution limits apply. These increments are shown in Table 3.2.2.

Potential air quality impacts from the Proposed RMP and Alternatives are analyzed and reported in Chapter 4. However, the analysis is prepared solely under the requirements of NEPA, in order to assess and disclose "reasonably foreseeable" impacts to both the public and the Bureau decision maker before a Record of Decision is issued. Due to the preliminary nature of the NEPA air quality assessment, it should be considered a reasonable upper estimate of potential impacts. Actual impacts at the time of development may be lower.

UDEQ is the air quality regulatory agency responsible for determining potential impacts once detailed development plans have been made, subject to applicable air quality laws, regulations, standards, control measures and management practices. Therefore, the State of Utah has the ultimate responsibility for reviewing and permitting air pollutant emission sources before they become operational. EPA has this responsibility on tribal lands. Representative background concentrations recommended by UDEQ and other appropriate sources were added to the modeled results for comparison to the appropriate ambient air quality standards as outline in Table 3.2.4.

Table 3.2.3. Sensitive Areas to Be Considered in the Analysis

Mandatory Federal Class I Area (unless otherwise specified) [a]	Managing Agency [b]	Class Category	State
Arches NP	NPS	Class I	UT
Browns Park NWR	USFWS	Class II	UT
Canyonlands NP	NPS	Class I	UT
Capitol Reef NP	NPS	Class I	UT
Dinosaur NM	NPS	Class II[c, d]	UT/CO
Flaming Gorge NRA	FS	Class II[e]	UT/WY
High Uintas WA	FS	Class II[c]	UT
Ouray NWR	USFWS	Class II	UT
USFS Request (Areas near Mount Olympus, Twin Peaks, Lone Peak, Mount Timpanogos, and Mount Nebo)	FS	Class II	UT

[a] NP= National Park, WA=Wilderness Area, NWR=National Wildlife Refuge, NM=National Monument, NRA=National Recreation Area.

[b] NPS= USDI - National Park Service. USFWS = US Fish & Wildlife Service, FS= USDA - Forest Service.

[c] Sensitive Class II areas included in the analysis. (Archer, 2001a and Archer, 2002a)

[d] SO2 increments in these Class II areas in Colorado have the same protection as Class I areas.

[e] Sensitive Class II areas included in the analysis per CDPHE. (Machovec, 2002)

Sensitive areas of the Ute Indian Tribe were also considered.

Table 3.2.4. Background Concentrations for Vernal RMP Area

Pollutant	Annual ($\mu g/m^3$)	24-Hour ($\mu g/m^3$)	8-Hour ($\mu g/m^3$)	3-Hour ($\mu g/m^3$)	1-Hour ($\mu g/m^3$)	Monitoring Station Location Description
NO_2	10	-	-	-	-	Recommended by the Utah Dept. of Environmental Quality.[a]
SO_2[b]	5	10	-	20	-	Estimates based on the 1993 PSD application for Bonanza Power Plant, Deseret Generation and Transmission.
PM_{10}	10	28	-	-	-	Recommended by the Utah Department of Environmental Quality.[a]
CO[c]	-	-	4,236	-	6,984	Grand Junction, Mesa County, Colorado. (Highest monitored concentration in 2001.)[d]

[a] Background concentrations recommended by the Utah Department of Environmental Quality in memorandum No. DAQP-003-03, dated on January 17, 2003 from Richard W. Sprott to Yu Shan Huang.

[b] The SO2 background concentrations are provided by Tom Orth, UDEQ. (Orth 2002)

[c] The CO concentrations are reported in ppm: 8-hr, 3.7 ppm; 1-hr, 6.1 ppm.

[d] Monitoring station was nearest to the Vernal RMP area. This background concentration is a conservatively high estimate for the Vernal RMP area since it was measured in an urban area.

3.2.4.3 VISIBILITY CRITERIA

Federal Class I areas, which include certain national wilderness areas, national memorial parks, and national parks, are afforded the highest level of protection. Ambient air increments that apply within Class I areas are more stringent than those that apply to other areas (i.e., Class II areas). In addition to more stringent ambient air increments, Class I areas are also protected by the regulation of AQRVs within their borders. Federal Land Managers (FLMs) are responsible for the management of Class I areas. Mandatory Federal Class I areas (sensitive areas) considered in the Air Quality modeling methodology for the Vernal and Roan Plateau air analysis were Dinosaur National Monument, Canyonlands National Park, Flaming Gorge NRA, Arches National Park, and Capitol Reef National Park.

3.2.5 CONSISTENCY WITH NON-BUREAU PLANS

The Vernal Field Office manages its resources consistent with other plans not administered by the BLM. EPA Region 8 regulates all air quality related issues in the Uintah and Ouray Indian Reservation; while the UDEQ regulates the air quality related issues in the state of Utah, except on Indian lands.

In addition to the federal and state air quality programs mentioned in the previous section, the BLM is also committed to manage the VPA consistent with the Utah Smoke Management Plan (SMP). The BLM, U.S. Forest Service, National Park Service, Utah Department of Natural Resources, U.S. Fish and Wildlife Service, and the UDEQ currently have a signed Memorandum of Understanding (MOU) in place to regulate the prescribed burning activities in Utah (UDAQ 1999). The MOU requires the BLM to report all prescribed fire activities to the SMP program coordinator. UDEQ has incorporated the SMP into UAC R307-204 in 2001. Each prescribed fire must first be approved by the SMP through issuance of a burn permit in order to assure that the burning activity will not cause dangerous air quality conditions.

3.2.6 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 3.2.2 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.

The 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 CO2 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".

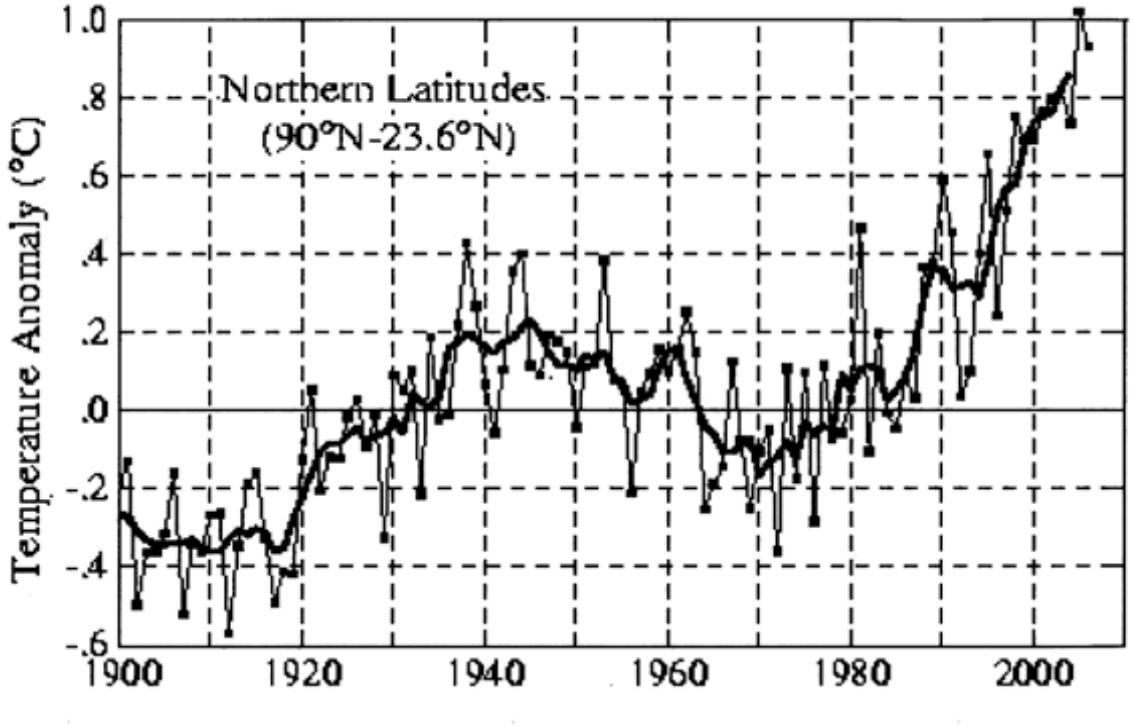

Figure 3.2.2. Annual mean temperature change for northern latitudes (24–90° N). Source: Goddard Institute for Space Studies (2007).

3.3 CULTURAL RESOURCES

The VPA has a wide array of environmental settings and resources long used by humans. Consequently, the VPA encompasses a large and diverse assemblage of prehistoric archaeological sites, historical archaeological sites and localities, and locations of traditional cultural value. For the purpose of this chapter, *cultural resources* are defined as both prehistoric and historical archaeological sites and structures, as well as non-archaeological and non-structural sites (i.e., waterways, view sheds, and resource areas) that have been identified as important for traditional and/or ideological reasons by the various Native American groups with ancestral and/or present ties to the area. Many of these cultural resources have multiple associations and use values. These non-renewable resources provide a record of prehistoric and historical cultures and events and have use value for many contemporary groups including local residents, scientists, and Native Americans.

3.3.1 PREVIOUS PROJECTS AND KNOWN CULTURAL RESOURCE TYPES WITHIN THE VPA

Various explorers, scholars, government institutions, academic institutions, and private cultural resource consulting firms have carried out anthropological and archaeological research within the VPA. The quality and quantity of research carried out by these different entities has, to date,

proven highly variable. Previous research projects range from small surveys of a limited geographic area to large, linear projects spanning the entire VPA.

Beginning as early as 1892 and extending to 1926, approximately seventeen significant archaeological projects were completed in the Uinta Basin. These projects recorded numerous sites and recovered many artifacts and data. As most of these projects were undertaken in a period when rigorous scientific standards were not the norm, much of the data is poorly recorded, reports are descriptive or speculative in nature, or data has been lost. Nonetheless, these early reports remain valuable as descriptive or comparative sources of data (Spangler 1995:81).

By the mid-1930s, the application of more rigorous and systematic archaeological standards was becoming more common. Beginning in this period, researchers focused on areas where high site frequencies were anticipated (i.e., in canyons, along drainages, near permanent water, etc.). As expected, research in these areas yielded high frequencies of sites with evidence of permanent settlement and horticulture. Areas that have been studied in this manner include the Dinosaur National Monument area, Nine Mile Canyon, and various areas along the Tavaputs Plateau and Uinta Basin foothills (Spangler 1995:181). Prior to the 1970s, archaeologists associated with universities or research institutions carried out archaeological research in these areas. The passage of several environmental protection laws during the 1960s and 1970s (the foremost being the National Historic Preservation Act of 1966) spurred cultural resource management archaeology across the country. In the Uinta Basin, the first significant cultural resource management projects were carried out in the 1950s and 1960s, with a quantitative jump noted in the early 1970s (Spangler 1995:190). Since the 1930s, more than 62 significant archaeological projects have been completed in the Uinta Basin (Spangler 1995). Numerous archaeological sites were recorded during these projects, with large numbers recommended eligible to and many actually nominated to the NRHP (Appendix D).

3.3.2 Prehistoric and Ethnographic Site Types

The following section provides a basic description of the primary known prehistoric site types within the VPA. Some site types, such as artifact scatters, are included because they are common throughout the area and are a major component of the Section 106 compliance workload for BLM archaeologists. Others, such as burials, rock art, and ceremonial sites, may not occur in as large numbers as do artifact scatters but are included because they represent significant management challenges to the BLM due to their importance to Native American tribal groups.

Rock Art – A large number of rock art sites have been identified in the Uinta Basin and more are likely to exist. Rock art sites identified in the Uinta Basin are highly variable and may range from one depiction to a panel or series of panels with numerous depictions. Some sites contain large, multiple, and interconnected rock art panels. In addition to variations in size, numerous different rock art styles have been recorded in the Uinta Basin. In some instances rock art is located near other types of sites; in other instances, rock art is isolated. As rock art is frequently located in difficult terrain, a comprehensive survey of existing rock art and its relationships to other sites has been difficult to complete. Finally, rock art sites have routinely been subjected to acts of vandalism and are susceptible to deterioration (Spangler 1995:140-145). Currently, there

remains much to be learned regarding known rock art sites with a high probability for further significant rock art discoveries.

Well-preserved Open Camp and Village Sites – Open camp and village sites are similar large prehistoric occupations, distinguished primarily on the basis of the presence or absence of residential structures. Campsites located on plateaus, outcrops, and valley floors characterize open campsites. These sites typically have evidence of lithic scatters, ceramic scatters, and projectile points, and are often defined on the presence of remnants of hearths and other features. Many of the sites have been characterized as hunting and butchering activity areas.

Platform Sites – Platform sites, or sites located on top of flattened knolls, are rare within the Uinta Basin. One site overlooking the Green River is an unusual site on a knoll that appears to have been leveled off, whether manually or by environmental processes is unknown. The leveled surface of the knoll has a circular structure made of flat sandstone slabs approximately 1.5 feet high with the interior filled with a light-colored clay material. This structure is unknown in function and, to date, it is the only known feature of its type within the Uinta Basin. Others could be present with the Uinta Basin, but have yet to be discovered.

Rock Shelters and Caves – As their name implies, rock shelter sites contain evidence of human occupation located within existing rock overhangs or caves. The range of rock shelter sites includes relatively long-term single occupations, multiple reuse occupations through time, and ephemeral single-use episodes. Rock shelters and caves are generally located within canyons, near permanent water sources, such as rivers or streams. Most of these sites also tend to be located on the southern side of canyons (Spangler 1995:162), although they can be found within any portion of geologically suitable areas.

Prehistoric Architectural Sites – A relatively wide range of site types is included in this category. Architectural sites have been recorded in open-air and sheltered settings, at nearly all elevations, and in virtually every environment within the Uinta Basin. However, some types of architecture are restricted to only certain regions or settings. To date, the range of architectural sites includes stone or masonry structures, pit structures, temporary brush structures, tipi rings, sweat lodges, storage structures or granaries, stone alignments or walls, cairns, and rubble mounds. Structures such as tipi rings, temporary brush structures, and perhaps sweat lodges are located in more open environments, on knolls, cliff edges, or terraces. Stone or masonry structures, granaries, and often walls are found in cliffside rock shelters, in canyons or on ledges. Other stone or masonry structures can also be found in open areas, stream and river terraces, upland ridges, small cliff openings, and butte or mesa faces. Typically, such structures are found within reasonable proximity of sandstone formations and outcrops, which provide much of the source material for building them.

Prehistoric Artifact Scatters – Prehistoric artifact scatters may be encountered in open-air or sheltered settings and in nearly all environment types and elevations. These types of sites are located throughout the Uinta Basin and number from the hundreds to the thousands. Artifact scatters typically consist of lithic artifacts such as chipped stone debitage, tools, cores, and tool and core fragments. However, many artifact scatters may also contain ceramic artifacts, groundstone artifacts, or a combination of lithic, ceramic, and groundstone artifacts. Previously

recorded artifact scatters in the Uinta Basin range from only a few to hundreds (or even thousands) of artifacts. Artifact scatters do not typically contain evidence of architecture, although smaller features, such as hearths, may be present either on the surface or below the surface. The function of artifact scatters is highly variable and can be subject to differing interpretations. Minimally, artifact scatters are likely to have been involved in short-term land-use settlement systems.

Prehistoric Resource Procurement Sites – Locations where prehistoric populations procured a specific resource are common within the Uinta Basin. A wide range of resources appear to have been exploited in a manner that left archaeological evidence, including game animals (hunting sites), chipped stone materials (lithic procurement sites), and floral materials (botanical processing sites). Several different hunting site types have been identified to date, including hunting blinds, game drives, game traps, and butchery sites. Hunting sites can be designed to either funnel game toward a desired goal or to hide the hunter in ambush-style hunting. In general, hunting sites are identifiable due to the strategic placement of rock or brush structures along game trails, water sources, near topographic features that restricted game movement, or in locales that provide an advantage in elevation. Butchery sites are typically identified by the presence of high numbers of animal bones that bear evidence of processing - such as cut marks or diagnostic breakage patterns. In many instances, the kill location and butchery location are the same.

Prehistoric Ceremonial Sites – Ceremonial sites are usually located in areas with panoramic views, and are recognized by the presence of a stone circle or alignment that contains little or no artifacts. Ceremonial sites are interpreted as vision quest locations (Reed and Metcalf 1999:52). The vision quest interpretation has largely been inferred from ethnographic work among modern Native American groups. However, the actual nature of prehistoric ceremonial sites is currently not well understood.

Prehistoric Isolated Features – Sites recorded as prehistoric isolated features typically consist of one isolated cultural feature that has few or no associated artifacts. In many instances the isolated feature is unidentified, while in other cases the feature is identified as a simple cultural feature (i.e., a cairn, etc.).

Prehistoric Landscapes – Prehistoric landscapes are a type of cultural resource that encompasses a range of cultural resource sites within a given environment. The study of prehistoric landscapes is a relatively new endeavor in the New World. This approach has become more common in the Old World, namely Great Britain and Europe. The interaction of human sociopolitical and economic systems and the landscapes in which humans live and create environments is one main focus of research into landscape archaeology. In short, prehistoric landscape can be defined as including humans and their anthropogenic ecosystem.

The types of landscapes that could be characterized within the Uinta Basin include canyons and plateaus. These encompassing landscapes are large in scale, but contain hundreds of smaller, more distinct units of residential dwellings, storage areas, resources scatters, etc., that make up the landscape. Individually, the sites within a given landscape may not be particularly noteworthy or significant. However, when each site is taken into consideration with other,

geographically close sites, a landscape emerges that encompasses multiple types of past human uses of the landscape. These individual sites cluster together in a setting that sets it apart from the region as a whole. These landscapes could also have importance for extant Native American tribes as sacred or important places with cultural importance.

Prehistoric Trails – Travel routes along river corridors and open drainages were common ways for prehistoric peoples to get from area to area. The White River was a traditional Ute travel route within the eastern Uinta Basin to western Colorado (Spangler 1995:872). Other trail areas have been formally identified to the east of the region (Reed and Metcalf 1999:51) as well as in the Book Cliffs (Blaine Phillips personal communication 2002), and additional unidentified prehistoric and protohistoric trails are likely to exist within the region. Prehistoric trails could potentially be identified through remote sensing and ground-truthing.

3.3.3 HISTORICAL SITE TYPES

The following section provides a basic description of the primary known historical site types within the VPA. Undoubtedly, other site types do exist within the area, but those listed here comprise the bulk of historical sites currently managed by the BLM.

Historical Architectural Sites – Historical architecture sites range from simple one-room cabins to multi-story and multi-room structures. Historical structure sites may contain abandoned structures or evidence of structures, while other sites might consist of a structure or structures that are still in use. To date, historical architecture sites include structures such as cabins/homesteads, forts or military posts, trading posts, private residences, line shacks, civic structures, stone or masonry walls, fences, corrals or pens (both Anglo and Ute), sheds, barns, or outhouses. Although typically located in desirable areas or near reliable water sources, historical architecture can be found in nearly every setting or environment. Among the more common structural sites with the VPA are those towns, such as Dragon, Watson, and Rainbow mines, and rail sidings associated with gilsonite mining in the region.

Artifact Scatters/Middens – Historical artifact scatters and middens may consist of one or more of the following: glass, ceramics, cans, building materials, barbed wire, cartridge cases, faunal material, personal items, or miscellaneous artifacts. Artifact densities may range from relatively sparse to relatively dense scatters. Historical artifact scatters can represent light or intense land use, and can be encountered in nearly any environment or elevation. Artifact scatters may be associated with isolated residences, larger settlements, campsites, or, they may be the result of random dumping episodes.

Aspen Art and Historical Inscriptions – Aspen art (i.e., dendroglyphs) and historical inscriptions are present on BLM lands within the VPA. These inscriptions have been found both on trees (primarily aspen) and on rock faces. Aspen art is considered to be any historical carving or engraving made on trees. Aspen art includes carvings related to activities such as settlement (e.g. as property markers) as well as random works found near roads or near historical campsites. The frequencies of aspen art range from a single mark, multiple markings on one tree, or a series of markings on multiple trees. Aspen art is often associated with particular ethnic groups, such as the Basque (primarily in Nevada), or with particular labor groups, such as sheepherders, timber

men, and others who spend time within aspen groves. Elsewhere in Utah, particular groves of trees became favorites for carvers, and dozens of inscriptions can be found which span long periods of time. These groves essentially became historical "message boards" for users of the area.

Historical Burials/Cemeteries – Early historic period burials may consist of isolated burials of a few or one individual, while early cemeteries will contain numerous individuals. Currently, several cemeteries exist within the Uinta Basin. In addition, several isolated burials, located both on public and private land, have been recorded. Other isolated burials might yet be encountered.

Irrigation Systems/Canals – The development of agriculture and ranching in the Uinta Basin often required the building of waterworks to bring water into relatively dry regions. In general, irrigation works are considered as improvements, which have been made on natural drainages, or as the construction of new waterways. Irrigation works can include ponds, dams, concrete, stone-lined or earthen ditches or canals, headgates, culverts, diversion gates, or wells.

Mining Sites – In many parts of the Uinta Basin, the mining industry has played an important economic role. Mining related sites are variable. Recorded examples include small-scale mining efforts at one locale, small-scale operations at multiple sites, and complex mining works at one or more locations carried out by large mining firms. The goals of Uinta Basin mining efforts are also varied, with several different kinds of precious metals (i.e., gold, silver, copper, and uranium), minerals, and hydrocarbons sought. Besides the actual mine or quarry, mining sites can have related architecture, temporary camps, ore piles, middens, artifact scatters, burials, or aspen art located nearby. Additionally, railroads constructed specifically to serve the mining industry may also be associated with mine sites.

Oil and Gas Industry Sites – Oil and gas industry historical sites can consist of pipelines, wells, processing and transport facilities, and "prospects." The first well in the Uinta Basin was drilled on the East Tavaputs Plateau in 1900 (Spangler 1995:822). Although unsuccessful, the sinking of this first well foreshadowed the fervent activity that would occur in the area 40 years later. While more than 40 wells were drilled in the Uinta Basin between 1908 and 1913, most historical archaeological and structural sites associated with the industry date to the post-World War II era, when oil and gas exploration began in earnest.

Privies/Outhouses – Prior to the installation of buried sewer lines, sanitation facilities often consisted of excavated pits designed to collect and contain waste. Although originally intended to serve as sanitation facilities, privies often served as secondary refuse dumping locales. Also during use, personal items were often accidentally dropped into privies. Through secondary dumping and accidental loss, many privies contain high frequencies of artifacts. As privies routinely contain high numbers of artifacts, in an often-undisturbed subsurface deposit, privies may serve as valuable sources of data. Privies are routinely found in association with campsites, private residences, public structures, military posts, and commercial buildings. Privy sites have been found on mining sites and other industrial sites as well. No clear indication of the frequency and/or distribution of such sites could be gleaned from Spangler (1995), thus it is unclear how many historical privies and outhouses are present on BLM lands within the VPA. However,

given their general association with permanent and/or long-term occupation sites, few privies are likely to be found on BLM lands.

Historical Transportation Sites – Establishing efficient transportation routes was one of the main goals of explorers and settlers during the settlement of the west. The Uinta Basin was no different. As Euroamericans settled the Uinta Basin, establishing efficient travel avenues was of vital importance in aiding the growth of settlements, the mining industry, and the agriculture and ranching businesses. To date, identified transportation related sites include trails, paths, paved or unpaved roads, bridges, railroads, wagon or stagecoach routes, stagecoach or railroad stops, railroad section stations, ferry sites, and airstrips or runways. Furthermore, as trappers and fur traders routinely used waterways for travel, the shores of various sections of waterways might contain evidence of early travel. Several East-West and North-South transportation routes used and developed by the Northern Ute bands in the 19th and early 20th centuries are known within the VPA. These include "Pony Trails" and "Wagon Trails". These routes gave access into and out of western Colorado and into and out of the San Rafael area of Utah. Burials, rockart and other site types are associated with these routes.

3.3.4 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 historical artifacts assemblages and collections. Tribal representatives typically identify these sites during the government-to-government consultation process that is required of federal agencies. However, Traditional Cultural Properties can also be identified by representatives of other culture groups, such as historical culture groups associated with the Euro-American migration to the western United States. Some common site types are lakes and springs, land features, and traditional gathering or collection areas.

Lakes and Springs – Several tribes, including the Shoshone and Ute, claim places of water as places of traditional importance and have traditional stories about mythical beings, or water spirits that live in lakes, rivers, and springs (Spangler 1995). No specific places of this type have been identified in lands managed by the VFO. However, an ethnographic overview for the Flaming Gorge Dam Environmental Impact Statement prepared by SWCA for the USBR recorded several stories about "water babies" and other mythical beings seen in the Green River in historic times (Rhodenbaugh and Newton 2000). None of these areas were identified as Traditional Cultural Properties.

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. Recently, Native Americans have also identified hunting areas as Traditional Cultural Properties (Newton and Hancock 2000). No specific places of this type have been recorded on lands managed by the VFO.

Land Features – Large geographic regions, such as deserts, mountain ranges, and valleys are often identified as Traditional Cultural Places but few have been formally documented as such. According to Deloria and Stoffle (1998), the Oquirrh Mountains and Granite Mountain near Salt Lake contains various places that are considered to be traditionally important or sacred to the Goshute Indians. Deloria and Stoffle did not specify what these places were or precisely where they were located. Bull Lake, which is located on the Wind River reservation, is considered to be a place of traditional importance to the Eastern Shoshone (Shimkin 1986). It is said that Bull Lake is where monsters live and if eaten, the monsters will change into water buffalo and disappear. No specific places of this type have been recorded on lands managed by the VFO.

3.3.5 General Site Locations and High Site Density Areas

Cultural resources are scattered throughout the VPA. Present knowledge of their locations is largely constrained by the nature of cultural resource investigations, most of which have been driven by the Section 106 compliance needs of development projects. As such, existing data on site types, locations, and significance (use values) consists of snapshots across the VPA rather than a comprehensive picture. Nevertheless, based on these data, as well as on a number of overview surveys, it is possible to define the types of environmental settings where prehistoric and historical sites are more or less likely to occur. Overview surveys and existing data provide a general picture of site location tendencies that can be used to describe the places where prehistoric and historical sites are likely to exist.

During the late 1970s and early 1980s a number of surveys called "Class II" surveys were undertaken in order to attempt to determine if environmental variables could predict prehistoric archaeological site location in a way that would preclude the need to conduct formal surface inventories in particular environmental settings (Spangler 1995:226). Because the surveys found that prehistoric archaeological sites could be found across nearly all environmental zones, these surveys failed to meet their original goals. Furthermore, the surveys were unable to accurately predict specific site locations. However, the surveys were able to demonstrate good associations of prehistoric archaeological sites with general environmental zones. In other words, while specific site locations could not be predicted, and it appeared that there was potential for the presence of at least one or a few cultural resource sites in nearly all environmental zones of a given area, the Class II surveys were able to identify zones that had higher and lower frequencies of prehistoric archaeological sites.

The association of prehistoric archaeological sites with particular environmental zones can serve as a useful management tool for identifying areas where anticipated activities would have greater or lesser potential for impacts on prehistoric cultural resources. The Class II surveys, summarized in Spangler (1995:226-242), identified that proximity to water and certain vegetation types tended to influence site density. Areas within approximately 1 km of permanent water or within immediate proximity of a semi permanent water source appear to have high probabilities for cultural resource site occurrence. Furthermore, vegetation zones dominated by juniper were also identified as areas with high potential for cultural resource site locations. Finally, areas of intermittent sand dunes also tended to have high densities of prehistoric archaeological sites. Areas lacking water, juniper trees, or sand dunes, and areas of relatively steep slope tended to have low site densities. Areas of high site density tended to have between 1

and 7 sites per square mile with an average of 4.87 sites/square mile while areas of low density had less than 1 site per square mile (Spangler 1995:226-242).

The locations of historical cultural resource sites are more difficult to predict. Because historical populations have greater ease of transportation and different economic interests, historical site locations are not as constrained by availability of water and particular vegetative resources as were the locations of prehistoric occupations. Furthermore, linear historical sites such as roads, railroads, and canals, are likely to crosscut a wide variety of topographic settings and environmental zones. Nonetheless, two factors are likely to have conditioned the location of most historical cultural resource sites—proximity to watered/arable land for agriculture and proximity to mineral resources for extractive industries.

For the purposes of analysis, these factors were utilized to develop zones of high and low probability for cultural resource site locations. All areas within approximately 1 km of permanent water, or within juniper vegetation zones, sand dunes, or general area of historical mining districts were considered high site probability zones. Areas with greater than 30% slope, or not having any of the high site probability factors were considered low site probability zones.

In addition, four areas of high site density have been identified within the VPA through previous investigations. These areas, and the acreages they encompass, are identified in Table 3.3.1. To be certain, other areas of high site density exist within the planning area but have not yet been identified and verified through field studies. Areas of high site density, such as those listed in Table 3.3.1, have many significant use values. In particular, they have high scientific and conservation values, and in some cases, high traditional values as well. Such areas also tend to have high public use values, but these are outweighed by other use values that necessitate the restriction of activity within the areas.

Table 3.3.1. Known High Site Density Areas within the VPA

Site Name/Number	Acreage
Little/Devil's Hole	10,878 acres
Uinta Foothills	33,059 acres
Upper Willow Creek	4,304 acres
Site 42Un1388 (Four Mile Wash)	560 acres

3.3.6 KNOWN NATIONAL REGISTER LISTED SITES

Existing data do, however, identify several cultural sites of determined local, regional, or national significance and four areas of high site density. The sites of determined significance are listed on the National Register of Historic Places (NRHP) (Table 3.3.2). Although these sites have been listed on the NRHP, it should be remembered that sites which have been determined eligible for listing on the NRHP but are not currently listed are afforded the same level of protection and consideration in planning and land-use decisions as those that are listed. However, since the locations of every single eligible site within the planning area are not known, largely because of the dearth of investigative surveys that have been conducted, it is not possible to

provide a comprehensive list or map of all such sites. Therefore, only those NRHP-listed sites are provided herein.

Table 3.3.2. Known National Register Listed Sites within the VPA

Site Name/Number	Area
Cockleburr Wash Petroglyphs	Jensen
Dr. John Parson Cabin Complex	Browns Park
John Jarvie Historic Ranch District	Browns Park
Little Brush Creek Petroglyph Panel	Vernal
McConkie Ranch Petroglyphs	Dry Fork
Nine Mile Canyon	Nine Mile Canyon (East Portion)

3.3.7 SUMMARY OF CULTURAL RESOURCES

Cultural resources within the Vernal area are numerous, diverse, and widely dispersed. The resources range from small, ancient artifact scatters associated with prehistoric populations to historical resources like cabins, homesteads, mines, and railroads. Although these resources have been documented over years of study, a comprehensive picture of the exact distribution of the resources is not possible due to the large area encompassed and the lack of region-wide systematic study.

Nonetheless, previous data and investigations do provide a general picture of the types of sites present and their locations. Although it is not possible to provide exact data on the location of all types of cultural resources and to therefore gauge with precision the effects of particular management decisions on those resources, it is possible to derive general tendencies for site locations that can be use to gauge the relative probability and relative severity of the impacts of various management decisions on cultural resources in the overall area. For the purposes of subsequent analyses, areas within the VPA would be divided into zones with "High" and "Low" probabilities for cultural resources, based on the relationships between site location and environmental variables that have been established by previous research (Spangler 1995:226–242). High probability zones would be considered those that are within 1 km of permanent water, a juniper zone, sand dune areas, and historical mining districts. Low probability zones would be all areas with greater than 20% slope and areas not meeting the criteria for definition as a high probability zone. These criteria provide replicable proxy data for site location, and can be used to gauge whether a management decision is more or less likely to impact cultural resources.

3.4 ENVIRONMENTAL JUSTICE

The Executive Order on Federal actions to address environmental justice in minority populations and low-income populations (Executive Order 12898, with explanatory memorandum) directs federal agencies to assess whether their actions have disproportionately high and adverse human health or environmental effects on minority communities and low-income communities. The Ute Tribe constitutes both a minority community and a low-income community.

Federal minerals are located on 188,500 acres of the Hill Creek Extension, Uintah and Ouray Indian Reservation in Uintah County 113,684 acres within the Hill Creek Extension are Indian minerals. The Hill Creek Extension has important cultural and economic values for the Northern Ute Tribe. This area, as with other areas on the reservation, is economically important because of oil and gas royalties, rights-of-way fees and employment opportunities.

The Uintah and Ouray Indian Reservation has 3,725 Tribal members living on the reservation. The total potential labor force is approximately 1,600, of which about 42% are considered unemployed. Approximately 80% of those who are employed work for the Tribe. Eighty-three percent of those that are employed earn less than $14,000 annually. Mineral resources, particularly oil, gas, and oil shale, are the greatest economic assets of the Tribe. Other minerals on the reservation include tar sands, coal, gilsonite, bentonite, wurtzilite, phosphate, and sand and gravel. Raising cattle and the growing of livestock feed are other important economic activities that occur on the reservation (BLM 1999).

The southern portion of the Hill Creek Extension, along the Book Cliffs divide, has important traditional life ways and religious values for the Tribe. This area has been distinguished as "wilderness" by the Tribe because of its relatively pristine condition. Big game hunting is an important traditional lifestyle for Tribal members. Some religious ceremonies of the Ute people require plants and other materials that are located here. Additionally, the Hill Creek Extension contains numerous archaeological sites, including rock art, camps and burials that have sacred meaning (Duncan 1992).

3.5 FIRE MANAGEMENT

3.5.1 RESOURCE OVERVIEW

Fire management planning policy requires that a Fire Management Plan, including fire prevention, preparedness, suppression, and use as well as subsequent restoration and rehabilitation, be conducted on an interagency basis. The Fire Management Plan conforms to the National Fire Plan and Federal Wildland Fire Management Policy (USDI 1995). The Vernal Field Office is a major partner in the Uinta Basin Interagency Fire Center (Center). The Center conducts all initial and extended-attack dispatching for the BLM, Ashley National Forest, the Uintah-Ouray Indian Agency, the USFWS - Ouray and Browns Park National Wildlife Refuges, the Utah Division of State Lands and Forestry, and the Utah component of Dinosaur National Monument. An annual operating plan (AOP) has been developed by the Center to establish operating procedures for coordinated responses and cooperative sharing of resources throughout the VPA. Consolidation of dispatch services in the Center has improved coordination of interagency fire planning among the land management agencies in the area.

Wildland fires are integral natural forces affecting public lands within the VPA. In the 10-year period from 1989 to 1998, 497 wildland fires burned a total of 8,540 acres in the VPA. Of these wildland fires, 445 were caused by lightning, and 52 were human-caused ignitions. During the period from 1999 through 2001, 24,294 acres were treated by prescribed burning in a total of

nine treatment areas. Plans for the following five years included prescribed burns on approximately 11,000 acres annually (see Fire Management Plan for specific sites and acreage).

Historically, a lack of funding from resources programs limited the fuels program to a few prescribed fires. The fire suppression program was funded at limited levels until the new Fire Management Plans (FMPs) were completed, and suppression of wildland fire was the only fire management tool used. The fire suppression policy did not take into account the long-term effects on the ecosystems of the area or the long-term costs associated with it. By restricting the natural role of fire in the ecosystem, fuel loads have increased over the years. Pinyon-juniper, sagebrush, and other shrub-type species have become the dominant vegetation communities. Other large conifer species (e.g., Douglas fir, Ponderosa pine) have become decadent, and the health of these stands has declined (see Woodlands and Forest section).

More than one million acres have been designated as needing fire treatments within the VPA. Treatment goals are to reduce the potential for catastrophic stand-destroying wildland fire, enhance wildlife habitat, and increase vegetation diversity. These VPA fire treatment areas also include forage areas for livestock and wildlife, mineral resources including oil and gas fields, and popular hunting and fishing areas. The area is mainly rural, but has an increasing number of residences and population centers within four identified Wildland Urban Interface (WUI) areas.

3.5.2 FIRE MANAGEMENT CATEGORIES

The VPA is divided into fire management categories, and the appropriate fire treatment response for the VPA would be managed using the Fire Management Polygons (A, B, C, and D) as described in BLM Handbook 1601 - land-use Planning, and as summarized below:

Category A. Areas where unplanned fire is not desired at all.

Category B. Areas where unplanned fire is not desired because of current conditions. Prescribed fire use is allowed to obtain resource management objectives. Mechanical/chemical treatments would be used where social and/or resource constraints preclude the use of prescribed fire.

Category C. Areas where wildland fire is desired. Prescribed fire is allowed and may be extensive to obtain resource management objectives. Mechanical/ chemical treatments would be used where social and/or resource constraints preclude the use of prescribed fire.

Category D. Areas where wildland fire is desired, and there are few or no constraints for its use.

Fire suppression activities and the appropriate management response (AMR) would be implemented through the guidance developed in the fire management categories and developed for the Vernal Field Office. The criteria used in developing the categories were determined by an interdisciplinary team of resource specialists. Criteria for each category are described below:

Category A. This category includes the salt desert shrub type where the risk of cheatgrass (a noxious weed) invasion is high after an area has been burned or treated. Also included are the major river corridors in the VPA where fire would destroy Fremont cottonwood, which is a keystone species that is presently declining. Constraints to fire management activities include cultural resource sites, high recreational use, highly developed oil and gas fields, high invasive weed potential, and threatened and endangered (T&E) species habitat. Wildland fire for resource use is not appropriate.

Category B. This category includes identified crucial deer winter range and crucial sage grouse habitat. Within this habitat, Wyoming sagebrush is identified as a keystone species, which has been in a continual state of decline because of widespread drought and invasive species encroachment. Also included within this polygon are the four identified WUI areas, including cultural resource sites, adjacent urban interfaces, sage grouse and deer winter range habitat, moderate potential for invasive weeds, and T&E species habitat. Wildland fire for resource use is not appropriate.

Category C. This category contains the pinyon-juniper type, along with the aspen/Douglas fir, mountain browse, and non-crucial areas of the sagebrush type. Fire is desired to achieve resource objectives. Constraints to fire management activities include a limited amount of oil and gas development, non-critical sage grouse habitat, a limited amount of T&E species habitat, and a limited amount of cultural resources. Wildland fire use for resource objectives is appropriate.

Category D. This category contains all of the existing Wilderness Study Areas (WSAs) within the VPA. The role of fire would be widely incorporated, as there are few resource constraints within these polygons. Constraints to fire management activities would include WSA-designated areas, non-critical sage grouse habitat, a limited amount of T&E species habitat, and a limited amount of cultural resources. Wildland fire use for resource objectives is appropriate.

3.6 HAZARDOUS MATERIALS

3.6.1 BLM HAZARDOUS MATERIALS MANAGEMENT PROGRAM GOALS

Hazardous materials are defined as any material that, because of its quantity, concentration, or physical or chemical characteristics, may pose a real hazard to human health or the environment. Hazardous materials include flammable or combustible material, toxic material, corrosive material, oxidizers, aerosols, and compressed gases.

The Hazardous Materials Management Program, a program that provides guidance supplemental to the National Contingency Plan (EPA 1994), typically supports and guides other programs or agencies to ensure that they adhere to all federal and state environmental laws and regulations regarding hazardous materials. The Hazardous Materials Management Program would review this document, the VPA RMP EIS and would also review all National Environmental Policy Act

(NEPA) compliance documents produced for actions within the VPA for hazardous materials management environmental compliance. If the Hazardous Materials Management Program found within the VPA sites that contained hazardous substances, all surface and/or subsurface activities would be suspended until the VPA obtained direction from the appropriate federal and/or state regulatory agency. Monitoring would be carried out in response to assessment, cleanup, and restoration of a contaminated site. Monitoring would be coordinated with other programs to ensure that those program objectives were met.

The owners and operators of oil, gas, and coal bed natural gas (CBNG) wells within the VPA are required to have emergency plans that cover potential emergencies including fires, employee injuries, chemical releases, and other potential hazards related to hazardous materials. Emergency plans typically contain phone numbers for all medical and emergency services and a list of responsible personnel to contact in the case of emergency. The plans would be posted at all emergency facilities, and employees would be trained in emergency response upon being hired by minerals exploration and development, and maintenance companies.

There are no approved hazardous waste disposal facilities on public lands within the VPA. All hazardous wastes are transported out of the VPA to approved disposal facilities that are constructed and operated in accordance with state and federal regulations. Oil and gas operators are required to comply with a Hazardous Substance Management Plan, as directed by the regulations of the Resource Conservation and Recovery Act (RCRA), which regulates transportation and disposal of hazardous wastes. All private business and organizations that handle hazardous materials would be required to comply with EPA regulations pertaining to the storage, use, transportation, and disposal of these materials. The transportation of hazardous materials is subject to guidelines under the Utah Department of Transportation as well as the United States Department of Transportation.

The current BLM, Vernal Field Office declaration statement regarding hazardous materials management within the VPA is as follows:

> Less than 10,000 pounds of any chemical(s) from EPA's Consolidated list of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act [SARA] of 1986, and less than the Threshold Planning Quantity [TPQ] of any extremely hazardous substance(s), as defined in 40 CFR 355, would be used, produced, transported, stored, disposed, or associated with the proposed operation annually. Vehicle and equipment fuel, lubricants, antifreeze and battery acid would be the only hazardous material used or associated with the proposed action. Risk of a release would be very low, and the adverse environmental affect of a release would be minimal because it would be cleaned up immediately and disposed of in an approved waste disposal facility (BLM 2001).

3.6.2 HAZARDOUS MATERIALS RISKS WITHIN THE VPA

There are two types of hazardous materials risks: those risks associated with unauthorized releases, and other hazardous materials risks from controlled uses of materials listed under SARA and 40 CFR 355.

The remote nature of VPA lands creates an opportunity for illegal dumping of hazardous materials. These unauthorized releases could include materials from illegal drug laboratories or the illegal dumping of hazardous materials by private companies or individuals. When these types of dumps are encountered, the dumpsite is secured to ensure public safety, appropriate agencies are contacted, and clean up is conducted in accordance with established BLM plans and procedures. If the source responsible for the dumping is identified, that information would be released to the appropriate authorities for prosecution.

Controlled releases of hazardous materials could be the result of programs conducted by the Vernal Field Office, state or local governments, or operations of local businesses and industries. Authorized sources of hazardous materials could include oil and gas development, mineral extraction and processing operations, landfills and hazardous material disposal sites, aboveground and underground storage tanks, abandoned mine lands (AML), and small businesses.

3.6.2.1 LANDFILLS AND HAZARDOUS WASTE DISPOSAL FACILITIES

There are no approved hazardous materials waste facilities on public lands in the VPA. However, a hazardous materials disposal site is located on private land near Altamont, Utah. BLM policy has been to either close or transfer ownership of all landfills that were historically on Vernal Field Office-administered lands. The Vernal Field Office is currently in compliance with this policy. In order to meet compliance, Red Wash and Jensen landfills were closed; ownership of the Vernal City/County landfill was transferred from BLM ownership; and dumps at the White River oil shale facility were covered and revegetated.

3.6.2.2 STORAGE TANKS

The use of aboveground storage tank (AST) and underground storage tank (UST) operations is regulated by the EPA and administered by the state of Utah. Operators are responsible for understanding and complying with the EPA regulations. Underground storage tanks within the VPA are concentrated primarily within the towns of Vernal and Naples, and along the Highway 40 and 191 travel corridors (UDERR 2004).

3.6.2.3 SMALL BUSINESSES

The types of small businesses and organizations that generate or use hazardous materials include (but are not limited to) automotive shops, dry cleaning businesses, print shops, and hospitals. These operations are regulated by the EPA and administered by the state of Utah. It is the responsibility of the business/organization owner to understand and comply with EPA

regulations pertaining to hazardous materials used or hazardous wastes that are generated by that business or organization.

3.6.2.4 OIL AND GAS

An increased risk of hazardous materials is an indirect effect of oil, gas, and mineral development. As oil and gas development increases so does the use, generation, and transportation of hazardous materials (Table 3.6.1). For descriptions of areas that may be affected by particular kinds of development, see Section 3.9, Mineral Resources.

3.6.2.5 TAR SAND

In the early 1980s, certain tar sand deposits in the Uinta Basin were divided into seven Special Tar Sand Areas (STSAs), as designated by the USGS under direction from Congress pursuant to the Combined Hydrocarbon Leasing Act of 1981. These STSAs are: (1) Pariette, (2) Sunnyside, (3) Argyle Canyon - Willow Creek, (4) Asphalt Ridge - Whiterocks, (5) Hill Creek, (6) P.R. Spring, and (7) Raven Ridge - Rim Rock (BLM 2002).

Tar sands may be extracted via in-situ methods or via surface mining, depending on the depth. In-situ extraction and processing may involve chemicals similar to those for conventional oil and gas (see Table 3.6.1). Hazardous materials associated with surface mining are those primarily used in vehicle and equipment operation, such as battery acid, fuels, lubricants, and antifreeze.

3.6.2.6 GILSONITE

Gilsonite mining operations within the VPA do not conduct mineral processing on the mine site. Therefore, the only hazardous materials used for Gilsonite mining are those associated with vehicle and equipment operation.

3.6.2.7 OIL SHALE

Currently one RD&D lease has been issued to OSEC to prove development potential of oil shale processes. In addition, on SITLA lands, northeast of Bonanza (Sections 10 and 15 of T9S, R25E), is an oil shale project owned by Oiltech. This project is a pilot plant running processing tests of White River Oil Shale.

Table 3.6.1. Hazardous Constituents Potentially Used or Produced During Construction, Drilling, Production, and Reclamation Operations Associated with Oil and Gas Production

Use	Material	Hazardous Constituents
Drilling Materials	Barite	Barium compounds, fine mineral fibers
	Bentonite	Fine mineral fibers
	Caustic Soda	Sodium hydroxide
	Glutaraldehyde	Isopropyl alcohol
	Lime	Calcium hydroxide

Table 3.6.1. Hazardous Constituents Potentially Used or Produced During Construction, Drilling, Production, and Reclamation Operations Associated with Oil and Gas Production

Use	Material	Hazardous Constituents
	Mica	Fine material fibers
	Phophate Esters	Methanol
	Polyacrylamides	Acrylamide, Polycyclic aromatic hydrocarbons (PAHs), Petroleum distillates, Polycyclic organic matter (POM), "Fine mineral fibers
	Retarders	Fine mineral fibers
	Anionic Polyacrylamide	Acrylamide
	Polyanionic Cellulose	Fine mineral fibers
Cement/Plug	Anti-foamer	Glycol ethers
	Bentonite	Fine mineral fibers
	Calcium Chloride Flake	Fine mineral fibers
	Cellophane Flake	Fine mineral fibers
	Cements	Aluminum oxide, Fine mineral fibers
	Chemical Wash	Ammonium oxide, Glycol ethers
	Diatomaceous Earth	Fine mineral fibers
	Extenders	Aluminum oxide, Fine mineral fibers
	Fluid Loss Additive	Acrylamide, Fine mineral fibers, Naphthalene
	Friction Reducer	Fine mineral fibers, Naphthalene, PAHs, POM
	Mud Flash	Fine mineral fibers
	Retarder	Fine mineral fibers
	Salt	Fine mineral fibers
	Silica Flour	Fine mineral fibers
Fracturing Material	Biocides	Fine mineral fibers, PAHs, POM
	Breakers	Ammonium persulphate, Ammonium sulphate, Copper compounds, Ethylene glycol, Fine mineral fibers, Glycol ethers
	Clay stabilizer	Fine mineral fibers, Glycol ethers, Isopropyl alcohol, Methanol, PAHs, POM
	Crosslinkers	Ammonium chloride, Methanol, Potassium hydroxide, Zirconium nitrate, Zirconium sulfate
	Foaming Agent	Glycol ethers
	Gelling Agent	Benzene, Ethylbenzene, Methyl tert-butyl ether (MTBE), Naphthalene, PAHs, POM, Sodium hydroxide, m-Xylene, o-Xylene, p-Xylene
	PH buffers	Acetic acid, Benzoic acid, Fumeric acid, Hydrochloric acid, Sodium hydroxide
	Sands	Fine mineral fibers

Table 3.6.1. Hazardous Constituents Potentially Used or Produced During Construction, Drilling, Production, and Reclamation Operations Associated with Oil and Gas Production

Use	Material	Hazardous Constituents
	Solvents	Glycol ethers
	Surfactants	Glycol ethers, Isopropyl alcohol, Methanol, PAHs, POM
Production Product/Fuel	Natural Gas	n-Hexane, PAHs, POM
	Produced water/drill cuttings	Barium, Cadmium, Chromium, Lead, Manganese, Radium 226, Uranium, Other radionuclides
	Liquid hydrocarbons	Benzene, Ethyl benzene, n-Hexane, PAHs, POM, Toluene, m-Xylene, o-Xylene, p-Xylene
Fuel	Diesel fuel	Benzene, Cumene, Ethylbenzene, MTBE, Naphthalene, PAHs, POM, Toluene, m-Xylene, o-Xylene, p-Xylene
	Gasoline	Benzene, Cumene, Cyclohexane, Ethylbenzene, n-Hexane, MTBE, Naphthalene, PAHs, POM, Tetraethyl lead, Toluene, m-Xylene, o-Xylene, p-Xylene
	Jet A	Benzene, Cumene, Cyclohexane, Ethylbenzene, n-Hexane, MTBE, Naphthalene, PAHs, POM, Toluene, m-Xylene, o-Xylene, p-Xylene
	Propane	Propylene
Geophysical Survey Materials	Explosives, fuses, detonators, boosters, fuels	Aluminum, Ammonium nitrate, Benzene, Cumene, Ethylbenzene, Ethylene glycol, Lead compounds, MTBE, Naphthalene, Nitric acid, Nitroglycerine, PAHs, POM, Toluene, m-Xylene, o-Xylene, p-Xylene
Pipeline Material	Coating	Aluminum oxide
	Cupric sulfate solution	Cupric sulfate, Sulfuric acid
	Diethanolamine	Diethanolamine
	LP Gas	Benzene, n-Hexane, Propylene
	Molecular sieves	Aluminum oxide
	Pipeline primer	Naphthalene, toluene
	Potassium hydroxide solution	Potassium hydroxide
	Rubber resin coatings	Acetone, Coal tar pitch, Ethyl acetate, Methyl ethyl ketone (MEK), Toluene, Xylene
Emissions	Gases	Formaldehyde, Nitrogen dioxide, Ozone, Sulfur dioxide, sulfur trioxide
	Hydrocarbons	Benzene, Ethylbenzene, n-Hexane, PAHs, Toluene, m-Xylene, o-Xylene, p-Xylene
	Particulate Matter	Barium, Cadmium, Copper, Fine mineral fibers, Lead, Manganese, Nickel, POM, Zinc
Miscellaneous	Acids	Acetic anhydride, Formic acid, sodium chromate, Sulfuric acid

Table 3.6.1. Hazardous Constituents Potentially Used or Produced During Construction, Drilling, Production, and Reclamation Operations Associated with Oil and Gas Production

Use	Material	Hazardous Constituents
	Antifreeze, Heat Control, and Dehydration Agents	Acrolein, Cupric sulfate, Ethylene glycol, Freon, Phosphoric acid, Potassium hydroxide, sodium hydroxide, Triethylene glycol
	Batteries	Cadmium, Cadmium oxide, Lead, Nickel hydroxide, Potassium hydroxide, Sulfuric acid
	Biocides	Formaldehyde, Isopropyl alcohol, Methanol
	Cleaners	Hydrochloric acid
	Corrosion Inhibitors	4-4' Methylene dianiline, Acetic acid, Ammonium bisulfite, Basic zinc carbonate, Diethylamine, Dodecylbenzenesulfonic acid, Ethylene glycol, Isobutyl alcohol, Isopropyl alcohol, Methanol, Naphthalene, Sodium nitrite, Toluene, Xylene
	Emulsion Breakers	Acetic acid, Acetone, Ammonium chloride, Benzoic acid, Isopropyl Alcohol, Methanol, Naphthalene, Toluene, Xylene, Zinc chloride
	Fertilizers	Unknown
	Herbicides	Active and inert ingredients (including proprietary ingredients) of herbicides are addressed and described in the Final PEIS and ROD Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States, June 2007.
	Lead-free thread compound	Copper, zinc
	Lubricants	1,2,4-Trimethylbenzene, Barium, Cadmium, Copper, n-Hexane, Lead, Manganese, Nickel, PAHs, POM, Zinc
	Methanol	Methanol
	Motor Oil	Zinc compounds
	Paints	Aluminum, Barium, n-Butyl alcohol, Cobalt, Lead, Manganese, PAHs, POM, Sulfuric acid, Toluene, Triethylamine, Xylene
	Paraffin Control	Carbon disulfide, Ethylbenzene, Methanol, Toluene, Xylene
	Photoreceptors	Selenium
	Scale inhibitors	Acetic acid, Ethylene diamine tetra, Ethylene glycol, Formaldehyde, Hydrochloric acid, Isopropyl alcohol, Methanol, Nitrilotriacetic acid
	Sealants	1,1,1-Trichloroethane, n-Hexane, PAHs, POM
	Solvents	1,1,1-Trichloroethane, Acetone, t-Butyl alcohol, Carbontetrachloride, Isopropyl alcohol, MEK, Methanol, PAHs, POM, Toluene, Xylene
	Starting Fluid	Ethyl ether
	Surfactants	Ethylene diamine, Isopropyl alcohol, Petroleum naphtha

3.6.2.8 PHOSPHATE

Phosphate deposits exist in the Uinta Basin within the Meade Peak Member of the Permian Park City Formation. Simplot Phosphate (formerly known as SF Phosphate) owns and mines a phosphate deposit that is located on private land within the VPA.

The Utah Division of Water Quality regulates Simplot Phosphate's phosphate mining operation, including the large tailings pond disposal area. Samples of tailings water taken indicate concentrations of phosphate, fluoride, total dissolved solids (TDS), and chromium to have been higher than the Utah Water Quality Standards (UDDW 2003). These standards are the most stringent of the applicable numeric criteria for Big Brush Creek, the nearby creek.

In 1996 Simplot (then SF Phosphate) performed a full-spectrum chemical analysis on a grab sample of the mine's tailings water. With the available data, it is not possible to know if the standards for cyanide, chromium, or zinc exceeded limits because the testing methods did not meet the accuracy levels for those determinations; however, the results indicate that TDS and phosphorus exceeded the limits. Although analyses of tailings solids show that the 1996 tailings solids are non-toxic, non-acid-forming, and non-saline, data showed higher levels of sulfates, hardness, calcium, and TDS in tailings water than those found in Big Brush Creek. This indicates that should tailings water migrate past the seepage collection system into Big Brush Creek, the creek's water would be degraded.

Open plan of operation UTU76097 involves a planned phosphate mill tailings disposal from Simplot Phosphate's milling of phosphate from patented mining claims onto mill sites.

3.6.2.9 MINERAL MATERIALS

Mineral materials include sand, gravel, and building stone. There is currently one open notice under the CFR 3809 BLM Surface Management regulations on public lands within the VPA. This notice, UTU66378, regulates a stone quarry that employs motorized vehicles to extract and haul the stone. Materials used for vehicle and equipment operation, such as battery acid, fuels, lubricants and antifreeze are the hazardous materials associated with surface mining.

3.7 LANDS AND REALTY

As provided by FLPMA, the BLM has the responsibility of planning for and managing public lands. Public lands, as defined by FLPMA, are lands and/or any interest in lands (e.g., mineral estate, reservations, etc.) that are owned by the United States and administered by the Secretary of the Interior, through the BLM. The land surface and mineral ownerships within the VPA are varied and intermingled; consequently, so are the administrative jurisdictions for land use and minerals.

Land and realty program objectives are the following:

- 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 resource management objectives of the BLM.

3.7.1 LAND OWNERSHIP ADJUSTMENT

As mandated by Sec. 106 (a)(1) of FLPMA (43 USC 1701), public lands are retained in federal ownership except for those public lands that have future potential for disposal (i.e., sale and exchange).

3.7.2 DISPOSAL AND ACQUISITION

As described under Sec. 203 (a) and Sec. 206 of FLPMA (43 USC 1713; 1716), public lands have potential for disposal when they are isolated and/or difficult to manage. Lands in the VPA identified for disposal must meet public objectives (as outlined in Sec. 203 (a) and Sec. 206 of FLPMA), such as community expansion and economic development. Exchanges are initiated in direct response to public requests or by the BLM to improve management of the public lands. The BLM will use both sales and exchange to accomplish disposals to meet plan goals.

Public sales are managed under the disposal criteria set forth in Sec. 203 of FLPMA. Federal law requires lands to be sold at not less than fair market value. Public lands classified, withdrawn, reserved, or otherwise designated as not available or subject to sale are not available for sale.

Public land cannot be effectively administered without legal and physical access. Methods used to acquire legal rights that meet resource management needs include negotiated purchase, donation, exchange, and condemnation. Acquisition alternatives include purchase of fee or less-than-fee interest above, on, and below the surface; perpetual exclusive easements; and permanent or temporary nonexclusive easements. Acquisition of access rights supports one or more of these resources: lands, minerals, forestry, range, wildlife, recreation, and watershed. Acquisitions of road or trail easements are probably the most frequently encountered access needs. Such easements include:

- road easements
- scenic or conservation easements
- sign locations
- stream clearance projects
- utility easements
- hunting and fishing easements
- range improvements

In the case of a split-estate acquisition, courts have historically ruled that use of the mineral estate has precedence over use of the surface estate, regardless of consistency with long-term land-use planning decisions.

3.7.3 WITHDRAWALS

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, although the land does not leave federal ownership. 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 often used to preserve sensitive environmental values, protect major federal investments in facilities or other improvements, support national security, and provide for public health and safety. Withdrawals segregate a particular portion of public lands, suspend operation of the public land laws (withdrawn from settlement, sale, location, or entry), and prevent any disposal of public lands or resources involved in certain types of land-use application. Withdrawals remain in effect until specifically revoked.

Withdrawals that no longer serve the purpose for which they were established or that lack sufficient justification of need would be revoked. Withdrawal review is mandated by FLPMA, which requires the BLM to eliminate all unnecessary withdrawals and classifications. Before recommending a withdrawal continuation, alternatives such as rights-of-way (ROWs) and interagency agreements must be explored. Appendix E describes the existing withdrawals within the VPA.

3.7.4 RIGHTS-OF-WAY (ROWS)

All public lands in the VPA are made available for ROW designation, permits, and leases, with the exception of defined exclusion and avoidance areas. Short segments of corridor, or windows, are designated when a full-length ROW corridor cannot be justified. Existing utility windows, ROW concentration areas, and communication sites are the preferred locations for future grants. Designated corridors are the preferred locations for placement of two or more linear or aerial ROWs that are similar, identical, or compatible. Corridors may be designated as Active or Contingency.

3.7.5 UTILITY/TRANSPORTATION SYSTEMS

ROWs are granted on a case-by-case basis. The majority of ROWs granted in the last 20 years have been for oil and gas gathering systems or roads. The majority of these ROWs did not follow designated corridors. Instead, routes were recommended that were the least environmentally damaging and followed de facto utility and transportation systems. Historically, pipeline ROWs granted within the VPA have been small surface pipelines, because they were determined to be the least environmentally damaging. Most of the larger diameter (10+ inches) pipelines (e.g., MAPCO, Northwest and Questar oil/gas transportation pipelines) were buried. The Western Regional Corridor Study Committee recommended that utility corridors cross the VPA.

Exclusion areas prohibit ROWs and corridor/window designation. All WSAs are exclusion areas where new rights-of-ways are prohibited. Avoidance areas are areas where special environmental and/or management considerations exist. ROWs are either not granted in these areas, or, if granted, are subject to stringent terms and conditions. The following avoidance areas were described in the Diamond Mountain and Book Cliffs RMPs:

- Red Mountain
- Six Mile Draw roadless area
- Red Fleet recreation area
- Pariette Wetlands
- Green River corridor
- Development of inventoried recreation sites
- Sage grouse strutting areas
- Scenic corridors
- Archaeological sites
- Fragile watersheds
- Threatened and endangered plant and wildlife habitat areas
- Crucial winter range
- ACECs (Diamond Mountain RMP)

3.7.6 ACCESS

Access to public lands is provided throughout the VPA. Access should be closed or restricted, where necessary, to protect public health and safety and to protect significant resource values. Easements can be acquired to provide access to public lands for recreational, wildlife, range, cultural/historical, mineral, ACEC, special management areas, and other resource needs. Note that all valid existing leases and rights are acknowledged by the BLM, and management actions implemented through approval of the Final RMP and Record of Decision do not apply retroactively to these leases and rights.

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 the 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, the BLM must grant the leaseholder reasonable access with consideration given to minimize impacts to wilderness character

3.7.7 PERMITS AND LEASES

Sec. 302 of FLPMA states that public lands may be offered for permit or lease to state, local, or private citizens for use, occupation, or development. For example, the BLM may permit agricultural development, residential use (only under certain very limited conditions), commercial use, advertising, or National Guard use of public lands. Permits are usually short-term authorizations not to exceed 3 years. Leases are long-term authorizations that usually require a significant economic investment in the land. Permits and leases generally require the permittee or lessee to pay rent to the U.S. for the use of federal property.

3.7.8 TRESPASS

Trespass occurrences are known to exist but many have not been documented and pursued because of lack of personnel and higher priority work. Common trespass locations in the VPA are along drainages, oil fields, and other areas bordering public lands. The BLM is responsible for realty trespass abatement, which consists of trespass prevention, trespass detection, and trespass resolution. The method of trespass resolution depends on whether a trespass was intentional or not, the extent and duration of use, and the existence and extent of resource impacts. In the past, trespass resolution has involved the BLM collecting administrative costs from the trespassing party and then either issuing temporary land-use authorizations (such as ROW grants, leases, or permits to resolve unauthorized agricultural use or location of canals, fences, pipelines or other facilities) or requiring that the unauthorized use be discontinued or that the personal property be removed.

3.8 LIVESTOCK AND GRAZING MANAGEMENT

The Vernal Field Office currently administers grazing on 167 allotments throughout the VPA. Of these, five grazing allotments (Dry Creek, Hoy Flat, Offield Mountain, South Pot Creek, and Wild Mountain–Colorado) are located entirely outside the VPA boundary and two allotments (Max Canyon and Blind Canyon) are located entirely on private land inholdings within the VPA. The 160 allotments within the VPA designated for livestock grazing encompass approximately 1,691,116 acres of BLM land. An additional 545,887 acres of other lands (private, state, tribal, etc.) are included within these allotments.

Livestock are regularly permitted to graze on 153 of the 160 allotments as follows: cattle (113), sheep (27), sheep and cattle (12), and horses (1). A few of the cattle and/or sheep allotments also permit some horses. Forty-five of the 153 allotments are currently grazed under a deferment rotation system, which involves delaying grazing in an allotment until the seed maturity of the key forage species.

On the remaining 7 allotments (Red Creek Flat, Rye Grass, Marshall Draw, Taylor Flat, Warren Draw South, Watson-Diamond Mountain and Sears Canyon), cattle are permitted on a temporary, non-renewable basis; however, such use is discretionary.

Within the VPA, 146,161 animal unit months (AUMs) are allocated for livestock, but active permitted use for the 160 allotments is currently 137,897 AUMs. However, the demand for forage resources by livestock (the total average actual use) for the past 10 years was only 78,500 AUMs.[1] Suspended use for the 160 allotments is currently 26,364 AUMs. Comprehensive grazing allotment information is summarized in Appendix L.

3.8.1 Past Grazing Management Categories and Current Range Conditions, Carrying Capacity, Management, and Facilities

Ecological conditions of the two former RMAs (Diamond Mountain and Book Cliffs) were assessed and identified using two different evaluation methods. In the 1994 Diamond Mountain RMP, allotments were evaluated according to seral stages, (Early, Mid or Late). In the 1985 Book Cliffs RMP, allotments were evaluated as being in Excellent, Good, Fair, or Poor ecological condition.

In 1997, the BLM in Utah developed Standards for Rangeland Health and Guidelines for Grazing Management (see Appendix F). These standards are descriptions of the desired condition of the biological and physical components and characteristics of rangelands. Guidelines are management approaches, methods, and practices that are intended to achieve a standard.

The BLM has defined four Fundamentals of Rangeland Health, which are the basic ecological principles underlying sustainable production of rangeland resources. These four fundamentals are embodied in the BLM's new Grazing Regulations (43 CFR Part 4100) and serve as the basis for standards and guidelines for grazing management on BLM-administered public lands in Utah. The Standards and guidelines developed by the Utah Resource Advisory Council provide for conformance with these fundamentals (43 CFR Part 4180.2(b)). The fundamentals are as follows:

- Watersheds are in or making significant progress toward properly functioning physical condition. This condition includes their upland, riparian/wetland, and aquatic components. Soil and plant conditions support infiltration, soil moisture storage, and the release of water that are in balance with climate and landform, and maintain or improve water quality, and timing and duration of flow.

[1] This information was compiled from the Actual Use records of each livestock operator. When actual use was not available, licensed-use figures were used.

- Ecological processes, including the hydrologic cycle, nutrient cycle, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.

- Water quality complies with State water quality standards and achieves, or is making significant progress towards achieving, established BLM management objectives such as meeting wildlife needs.

- Habitats are, or are making significant progress toward being, restored or maintained for Federal Threatened and Endangered species, Federal proposed, Category 1 and 2, Federal candidate, and other special status species.

3.8.2 CURRENT GRAZING MANAGEMENT CATEGORIES

Following the four fundamentals, the Vernal BLM has since re-evaluated each grazing allotment and designated each as being in one of three management categories: Maintain (M), Improve (I), or Custodial (C). The criteria used for categorizing the allotments were based on resource potential, resource use conflicts, opportunity for positive economic return on public investments, and the present management situation. Sixty allotments are in the I category, 47 are in the M category, and 53 are in the C category.

3.8.2.1 CATEGORY M – MAINTAIN EXISTING RESOURCE CONDITIONS

- The present ecological condition and management are satisfactory.
- Either:
    1. Late to climax seral stage condition will be maintained under present management, if desired; or
    2. Conditions are mid seral stage or improving, with improvement expected to continue under present management, if desired; or
    3. Opportunities for BLM management are limited, either because the percentage of public land is low or the acreage of public lands is small.
- There are no major, land-use resource conflicts with livestock grazing.

- Land ownership status may or may not limit grazing management opportunities.
- Opportunities for positive economic return from public investment may exist.

3.8.2.2 CATEGORY I – IMPROVE EXISTING RESOURCE CONDITIONS

- Present ecological condition is unsatisfactory.
- Ecological condition is in early to mid seral stage.
- Ecological condition is in mid to late seral stage.
- Ecological succession is expected to regress further.

- Allotment has a potential for medium to high vegetation production, but production is low to moderate.
- Resource conflicts/controversy with livestock grazing are evident.
- There is potential for positive economic return on public investment.

3.8.2.3 CATEGORY C – CUSTODIAL MANAGEMENT

- Present ecological condition is not in a declining trend.
- Allotment has a low vegetation production potential and is producing near this level.
- There may be limited conflicts between livestock grazing and other resources.
- Present management is satisfactory or is the only logical management under existing conditions.
- Opportunities for positive economic return on public investments do not exist.

3.9 MINERALS AND ENERGY RESOURCES

3.9.1 OIL AND GAS

Oil and gas development are major resource development activities within the Uinta Basin, and intense oil and gas exploration and development are expected on BLM-administered lands within the VPA over the planning period of the Proposed RMP. These resources are located in an EPCA focus area. At present, approximately 2,800 oil and gas wells are active within the VPA. The Geologic and Engineering Team in the BLM Vernal Field Office has estimated the relative potential for oil and gas resources, including CBNG, in six exploration and development areas within the VPA. These areas, from north to south, are: Manila-Clay Basin, Tabiona-Ashley Valley, Altamont-Bluebell, Monument Butte-Red Wash, West Tavaputs Plateau, and East Tavaputs Plateau (See Figure 19 in the Maps section).

The number of current leases (wells, developments, and explorations) existing within the VPA changes rapidly and frequently. As such, presenting such information would be without merit, since said information would be outdated immediately upon issuance of the document.

Seismic surveys, both three-dimensional (3D) and two-dimensional (2D), are expected to increase during the planning period, particularly in the East Tavaputs Plateau exploration and development area. Forty-five (45) to 75 Notices of Intent (NOIs) to perform surveys are anticipated, and the Geologic and Engineering Team has estimated that approximately 2,055 new oil wells, 4,345 new gas wells, and 130 new CBNG wells would be drilled during the planning period. The majority of the oil and gas development activity is anticipated to occur in the Monument Butte-Red Wash exploration and development area. Most CBNG activity is expected to occur in the East and West Tavaputs Plateau areas.

3.9.1.1 OIL AND GAS LEASING, AND LOCATABLE AND SALEABLE MINERALS CATEGORIES

The exploration and development of oil and gas resources 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 designated four categories that describe the conditions placed upon public domain lands in regard to their availability for fluid hydrocarbon leasing, and the entire VPA has been assigned one of the following leasing categories for oil and gas development:

- Standard Stipulations
- Timing and Controlled Surface Use
- No Surface Occupancy
- Closed to Leasing

Standard Stipulations – This lease category identifies areas, which are open to exploration and development, subject to the terms and conditions of the standard lease form.

Timing and Controlled Surface Use – This category identifies areas that are open to exploration and development, subject to relatively minor constraints such as seasonal restrictions. These areas possess other land uses and/or resource values such as critical big game wildlife range or special status plant and wildlife species, which might conflict with fluid hydrocarbon exploration and development and, therefore, moderately restrictive lease stipulations may be required to mitigate these impacts. The stipulations are utilized where there are resource values, which may require specific protection, but the conflicts with fluid hydrocarbon exploration and development would not be of sufficient magnitude so as to preclude surface occupancy.

No Surface Occupancy – This minerals lease category identifies areas that are open to exploration and development subject to highly restrictive lease stipulations, which includes no surface occupancy (NSO). These areas possess special resource values or land uses such as camping or picnic areas, scenic areas, Recreation and Public Purpose (R&PP) patents and leases, important historical and/or archaeological areas, and buffer zones along the boundaries of special use areas such as wild and scenic river corridors. This category is used for those areas where a number of seasonal or other minor constraints would severely restrict exploration and development.

Closed to Leasing – This lease category identifies areas that are closed to leasing either by discretionary or non-discretionary decisions. These areas have other land uses or resource values, which cannot be adequately protected, even with the most restrictive lease stipulations. Closing these areas to leasing is the only way to ensure their appropriate protection. Discretionary closures involve lands where the BLM has determined that energy and/or mineral leasing, entry, or disposal, even with the most restrictive stipulations or conditions, would not be in the public interest. Non-discretionary closures involve lands that are specifically closed to energy and/or mineral leasing, entry, or disposal by law, regulation, Secretarial decision, or Executive Order. All WSAs are closed to leasing by law.

Locatable and salable minerals areas are generally classified as either Open or Closed. Locatable minerals are usually the base and precious metal ores, ferrous metal ores, and certain classes of

industrial minerals where acquisition is by staking a mining claim (location) over the deposit and then acquiring the necessary permits to explore or mine. Salable minerals are defined as mineral commodities sold by sales contract from the federal government. Salable minerals are generally common varieties of construction materials and aggregates, such as sand, gravel, cinders, roadbed, and ballast material.

3.9.1.1.1 EPCA

The Vernal Field Office Planning Area is located within the western portion of the Uinta/Piceance Basin area which covers a large amount of northeast Utah and northwest Colorado (approximately 18,945,000) acres and is known to have significant occurrences of oil and gas resources which have been depicted in a variety of studies. Based on the known quantities of oil and natural gas resources within the VPA, the Uinta Basin has been designated as an EPCA focus area for oil and gas exploration and development. Most recently, in 2003, a multi-agency effort produced a "Scientific Inventory of Onshore Federal Lands' Oil and Gas Resources and Reserves and the Extent and Nature of Restrictions or Impediments to their Development." It is BLM policy to consider this information in its planning process. The information, commonly referred to as the EPCA data, portrays two kinds of basic energy related information relevant to the Unita/Piceance Basin, volumetric data and accessibility data (EPCA 2003).

The volumetric data on oil reserve estimates for the entire basin is predicted between 61–296 million barrels of oil with a mean estimate of 149 million barrels of oil (EPCA 2003).

Volumetric data on gas reserve estimates for the entire basin is predicted between 12-35 trillion cubic feet with a mean estimate of 22 trillion cubic feet. Most of the undiscovered natural gas is found widely dispersed in continuous deposits rather than distinct structural traps (EPCA 2003).

Among the five study areas that were subject to the EPCA study, the Uinta/Piceance Basin has the highest percentage of oil (85%) available under standard lease terms (EPCA 2003).

Another kind of data illustrated by EPCA is that of accessibility by industry to the estimated reserves. Accessibility by industry was based on the actual depiction of existing land-use plan stipulations that presently occur in the Vernal Field Office Planning Area. Careful review of this information shows many major inaccuracies of oil and gas stipulations as they presently occur with in the planning area. A more accurate portrayal of existing oil and gas stipulations which affect industry accessibility to oil and gas resources is shown in Chapter 2, Proposed RMP and Alternatives and is located in the Alternative Matrix under Alternative D (No Action) which depicts current leasing stipulations.

In addition to the EPCA data, which is a very large-scale portrayal of energy information, the BLM prepared more site-specific data based on 14 conventional and unconventional oil and gas play areas within the Vernal Field Office. Numerous data sources including USGS, UGS, academic research, UDOGM, industry and government sources, were queried in order to depict specific information that was relevant to the potential for occurrence of oil and gas resources within Duchesne, Uintah and Daggett Counties. This information was then used to compile the

Mineral Potential Report for the Vernal Field Office. The mineral report also depicts the potential for reasonable foreseeable development for six different zones within the VPA. A brief summation of the six oil and gas producing zones is portrayed below.

3.9.1.2 MANILA-CLAY BASIN EXPLORATION AND DEVELOPMENT AREA

Historically, exploration activity for and production of oil and gas in this region have been relatively low, particularly over the last 15 years. All producing wells in the area were drilled prior to 1980. Historic gas well data indicate that only three gas wells have been drilled since 1980, none of which are currently producing wells. New geologic data or an increase in the price of natural gas could create increased interest in this area. It is projected that a maximum of 45 additional gas wells would be drilled in this area in the 5 years following the approval of the ROD for this plan.

3.9.1.3 TABIONA-ASHLEY VALLEY EXPLORATION AND DEVELOPMENT AREA

Past exploration for oil and gas resources in this region has been unproductive. Data indicate that there have been no gas wells and only one oil well drilled in this region since 1980, and that the lone well is not producing. It is projected that no more than 30 oil wells would be drilled within this area in the 5 years following the approval of the ROD for this plan.

3.9.1.4 ALTAMONT-BLUEBELL EXPLORATION AND DEVELOPMENT AREA

This area has had major oil exploration and production in the past, but due to a combination of low oil prices and the depletion of the oil reservoir the number of oil wells drilled annually in this area has decreased since the early 1990s. It is projected that no more than 175 oil wells would be drilled within this area in the 5 years following the approval of the ROD for this plan. Past exploration does not indicate a high potential for gas development, but the presence of deep gas reserves in the southern portion of this area could be explored over the next 15 years.

3.9.1.5 MONUMENT BUTTE-RED WASH EXPLORATION AND DEVELOPMENT AREA

The Monument Butte-Red Wash exploration and development area has been an area of extensive oil and gas development and production in the past. It is projected that the oil and gas development within Monument Butte-Red Wash will continue to be extensive in the 5 years following the approval of the ROD for this plan with 1,700 oil wells and 3,100 gas wells projected to be drilled in this area.

3.9.1.6 WEST TAVAPUTS PLATEAU EXPLORATION AND DEVELOPMENT AREA

This is not to be confused with the West Tavaputs EIS analysis for full field oil and gas development currently being conducted out of the Price Field Office. The area in the VPA has not been extensively developed for oil and gas resources in the past 15 years. However, based on BLM discussions with oil and gas producers, there is major interest in this area for oil and gas exploration and development. The greatest interest is in gas development on the eastern side of

this area. As many as 75 oil wells, 350 gas wells, and 50 CBNG wells could be drilled in the area in the 5 years following the approval of the ROD for this plan.

3.9.1.7 EAST TAVAPUTS PLATEAU EXPLORATION AND DEVELOPMENT AREA

This area has had slightly more oil and gas exploration and development than the West Tavaputs Plateau area that falls in the VPA, and it is anticipated that major development, particularly within natural gas fields, will occur in the 5 years following the approval of the ROD for this plan. Increased seismic exploration is expected in the area, and a potential land exchange with the State of Utah (subject to congressional approval) is expected to lead to increasing additional drilling in the first five years. It is projected that 75 new oil wells, 600 new gas wells, and 80 new CBNG wells could be drilled in this area in the 5 years following the approval of the ROD for this plan.

3.9.2 TAR SAND

Tar sand contains heavy hydrocarbon residues such as bitumen, tar, or degraded oils that have lost their volatile components. Hydrocarbons can be liberated from tar sands by heating and other processes. Tar sand deposits in the VPA are generally located along the margins of the Uinta Basin.

The bituminous substance in the sandstones of the Basin's geologic formations is tarry residuum of petroleum that fills the pore space in coarse sandstones or forms cement in loose unconsolidated sands (Pruitt 1961). The ore retrieved from tar sands is bitumen. Bitumen is a general name for various solid and semi-solid hydrocarbons that are fusible and are soluble in carbon bisulfide. Petroleum, asphalt, natural mineral wax, and asphaltite are all considered bitumen.

In the early 1980s, certain tar sand deposits in the Uinta Basin were divided into seven Special Tar Sand Areas (STSAs) designated by the U.S. Geological Survey (USGS) under direction from Congress pursuant to the Combined Hydrocarbon Leasing Act of 1981. These STSAs are Pariette, Sunnyside, Argyle Canyon - Willow Creek, Asphalt Ridge - Whiterocks, Hill Creek, P.R. Spring, and Raven Ridge - Rim Rock (BLM 2002). Table 3.9.1 quantifies the estimated amount of bitumen that could potentially be recovered from each of the STSAs in the VPA.

Table 3.9.1. Estimated Number of Barrels of Bitumen Contained within Each STSA

STSA	Geologic Formations	Barrels of Bitumen
Argyle Canyon-Willow Creek	Green River Formation	60–90 million
Asphalt Ridge-Whiterocks	Duchesne River/Uinta, Navajo Sandstone, and Mesa Verde Formations	1.2–1.3 billion
Hill Creek	Green River Formation	1.6 billion
Pariette	Uinta Formation	12–15 million
P.R. Spring	Green River Formation	4–4.5 billion
Raven Ridge-Rim Rock	Green River Formation	100–130 million
Sunnyside	Wasatch Formation	3.5–4 billion

Table 3.9.1. Estimated Number of Barrels of Bitumen Contained within Each STSA

STSA	Geologic Formations	Barrels of Bitumen

Source: Blackett 1996

Other minor tar sand deposits have also been delineated within the VPA. These deposits include Chapita Wells (7.5 to 8 million barrels of bitumen), Cow Wash (1 to 1.2 million barrels of bitumen), Upper Kane Hollow (unestimated), Spring Branch (1.5 to 2 million barrels of bitumen), Tabiona (1.3 million barrels of bitumen), Lake Fork (6.5 to 10 million barrels of bitumen), Split Mountain (unestimated), Nine Mile Canyon (unestimated), Minnie Maude Creek (10 to 15 million barrels of bitumen), Little Water Hills (10 to 12 million barrels of bitumen), and Spring Hollow (unestimated; Blackett 1996).

Because tar sand development associated with a combined hydrocarbon lease could be more disruptive to environmental resources than oil and gas development, all combined hydrocarbon leases issued in STSAs are regulated by an amended leasing category system.

- Open to leasing, with standard stipulations
- Open to leasing, with standard and special stipulations
- Open to leasing, with no right of surface occupancy
- Closed to leasing

As of October 2001, there were four permitted tar sand surface mining operations in the VPA, all located in Uintah County. The potential for development of this resource, other than for asphalt paving, is anticipated to remain low over the next 15 years.

3.9.3 GILSONITE

Gilsonite is the purest solid bitumen found in nature. Gilsonite is the trade name for Uintaite, which is a black, pitch-like substance that occurs in pure form in vein-type deposits in the Tertiary sediments of the Uinta Basin of northeastern Utah. It is a petroleum substance of uniform composition and texture with a distinctive conchoidal fracture. In gilsonite, the surfaces exposed along fractures typically have a bright sheen and reflect bright light, in notable contrast to the jet-black color. A number of important uses for gilsonite have been found since its discovery in the late nineteenth century. These uses include high-grade varnishes, lacquers, paints, acid proofing, insulating plastics, inks, and mastic (Crawford 1960). For commercial purposes, it is graded and marketed by producers into "Selects" and "Standard." There is also a very high-grade variety with high luster and deep black color known as "Jet Black" (Stern 1960).

Gilsonite is allocated by non-competitive and competitive leasing only. Leasing actions may be initiated by public interest or by the BLM. Allocation methods vary to suit different situations.

There is high to moderate potential for gilsonite occurrence within the VPA. It is likely that there will be continued exploration and development of this resource within the next 15 years.

3.9.4 OIL SHALE

Oil shale is a popular term for sedimentary rock (e.g., marlstone) from the Tertiary Green River Formation that contains kerogen. Kerogen is a fossilized organic material that can be converted to conventional oil via retorting or destructive distillation processes (Cashion 1967) characterizes oil shale as a marlstone that, when distilled, will yield 15 gallons or more of oil per ton of rock.

Oil shale occurs within the lower part of the Parachute Creek Member of the Green River Formation. The Mahogany Oil Shale Zone of the Parachute Creek Member is the most notable kerogen-bearing unit of the Green River Formation (Trudell et al. 1983). It outcrops in the southern part of the VPA and dips north towards the synclinal axis of the Uinta Basin. The Mahogany Zone varies in thickness throughout the Uinta Basin, generally thickening and becoming less defined from east to west (Cashion 1967).

There is a high to moderate potential for occurrence of oil shale within the VPA. It is expected that a total of one or two small-scale projects may be active over the next 15 years.

3.9.5 PHOSPHATE

Phosphate deposits exist in the Uinta Basin within the Meade Peak Member of the Permian Park City Formation. Phosphate ore is present in the form of P2O5 (Schillie 2002). Extensive, relatively high-grade deposits occur at or near the surface in the VPA, making phosphate mining in the VPA economical because the ore can be cheaply strip-mined. Deposits in the Flaming Gorge/Manila Field area are less economically attractive because of the area's more complex geologic setting.

There is high to moderate potential for the occurrence of phosphate deposits within the VPA. Phosphate mining on private land is expected to continue over the next 15 years. There is some potential for exploration on BLM lands over the next 15 years.

3.9.6 MINERAL MATERIALS

Other mineral materials include fine sand, gravel, and building stone. Fine sand deposits can be found on the northern edge of Ashley Valley, the portion of the Uinta Basin lying between Asphalt Ridge and the Utah-Colorado state line, Moon Lake Reservoir, and Yellowstone Reservoir. Moon Lake Reservoir and Yellowstone Reservoir are both on U.S. Forest Service (USFS) land in the Uinta Mountains.

Coarse sand and gravel deposits are found along the northern margin of the Uinta Basin, where it abuts the southern flank of the Uinta Mountains. More specifically, these deposits occur in the upper sandstone units of the Tertiary Duchesne River Formation, in the Uinta Piedmont, and in Quaternary terrace/alluvial deposits in streams draining the Uinta Mountains. Green River terrace deposits are a source of sand and gravel, and the Mississippian Madison Limestone that crops out along the south flank of the Uinta Mountains can be crushed and used as an aggregate.

Building stone resources exist in the Parachute Creek Member of the Tertiary Green River Formation. More specifically, the resource occurs as loose rock that has been eroded from outcrops along the south side of Duchesne County through southern Uintah County.

There is a high to moderate potential for the occurrence of mineral materials, including sand, gravel, and building stone in the VPA. It is likely that exploration and development of these resources will continue to occur over the next 15 years.

3.9.7 LOCATABLE MATERIALS

Minor deposits of locatable materials that are associated with hydrothermal alteration and secondary mineral precipitation (e.g., base metals, gold, gypsum, and uranium) are known to exist within the VPA (Johnson 1973). The Precambrian Red Creek Quartzite has yielded some lead, gold, copper, silver, iron, and barium between Mountain Home and the Owiyukuts Plateau. The Mississippian carbonate rocks along the south flank of the Uinta Mountains contain some small iron deposits (Pruitt 1961). The terrace deposits of the Green River also contain some fine-grained placer gold (Pruitt 1961). Uranium is known to exist in some sections of the carboniferous units of the Mesa Verde and Uinta Formations (Chenoweth 1992). Gypsum is known to occur as an evaporative salt in the Jurassic Carmel and Triassic Moenkopi Formations. When mined for chemical-use purposes (e.g., for carbonate scrubber material), the Mississippian Madison Limestone that outcrops along the flanks of the Uinta Mountains may be subject to mining claim locatable mineral regulations, and may be removed pursuant to the Forest Service 36 CFR 228 (A) or the BLM 43 CFR 3715, 3802, and 3809 mining regulations, as appropriate.

There is moderate potential for the occurrence of locatable minerals within the VPA. Very little development activity for locatable minerals is anticipated over the next 15 years.

3.9.8 COAL

Coal mining has not occurred on public lands in the VPA due to lack of demand and the poor quality of the deposits. However, coal of commercial value exists in the coal unit of the Cretaceous Frontier Sandstone and the Mesa Verde Group Formations (Pruitt 1961). The Frontier Sandstone is the most important coal-bearing unit in the VPA. The quality of these coal beds improves in an easterly direction (Doelling and Graham 1972).

There is a moderate potential for the occurrence of economically valuable coal deposits within the VPA, but it is unlikely that coal exploration or development will occur over the next 15 years because of the generally low-grade quality of the coal.

3.10 NON-WSA LANDS WITH WILDERNESS CHARACTERISTICS

3.10.1 OVERVIEW

Since wilderness study areas (WSAs) were established in the 1980s, designation 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 the BLM's original inventories), in 1996 the Secretary of the Interior directed the BLM to take another look at some of the lands in question. In response to the direction of the Secretary, the 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).

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 lands administratively endorsed for wilderness; or in accordance with the Wilderness Act's language, areas "of sufficient size as to make practicable it preservation and use in an unimpaired condition". These are areas in a natural or undisturbed condition and provide outstanding opportunities for solitude or primitive forms of recreation (non-motorized and non-mechanized activities in undeveloped settings). The BLM used the same criteria for determining wilderness characteristics as in the 1979 wilderness inventory. The 5,000 acre value was helpful to the BLM in making preliminary judgments, but it was not considered a limiting factor. Refer to the definition of *Wilderness Characteristics* in the glossary in the Draft RMP/Draft EIS.

In April 2003 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 (FLPMA Section 201; 43 U.S.C. §1711) and to consider management of these values in its land-use planning process (FLPMA Section 202; 43 U.S.C. §1712). The BLM's land-use Planning Handbook (H-1601-1) states that decisions on whether or not to protect areas with wilderness characteristics are to be considered during planning.

3.10.2 PLANNING AREA PROFILE

There are nine areas in the VPA (approximately 102,938 acres) outside of existing WSAs that were determined by the BLM in the 1999 inventory to have the wilderness characteristics of size, naturalness, and outstanding opportunities for solitude or primitive recreation. In addition to the lands found to have wilderness characteristics in the 1999 inventory, other lands in the VPA have been proposed for wilderness as a part of legislation before Congress (America's Red Rocks Wilderness Act). A BLM interdisciplinary team evaluated a variety of sources of information, including information provided by the public about these areas, their on-the-ground knowledge of these areas, information in case files and field notes/files, master title plats, aerial photos, GIS data layers, and field inspections, and the team determined that all or parts of these areas have wilderness characteristics. Of the 34 areas evaluated, a total of 25 areas outside of existing WSAs totaling about 277,596 acres were found to have wilderness characteristics. These areas are identified in the table below (Table 3.10.1; See Figure 26 in the Maps section). These non-WSA lands with wilderness characteristics have been carried through the land-use planning process to assess the impacts of management options on these lands and to determine how their wilderness characteristics will be managed. Many of the inventoried lands were found to lack

wilderness characteristics, and these are also identified in the table below (Table 3.10.1; see Figure 26 in the Maps section).

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

Table 3.10.1 Non-WSA Lands with Wilderness Characteristics in the VPA

Name	Acres with Wilderness Characteristics (WC)	Acres with No Wilderness Characteristics (NWC)	Contiguous Lands with Wilderness Characteristics
Beach Draw	898	9	Beach Draw is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Bitter Creek	33,488	8,816	No contiguous lands with wilderness characteristics.
Bourdette Draw	13,335	2,174	No contiguous lands with wilderness characteristics.
Bull Canyon	2,483	32	Bull Canyon is contiguous to the BLM's Bull Canyon WSA, located in Utah and Colorado.
Cliff Dweller Canyon	0	14,604	No contiguous lands with wilderness characteristics.
Cold Spring Mountain	8,764	4,412	Cold Spring Mountain is contiguous to the BLM's West Cold Spring WSA, located in Utah and Colorado.
Cripple Cowboy	13,603	0	Cripple Cowboy is contiguous to the BLM's 400-acre Book Cliffs Mountain Browse ISA.
Daniels Canyon	3,045	0	Daniels Canyon is contiguous to the BLM's Daniels Canyon WSA and Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Dead Horse Pass	6,994	1,124	No contiguous lands with wilderness characteristics.

Table 3.10.1 Non-WSA Lands with Wilderness Characteristics in the VPA

Name	Acres with Wilderness Characteristics (WC)	Acres with No Wilderness Characteristics (NWC)	Contiguous Lands with Wilderness Characteristics
Desolation Canyon	63,118	6,993	Desolation Canyon is contiguous to the BLM's Desolation Canyon WSA. The non-WSA lands with wilderness characteristics are located in the BLM's Vernal, Price, and Moab Field Offices. This is the acreage with wilderness characteristics in the Vernal Field Office portion of the area. Total acreage of the non-WSA lands with wilderness characteristics covering all three field offices is 154,767.
Diamond Breaks	4,539	186	Diamond Breaks is contiguous to the BLM's Diamond Breaks WSA, located in Utah and Colorado.
Diamond Mountain	27,238	25	Diamond Mountain is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Dragon Canyon	0	19,899	No contiguous lands with wilderness characteristics.
Goslin Mountain	0	6,084	No contiguous lands with wilderness characteristics.
Hells Hole Canyon	2,709	0	Hells Hole Canyon includes 7,000 acres in Colorado.
Hideout Canyon	1,113	0	Hideout Canyon includes 11,607 acres of lands with wilderness characteristics in the Moab Field Office.
Lower Bitter Creek	11,417	2,682	No contiguous lands with wilderness characteristics.
Lower Flaming Gorge	17,810	3,360	No contiguous lands with wilderness characteristics.
Mexico Point	1,277	79	Mexico Point includes 12,837 acres of lands with wilderness characteristics in the Moab Field Office.
Moonshine Draw	4,513	0	Moonshine Draw is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Mountain Home	7,083	2,201	No contiguous lands with wilderness characteristics.

Table 3.10.1 Non-WSA Lands with Wilderness Characteristics in the VPA

Name	Acres with Wilderness Characteristics (WC)	Acres with No Wilderness Characteristics (NWC)	Contiguous Lands with Wilderness Characteristics
Rat Hole Ridge	11,367	0	Rat Hole Ridge includes 1,200 acres of lands with wilderness characteristics in Colorado.
Red Creek Badlands	0	4,656	No contiguous lands with wilderness characteristics.
Seep Canyon	0	20,802	No contiguous lands with wilderness characteristics.
Split Mountain Benches	0	2,164	No contiguous lands with wilderness characteristics.
Split Mountain Benches South	0	355	No contiguous lands with wilderness characteristics.
Stone Bridge Draw	0	3,638	No contiguous lands with wilderness characteristics.
Stuntz Draw	1,992	0	Stuntz Draw is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Sunday School Canyon	0	18,069	No contiguous lands with wilderness characteristics.
Sweetwater Canyon	6,994	0	No contiguous lands with wilderness characteristics.
Vivas Cake Hill	277	0	Vivas Cake Hill is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
White River	21,210	8,564	No contiguous lands with wilderness characteristics.
Wild Mountain	527	31	Wild Mountain is contiguous to Dinosaur National Monument lands recommended by the Park Service for wilderness designation.
Wolf Point	11,802	2,764	No contiguous lands with wilderness characteristics.
Total (34 areas)	**277,596**	**133,723**	No contiguous lands with wilderness characteristics.

Non-WSA lands with wilderness characteristics analyzed in this document include 277,596 acres of BLM-administered public land. In addition to the acreage currently being managed to protect and preserve their wilderness characteristics, the BLM Utah is considering management options for 2,759,400 (5.3% of lands in Utah) additional acres of non-WSA lands with wilderness characteristics in six ongoing land-use planning efforts. This includes the 277,596 acres in the VPA. There are other federal lands with wilderness characteristics in Utah not administered by

the BLM that are currently being managed to protect those values. These are identified in Table 3.10.2.

Table 3.10.2. Federal Lands with Wilderness Characteristics in Utah that are Currently Being Managed to Protect Those Values

Land Administrator	Administrative Unit	Acres	Percent of Land in Utah*
BLM	Designated Wilderness	127,700	0.24
BLM	Wilderness Study Areas	3,214,740	6.10
National Park Service	Recommended Wilderness	1,467,082	2.79
U.S. Forest Service	Designated Wilderness	773,124	1.47
U.S. Forest Service	Recommended Wilderness	83,390	0.16
Total		**5,666,036**	**10.76**

*The percentage figures shown in this table are based on a total land area of 52,541,440 acres in Utah.

3.11 PALEONTOLOGY

Fossils are the remains, traces, or imprints of ancient organisms preserved in or on the earth's crust that provide information about the history of life on earth. Paleontological resources do not include any materials associated with an archeological resource, which consist of material remains of past human life or activities that are over 100 years old (as defined in section 3(1) of the Archeological Resources Protection Act of 1979, as amended (16 U.S.C. 470bb[1]).

3.11.1 REGIONAL OVERVIEW

At approximately 125 miles in length, the Uinta Mountains are the largest east-west-trending mountain range in the western hemisphere (Hansen 1969). The Uinta Basin is an asymmetrical elongate basin. The Uinta Mountains flank the northern length of the basin and the Book Cliffs/Tavaputs Plateau flank the southern margin. The Uinta Basin, Uinta Mountains, and Book Cliffs/Tavaputs Plateau are the dominant physiographic provinces of northeastern Utah. The Uinta Mountains rise to elevations greater than 13,000 ft (nearly 4000 m). This mountain range includes many of the highest peaks in Utah.

The Uinta Basin is situated in the central portion of the VPA. It has a geologic history of several orogenies (mountain building events) and a series sea level changes evidenced in the various rock formations and in the fossil record. The rock outcrops in the VPA are primarily sedimentary and span more than 2.8 billion years (Ga) of geologic history. These sedimentary deposits include Precambrian marine clastics, Paleozoic shelf deposits, Mesozoic terrestrial deposits, Tertiary basin fill and lake deposits, and Late Tertiary and Quaternary basin fill, glacial deposits, and alluvium (Diamond Mountain RMP 1990). In other words, the sedimentary rocks within the VPA formed and deposited in a variety of ancient environments more than 65 million years ago.

3.11.2 EVALUATION OF PALEONTOLOGICAL RESOURCE AND CONDITIONS

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 1998:01). The BLM considers vertebrate fossils, as a group, 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.

In 1998, the BLM released H-8270-1, General Procedural Guidance for Paleontological Resource Management. This handbook established a simple tri-level classification system (Condition I, II, and III) for the "ranking of [geographic] areas according to their potential to contain vertebrate fossils, or noteworthy occurrences of invertebrate or plant fossils" (BLM 1998:II-3).

On October 15, 2007, the BLM Washington Office (WO) IM 2008-009 (BLM 2007) replaced the tri-level classification system with the Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands, and H-8270-1 was revised to include this new classification system. The new classification system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. Table 3.11.1 below (from Attachment 2-2 of the IM) provides a correlation for the old and new classification systems.

Table 3.11.1. Correlation between Condition and PFYC Classification Systems for Paleontological Resources

Condition Classes	PFYC Classes
Condition 1 – Areas known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. (Note: this refers to known localities or groups of localities)	PFYC Class 4 (High) or Class 5 (Very High), based on geologic unit.
Condition 2 – Areas with exposures of geologic units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 3 (Moderate), Class 4 (High), or Class 5 (Very High), based on geologic unit.
Condition 3 – Areas are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.	PFYC Class 1 (Very Low) or Class 2 (Low)

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions:

***Class 1* – Very Low.** Geologic units that are not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.

- Units that are Precambrian in age or older.

The probability for impacting any fossils is negligible.

***Class 2* – Low.** Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian (wind-blown) deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

***Class 3* – Moderate or Unknown.** Fossiliferous sedimentary geologic units where the fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.
- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

***Class 3a* – Moderate Potential.** Units are known to contain vertebrate fossils or scientifically significant non-vertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

***Class 3b* – Unknown Potential.** Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this Class may eventually be placed in another Class when sufficient survey and research is performed. The unknown potential of the units in this Class should be carefully considered when developing any mitigation or management actions.

***Class 4* – High.** Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface-disturbing activities may adversely affect paleontological resources in many cases.

***Class 4a* –** Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface-disturbing actions. Illegal collecting activities may impact some areas.

Class 4b – These are areas underlain by geologic units with high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available.

Class 5 – **Very High.** Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface-disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b – These are areas underlain by geologic units with very high potential but have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

Using data gathered from the Utah Geological Survey, this section identifies areas according to their potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.

3.11.2.1 CLASS 4 AND 5 AREAS

For the purpose of this management plan, all vertebrate fossil localities were identified as to section, township, and range. Any section that contained one or more (maximum of 36) vertebrate fossil localities was identified as a Class 4 and 5 area. The total area (the sum of all sections containing one or more vertebrate or trace fossil locality) for Class 4 and 5 areas is approximately 147,062 acres. Fossil localities that lack specific geographic information were not considered.

3.11.2.2 CLASS 3 AREAS

Areas where geological units that yield vertebrate fossils or significant invertebrate or plant fossils elsewhere are identified as Class 3 areas for the purposes of this management plan. Outcrops of units such as the Morrison, Mesa Verde, Mancos, Moenkopi, Green River, Uintah, Wasatch, Chinle, and Navajo/Nugget Formations should be considered as Class 3 areas in the VPA. All of these units contain vertebrate fossils in other locations and may require further assessment where they are exposed in the VPA. Areas where these units are covered or obscured are not Class 3 areas. The total acreage included in sections in which vertebrate or other scientifically significant fossils may be expected to occur is approximately 1,173,741 acres. Although significant fossils have not yet been found in these areas, there is a high potential for their discovery. Fossil localities that lack specific geographic information were not considered.

3.11.2.3 CLASS 1 AND 2 AREAS

Class 1 and Class 2 areas are not known to contain any paleontological localities and do not appear (at this time) to have geological units likely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils. Classes1 and 2 areas make up approximately 446,946 acres of the VPA.[2]

3.12 RECREATION

3.12.1 REGIONAL OVERVIEW

The vast and varied landforms within the VPA accommodate many recreational uses. With two major rivers and several small mountain ranges, this area attracts recreational users from the Uinta Basin, as well as from western Colorado, Wyoming, Idaho, and Utah's heavily populated Wasatch Front. The VPA is valued for its wide range of outdoor activities including hunting and fishing, rafting and canoeing, hiking and camping, OHV use, horseback riding and mountain biking, and general recreation. The rise in recreation's popularity has presented challenges to managing outdoor recreation to accommodate demand, while ensuring the health of the resources that are essential to its existence.

The basic units of recreation management are the Special Recreation Management Area (SRMA) and the Extensive Recreation Management Area (ERMA). An SRMA is a designated area where

[2] Calculations for condition areas acreages do not include State, Tribal, or Private lands.

recreation is emphasized. Extensive Recreation Management Areas are areas where recreation is unstructured and dispersed, where minimal recreation-related investments are required, and have minimal regulatory constraints.

3.12.1.1 Special Recreation Management Areas (SRMAs)

3.12.1.1.1 Browns Park SRMA

The Browns Park SRMA encompasses the Green River below Flaming Gorge Dam (from the Ashley National Forest boundary to the Utah-Colorado state line) and is approximately 23 miles in length and one mile wide, with line-of-sight up to one-quarter mile of the river centerline. River recreation, camping, fishing, and sightseeing are the primary recreational opportunities in Browns Park. There is an increasing interest in OHV, hiking, cycling, and equestrian use. The John Jarvie Historic Ranch is located within the Browns Park SRMA and provides a historic recreation resource for the area. The ranch accommodates approximately 15,000 visitors each year and is considered a major attraction within the Diamond Mountain ERMA.

3.12.1.1.2 Pelican Lake SRMA

Unlike many of the more remote recreation resources in the Diamond Mountain ERMA, Pelican Lake is in close proximity to Vernal and is heavily used by the semi-urban population of the Uinta Basin. The most popular activities on Pelican Lake are boating and fishing. Management of the SRMA has become more challenging as the population in Vernal continues to increase, bringing with it greater numbers of users and more conflicts between different recreational activities.

3.12.1.1.3 Red Mountain-Dry Fork

The Red Mountain-Dry Fork SRMA lies approximately 12 miles northwest of Vernal and is open year-round. Access to the area is by paved road. The area is primarily used by OHV recreationists, hunters, campers, mountain bikers, and for general day use. Rock art is also present in the area.

3.12.1.1.4 Nine Mile Canyon

The Nine Mile Canyon SRMA is located at the southwest boundary of the VPA, and is a popular tourist destination. Noted as having the highest concentration of rock art sites in the U.S., services are available, but limited, within the canyon and camping is not allowed. Travel through the canyon is along a narrow, unpaved road suitable for most passenger and small recreational vehicles. Nine Mile Canyon is protected by the Antiquities Act, which prohibits excavations or acts that may injure or destroy any historic or prehistoric ruins, dwellings, or other structures.

3.12.1.2 Extensive Recreation Management (ERMAs)

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. All areas within the VPA that are not part of a SRMA are included within the ERMA.

3.12.2 RECREATION TYPES

3.12.2.1 TRAILS

In November 2001, the Institute of Outdoor Recreation and Tourism at Utah State University (USU) prepared an analysis of public sentiment towards trails with a statewide telephone survey. Results were compiled for the Uinta Basin sub-area. Results of the survey indicated the following:

- Hiking was the most mentioned activity.
- OHV riding was mentioned second.
- Horseback riding was mentioned third.
- Only 47% of trail users indicated they would support the use of additional public funds for motorized trails.
- Over 79% of trail users support the use of additional public funds for non-motorized trails.
- A clear majority of the general population believes that trails provide economic benefit for local communities.

Using the data collected through USU, the Governor's Initiative on Trails established a goal to increase trail facilities throughout Utah. A working group to help establish priority areas for trail development focused on three major trails in the Uinta Basin:

- Dry Fork Flume, a non-motorized trail approximately 19 miles long.
- Outlaw Adventure OHV Trail, a motorized trail approximately 47 miles long.
- Vernal Canals – several non-motorized trails constituting 47 miles of total trail length.

3.12.2.2 OFF-HIGHWAY VEHICLES (OHVS)

The number of OHVs used in the VPA has grown in the last 10 years. According to Utah State Parks and Recreation, the number of statewide permits issued between 1988 and 1998 has grown from 20,000 to 70,000. There has been a 294% increase in registration since 1997, and annually, 30% have been first-time buyers. As identified by the National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands, the growth of OHV use can be attributed to the following:

- Greater public interest in unconfined outdoor recreation opportunities.
- Rising disposable income, fostered by a healthy domestic economy, for use on recreational pursuits.

- Advances in vehicle technology that enabled motorized OHV users to reach previously inaccessible areas.
- The rapid growth of the West's cities and suburbs, whose expansion and population growth has brought Westerners closer to once-remote public lands.
- A population with an increasing median age with changing outdoor recreational interests.

Extensive research has been conducted over the last several years to attempt to designate certain areas as appropriate for OHV use. This process is a long-term, ongoing effort to ensure resource protection while allowing a variety of recreation opportunities.

Areas that receive the most OHV use within the VPA are day-use areas accessible by the Vernal population. Presently, the areas of highest OHV use are: 1) Buckskin Hills, north of the town of Vernal; 2) Jensen Hills; 3) the Raven Ridge area, which is south of the east Highway 40 and east of the old Bonanza Highway; and 4) the Glen Bench ATV area north of Fantasy Canyon (an unofficial designated site, where people are directed to go to minimize intensive use of other more sensitive areas). Major visual, soils/watershed, and vegetation degradation is occurring in some areas.

3.12.2.3 HUNTING AND WILDLIFE VIEWING

Hunting and wildlife viewing are widespread throughout the VPA. Concentrated areas occur in the Book Cliffs ERMA and Pariette Wetlands . Big game hunting in the Book Cliffs and on Diamond Mountain is generally an extended recreational activity (5-12 days) because of the limited number of tags and the excellent hunting opportunities that the area provides. Public access to the Diamond Mountain public lands is limited because of private ownership.

3.12.2.4 SCENIC DRIVES

Four popular scenic drives, including Scenic Byways and Backways and one Federal Highway Administration National Scenic Byway, are within the VPA, typically promoted by the Dinosaurland Travel Board. The four routes are Nine Mile, Jones Hole, and Browns Park Backways and the Flaming Gorge Drive through the Ages National Scenic Byway. Other scenic routes would include the Dinosaur National Monument Park Highway, the state park roads into both Red Fleet and Steinaker Reservoirs, the Book Cliff Divide Road, and the day-use area accessing the Ashley National Forest up Dry Fork Canyon.

3.12.2.5 RIVER RECREATION

Two major rivers provide the resource for river recreation- the Green River, and the White River. Since the last BLM planning efforts (in 1985 for the Book Cliffs, and 1994 for Diamond Mountain), commercial river recreation clients and river user days have remained relatively constant, while casual use has been increasing by approximately 5% annually.

3.12.2.5.1 THE GREEN RIVER

Along the Green River, the BLM administers and collects fees for all of the commercial river permits in three major river sections: the Flaming Gorge Dam to Little Hole (Section A), Little Hole to Indian Crossing (Section B), and Indian Crossing to the Utah/Colorado state line (Section C). Permits are required for commercial boating, while boating for personal use from the Flaming Gorge Dam to the Dinosaur National Monument at Lodore Canyon does not require a permit. The bulk of commercial use, approximately 75 boats per day, occurs between the Flaming Gorge Dam and Little Hole (all of which is administered by the Ashley National Forest).

The most apparent conflict on the Green is between different recreational activities. It is not uncommon to have commercial and private rafts, single kayaks, and drift boats on the same stretch of river simultaneously floating past shore fisherman. The noise from larger groups on the rafts can interfere with the peace and solitude sought by the fishermen. Use along the shore is primarily by fishermen.

3.12.2.5.2 THE WHITE RIVER

The White River is also a major resource for commercial and non-commercial boating. Approximately 2,000 people visit this stretch of the White River each year. The most popular section of the White River is from the Bonanza Bridge to the Enron take-out, a distance of 32 river miles.

Several visual resources exist in this section of the White River, providing additional recreation opportunities. One of the recreational and visual resources along the river is the Goblin City Overlook, a lookout point approximately 800 feet above the White River. The view is primarily eastward through a series of high ridges, which have features resembling towers, spires, and turrets.

The confluence of the Green River and White River occurs within the boundary of the Uintah and Ouray Indian Reservation. The Reservation requires a permit for river use and for take-out through any of their property.

3.12.2.6 BOATING/SWIMMING

Although most reservoir recreation occurs on the state park facilities of Steinaker and Red Fleet Reservoirs, Pelican Lake also receives heavy use from boaters. Activities on Pelican Lake include motorized and non-motorized boating and picnicking. There is intense fishing for bluegill and bass, especially on spring weekends, and up to 70 boats may use the BLM boat ramp daily. Swimming in Pelican Lake is strongly discouraged due to the threat of bacterial and parasitic skin infections.

3.12.3 MANAGEMENT STRATEGIES

Within the VPA, and nationally, OHV areas are designated as open, limited, or closed. An open designation allows intensive OHV use where there are no compelling resource protection needs, user conflicts, or public safety issues. An area designated as limited restricts OHV use to meet specific resource management objectives. Limitations may occur on number or type of vehicles, time and season of use, or specific roads. An area is designated as closed to protect resources, ensure visitor safety, or reduce user conflicts. Within the VPA there are 787,859 acres open to OHV use, 887,275 acres that are limited, and 50,388 acres that are closed (see Figure 37 in the Maps section).

3.13 RIPARIAN AND WETLAND RESOURCES

Riparian areas and wetlands are considered some of the most diverse and productive portions of the VPA, but on the landscape level riparian areas and wetlands typically compose less than 1% of the total land area. Benefits from these areas are essential to both human and wildlife values. The lifecycles of most mammals, birds, amphibians, and fishes rely partially or wholly on riparian and wetland areas. Sensitive species such as the Ute ladies'-tresses, Bald Eagles, and Western Yellow-billed Cuckoos have their primary habitat in riparian areas. Additionally, these areas provide recreational, scenic, livestock production, and hunting areas for humans. Often, riparian and wetland resources are among the first landscape features to show impacts from management activities and often reflect overall watershed condition.

3.13.1 REGIONAL OVERVIEW

Approximately 16,000 acres of riparian zones are found along the Green and White Rivers and Bitter, Evacuation, Sweetwater, and Willow Creeks in the Book Cliffs portion of the VPA. As of 1982, 470 acres of riparian zones in the Book Cliffs portion of the VPA were identified as being in poor ecological condition (BLM 1984). However, current riparian conditions within the Book Cliffs are being assessed, and riparian conditions could have changed since the 1984 riparian/wetland assessment (see 3.11.2 below). The Diamond Mountain portion of the VPA contains 60,300 acres of riparian lands (2% of the inventoried lands), with 15,650 acres of the 60,300 acres in public lands. There are 540 miles of perennial and intermittent streams in the VPA (BLM 1993b). The BLM manages its riparian zones for multiple uses, including recreation, grazing, wildlife habitat, and other uses.

Wetlands in the study area are primarily adjacent to riparian zones and reservoirs. Additionally, several constructed water impoundments, the Pariette Wetlands, Bitter Creek Marsh, and springs are found in the VPA. The Pariette Wetlands have the largest contiguous area of wetlands in the VPA, and they are the largest waterfowl management area managed by the BLM in Utah. Specifically, the Pariette Wetlands area encompasses approximately 9,033 acres, 2,529 acres of which have riparian-wetland characteristics. The Pariette Wetlands riparian areas are situated along 7 miles of Pariette Draw, approximately 24 miles southwest of Vernal. Wetlands are divided between 20 ponds and impoundments that are regulated for waterfowl and migratory bird habitat. Bitter Creek contains vital riparian zones with box elders, aspens, willows, and sedges which support a variety of life including reptiles, amphibians, and waterfowl. The streams

and adjacent cliffs provide habitat for birds including Peregrine Falcons and Golden Eagles and provide prime calving grounds for elk and habitat for deer.

3.13.2 RIPARIAN AND WETLAND INVENTORY

The Vernal Field Office has prepared a preliminary inventory of riparian and wetland resources within the VPA, although, as of October 2003, a comprehensive assessment of riparian condition has yet to be conducted by a full ID Team. As identified in the preliminary riparian inventory there are 295 miles and 3,674 acres of riparian areas currently in proper functioning condition, 133 miles and 1,452 acres functioning at risk, and 79 miles and 1,213 acres that are not in properly functioning condition. These are preliminary numbers and they may change as the inventory is completed. Figure 5 Forage (see Maps section) displays the coverage of riparian and wetland inventory data within the VPA. Functioning condition is divided into three classes: properly functioning condition (PFC), functioning at risk (FAR), and non-functioning (NF). (See Glossary for definitions).

3.14 SOCIOECONOMICS

3.14.1 REGIONAL OVERVIEW

This section describes the current social and economic setting, trends, conditions, and characteristics for Uintah, Duchesne, and Daggett Counties in northeastern Utah (Table 3.14.1). It will serve as a baseline for future resource management by the Vernal Field Office.

Along with much of the rest of Utah, Daggett, Duchesne, and Uintah Counties have grown in population and economic vitality over the years. These counties are populated by citizens who place a high value on living in rural and small-town environments and want to keep that identity. However, they also want to be prosperous and to live in prosperous communities. As prosperity is a common desire among members of each community, it is predicted that the economies and populations of these three counties will continue to grow indefinitely.

There are a number of similarities between Daggett, Duchesne, and Uintah Counties. The driving time from each of the three county seats to the political and economic capital of the state, Salt Lake City, is approximately 2-3 hours. Each of the counties has a distinctly rural culture and strong attitudes regarding the importance of farming and ranching in their culture. Each of the counties has an abundance of topographic scenic beauty that draws large numbers of visitors. All three counties have vast expanses of BLM and USFS land within them.

State and federal land (including the Uintah and Ouray Indian Reservation) in the three counties, managed by state and federal officials and Reservation authorities, ranges from 72% in Duchesne to 81% in Uintah to 89% in Daggett. The leadership of all three counties regards most of this land as part of their economic base.

Although the political leadership in each of the three counties knows and trusts the others, they are each highly independent. "One size" responses to the three counties from any government or

private entity seeking to engage in a region-wide project will not necessarily "fit all." There is only one all-weather road (SR 44 and US 191) from the Daggett County seat, Manila, to anywhere in Uintah and Duchesne Counties. (It is a 1.5-hour drive to Vernal and a 2.5-hour drive to the City of Duchesne.) In the winter, because that road goes over the Uinta Mountains, travel time and hazard can be increased considerably. Because of the road's location on the north slope of the Uinta Mountains and its limited access, in some ways, Daggett County residents feel more socially and economically connected to the Rock Springs, Wyoming area than they do to any area of Utah.

Uintah and Duchesne Counties have large portions of the Uintah and Ouray Indian Reservation within their boundaries, and they both work collaboratively with Reservation authorities on matters of mutual interest. Oil and natural gas is a significant portion of the economy in these two counties, particularly in Uintah County. Although Daggett County has no Native American lands and produces less oil and gas, it is the site for transportation and pipeline corridors that deliver gas and electricity to markets. Thus, the energy sector plays a different but equally important role. Daggett County also has the single largest tourist/recreation attraction of the three counties: Flaming Gorge National Recreation Area, which draws more than a million visitors a year. Uintah County is much larger in population (25,224) and economy ($229.5 million total non-farm wages annually) than either Duchesne County (population 14,371; $113.3 million total non-farm wages annually) or Daggett County (population 921; $10.8 million total non-farm wages). Daggett County's tax base is so small that it has difficulty meeting all the responsibilities and expectations of a contemporary county.

Table 3.14.1. County Comparisons

County	Population 2000	Land Area	Percent BLM Land	Largest Industry
Daggett	921	459,553 acres	80.6	Government Services/Tourism
Duchesne	14,371	2.1 million acres	46.6	Government Services/Retail Trade
Uintah	25,224	2.9 million acres	46.1	Oil Gas and Mining/Government Services

To best understand the relationship between socioeconomics and planning for the Vernal Field Office, the social, economic, and governmental settings are discussed for each county. From these specific discussions, region-wide conclusions about the socioeconomic factors in the VPA can be drawn.

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 finished as of February, 2008. "Public lands," as described in the study, consist of all federal and state managed lands, and not only BLM lands. 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. 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 XX (USU Public Lands Study) contains initial summary results for Uintah, Duchesne and Daggett Counties lying within the Vernal 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.

3.14.2 UINTAH COUNTY

3.14.2.1 SOCIAL CHARACTERISTICS

Uintah County has experienced continuous population growth since the early 1900s (Table 3.14.2). Moderate growth is anticipated to continue into the next decade, as shown in the table below. The major communities include the county seat Vernal, Naples, and Ballard. Approximately 7,700 (or 31%) of Uintah County residents live in Vernal and 1,300 (or 5%) live in Naples. The largest number 15,644 (or 62%) live in unincorporated areas of the county. Most Uintah County residents live on farms, ranches, and unincorporated communities, many of which are tribal communities.

Table 3.14.2. Population Growth by Area, Past, Present, and Projected

Area	1990	2000	2020
Ballard Town	644	566	1,017
Naples City	1,334	1,300	1,718
Uintah County	22,211	25,224	29,058
Unincorporated Uintah County	13,589	15,644	18,495
Vernal City	6,644	7,714	8,341

Source: Utah Governor's Office of Planning and Budget (GOPB), 2000 Census, U.S. Census Bureau

Uintah County covers a land area of 4,477 square miles and, at 5.6 residents per square mile, is one of the least densely populated counties in the state. Approximately 10.3% of Uintah County residents are American Indian. Eighty percent of the households in Uintah County are family households, and 44.5% have children less than 18 years of age. Average household size in Uintah County, at 3.05 persons per household, is slightly smaller than the state average, at 3.13 persons per household. Approximately 65% of Uintah County residents are 18 years of age or older and 10% are 65 years plus (U.S. Census 2000).

Schools are an important component of the social setting in a community, indicating trends of the youthful population. Approximately 5,940 children are in the Uintah School District, and enrollment in Uintah schools has been steadily declining. Between 1997 and 2002, student population dropped from 6,445 to 5,938. The Vernal campus of Utah State University and the Uintah Basin Applied Technology College provide higher education opportunities to Vernal and Uintah County.

The residents of Uintah County value the rural character and quiet lifestyle that comprises their communities. The historical land-use practices including farming, ranching, and natural resource development that shaped the culture of the area serve as the foundation for today's rural community. While the initial Uinta Basin settlements were founded primarily upon agricultural practices, mining also helped establish communities in the basin. By the mid-1850s farmers and ranchers were growing wheat, vegetables, and fruit and grazing cattle in the basin and miners were extracting gold, copper, and gilsonite (Burton 1996). The agricultural and mining industries assisted in the formation of the local communities within the Uinta Basin and the historical practices still occur on the land today.

Many local residents are intimately connected to the traditional land-use practices that shaped the culture of the Uinta Basin. Today, citizens identify with the rural, small town sense-of–place that has been present in their communities for over a century. While residents of the County support growth and development, it must complement the current quality of life and values held by the citizens. According to the Uintah County General Plan Update, residents value the County's progressive, diverse, friendly, safe, rural and comfortable atmosphere.

3.14.2.2 ECONOMIC CHARACTERISTICS

3.14.2.2.1 EMPLOYMENT

Uintah County has experienced significant changes in its employment base in the past 50 years (Table 3.14.3). Initially, agriculture-related activities such as ranching and farming dominated the economy. Then, during the second half of the twentieth century, the development of oil and gas reserves provided a major contribution to growth. Now, retail trade, private services, and government services together provide a significant contribution to the county's economy. This evolution in employment base demonstrates Uintah County's shift from an agrarian economy to that of oil and gas, services to support oil and gas, and the boom in public land industries.

Service-based employment contributes to the job base in the area. Almost two-thirds of Uintah County employees work in retail trade, private services, or government services. While the table below shows a high number of retail, service and government jobs, it should be noted that many of these jobs are in support of the oil, gas, and mining industry. A recent University of Utah Study commissioned by the Governor's Office concluded that 49.5% of all employment in the Uinta Basin (Uintah and Duchesne Counties) was directly or indirectly attributable to the oil and gas industry (page 21). This effect is presumably greater in Uintah than in Duchesne or Daggett Counties (State of Utah 2007).

The average annual non-farm wage in Uintah County was $28,392 in 2003. Out of the top 35 employers in Uintah County, 13 are related to oil, gas and mining, 10 are government service employers, and 7 are retail employers. Unemployment in Uintah County was 6.1% in 2003, slightly higher than the state rate (approximately 5.6%).

Table 3.14.3. Uintah County Labor Force Statistics

	2000	2001	2002	2003
Construction	414	414	503	551
Ed/Health/Soc Svs	654	678	763	821
Financial Activities	283	274	309	323
Government	2,526	2,531	2,587	2,590
Information	104	115	120	133
Labor Force	11,029	11,707	12,563	13,013
Leisure/Hospitality	833	902	956	970
Manufacturing	253	199	194	189
Mining – Inc. oil & gas empl.	1,490	1,814	1,612	1,845
Non Farm Jobs	9,261	9,868	9,957	10,323
Other Services	240	269	258	282
Profess/Business Svcs	504	508	483	466
Trade/Trans/Utilities	2,010	2,182	2,172	2,190

Source: Utah Department of Workforce Services

Per capita annual income in Uintah County was $ 19,396 in 2003, lower than the state average of $24,639. The median household income in Uintah County was $42,422 in 2003. The national threshold for poverty in 2000 was an annual household income of $14,269. Nationally, 11.3% of the population fell below the poverty line in 2000 (U.S. Census Bureau 2001). Approximately 14.5% of all residents of Uintah County fall below the federal poverty line; only San Juan County (26.4%) and Duchesne County (15%) have a higher percentage of the population below the poverty line. The average for the state of Utah is 8% (Utah Department of Workforce Services - Workforce Information, May 2001).

3.14.2.2.2 AGRICULTURE

Agriculture has historically been a big part of the identity of the people of Uintah County. The Utah Department of Agriculture reports 908 farms in Uintah County in 2002. Livestock is the county's largest source of cash receipts, with $26.2 million in 2002 for livestock and livestock products. Crops produced $3.3 million in cash receipts. The total amount of land used for agriculture includes 33,136 acres of harvested cropland and 60,838 acres of irrigated land (Utah Agricultural Statistics 2002). Uintah County officials indicate that although agriculture is a major part of the economy, to survive, many farmers and ranchers have full-time jobs and use agriculture only to supplement their livelihood and to maintain a close family tradition. Agriculture is very dependant upon BLM land access for grazing rights and other use. Grazing is discussed in detail in the VPA Analysis of Management Situation and in numerous sections of the VPA RMP.

3.14.2.2.3 MINERAL RESOURCES

The Department of the Interior's Mineral Management Service identifies fluid and non-fluid mineral resources in Uintah County. The non-fluid mineral resources explored in Uintah County include phosphate, gilsonite, oil shale, and other minerals. Fluid mineral resource activities include oil production, natural gas exploration and related mineral exploration. Among the resources, the highest revenue generator in the county is natural gas; the industry in Uintah County generated over $30 million in federal Royalties in 2001. The most significant fluid mineral resource relative to contribution to state totals is oil production. Oil and gas production in 2001 represented 21% and 32% of the state totals, respectively. Table 3.14.4 shows the federal royalty values generated in 1998 and 2001 by Uintah County, and the following figure shows the amount of oil and gas production in Uintah County from 1991 to 2001. Note that number in parenthesis may reflect adjustments from the prior fiscal year.

It is also important to note that the amount of revenue generated in Uintah and Duchesne Counties does not remain in the counties. The total revenue is allocated to the federal government (Minerals Management Service). Of the total 10% pays administrative fees, 45% is allocated to the federal government (into Reclamation and General Funds), 45% is paid to the state, and the state then redistributes 40% of the royalty back to the county of origin (BLM 2005). The majority of the balance is used to fund other local projects, such as water projects of recreation facilities. Based on this formula, approximately $16 million of the total amount of royalties in 2001 was redistributed to the Uintah County (BLM 2005).

Table 3.14.4. Federal Royalty Values Generated, 1998 and 2001

	1998	2001
Bonus	$741,035.25	$132,170.00
Gas	10,904,135.48	30,314,562.60
Gas Plant Products	(13,007.10)	15,561.81
Gilsonite	179,696.71	254,742.99
Oil	2,451,527.92	2,847,820.40
Other Revenues	561,542.36	1,178,669.68
Rent	722,936.93	854,674.40
Total	15,547,867.55	35,598,183.88

Source: Minerals Management Revenue Service, 2001

Oil and gas production in the state of Utah is impacted by the U.S. and world prices of oil and gas. As those prices rise and fall, oil and gas production in Utah also rises and falls. According to the Energy Information Administration, the average wellhead price for gas in Utah was approximately $7.28 per MCF (thousand cubic feet). The average wellhead price for oil was $60.78 per barrel (Energy Information Administration 2006).

In 2003 Uintah County Collected approximately $19.5 million in total, local, centrally assessed and fee in lieu property taxes and approximately $4.3 million or 22% of the total was oil and gas extraction property taxes (BLM 2005)

Population growth rates in Uintah County have fluctuated with the boom and bust cycle of fluid and non-fluid mineral resources. For example, the population of the county grew by 64% between 1970 and 1980, following a boom in the industry. The growth rate fell to approximately 9% between 1980 and 1990, as the industry declined. The boom and bust cycle is also evident in other sectors of the local economy. Typically during a boom cycle, retail trade and service industries are strong. These industries suffer when production is low.

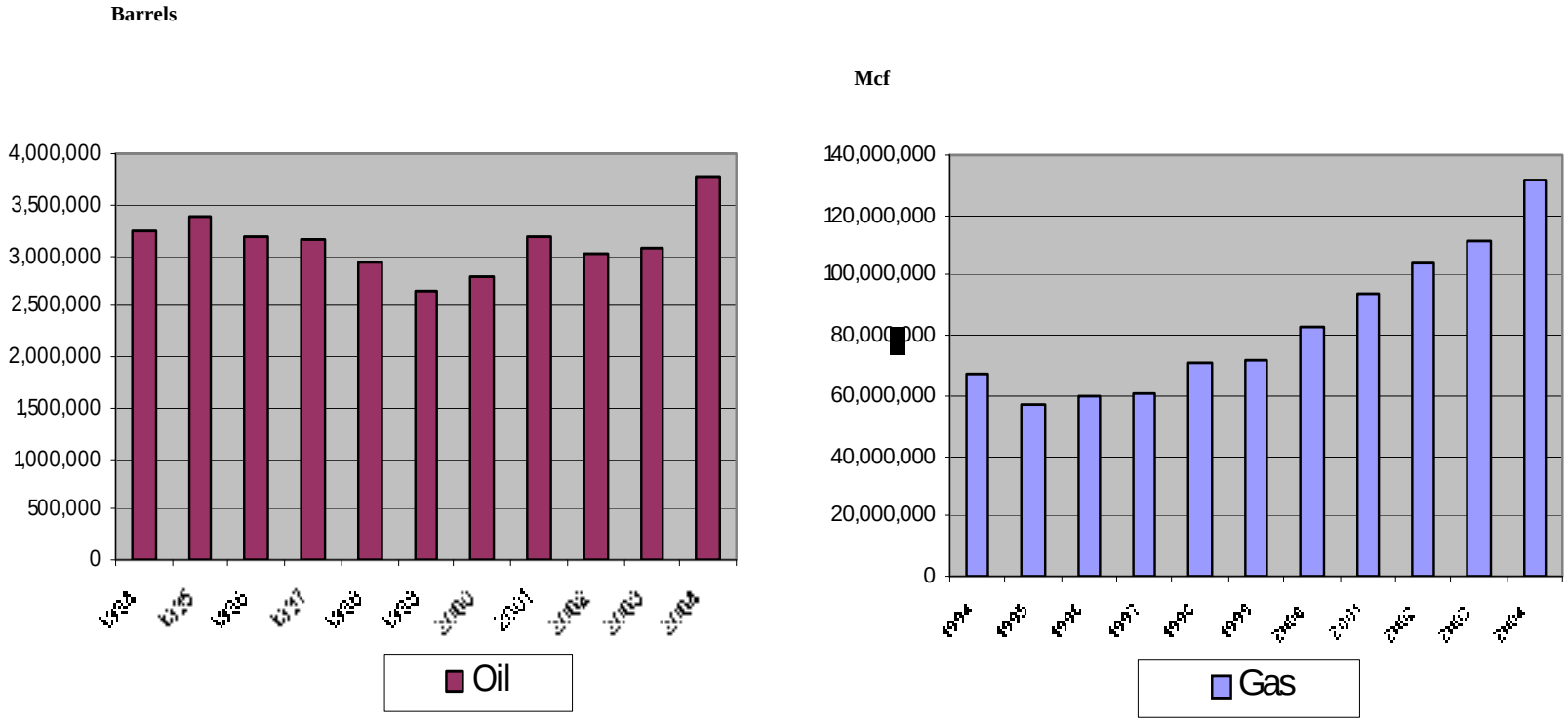

Figure 3.14.1. Uintah County Oil and Gas Production, 1999–2004. Source: Utah State Division of Oil, Gas and Mining, Department of Natural Resources 2004.

3.14.2.2.4 TOURISM AND RECREATION

Recreation is an important component in the quality of life for Uinta Basin residents. In addition to providing recreation opportunity in close proximity to their homes, these residents enjoy a healthy tax base drawn from tourism. Visitors to the Uinta Basin participate in a variety of recreational opportunities including sightseeing, camping, hiking, hunting, mountain biking, fishing, boating, and OHV use. While some of these activities can be engaged in year-round, the busiest months for recreation in the Uinta Basin are the summer months.

Several indicators help detect and explain the impact of the tourism and recreation industries on the local area: job base provided by the tourism industry, traveler spending, and regional visitation. According to the Utah Division of Travel Development, travel and tourism related jobs in Uintah County decreased 2.0% in 2003, down from 1,661 in 2002 to 1,628. Traveler spending in Uintah County was estimated to be $72.6 million per in 2003; a 40.7% increase from 2002 (Table 3.14.5). Traveler spending grew steadily from the early 1990s to 2002 and then surged to over $72 million in 2003. The significant jump in travel-related spending is anticipated to be the result of increased oil and gas development in the Uinta Basin (Johnson 2006). This inference could be drawn from the fact that regional visitation counts to popular tourist destinations in the area did not show comparable increases. For example, visitation to Dinosaur National Monument, for which Vernal serves as a gateway has declined from over 360,000 visits in 2005 to approximately 230,000 visits in 2007. The 36% drop in visitation over a two year period could be partially attributed to the closing of the quarry within the Monument. In addition, visitation trends to the Flaming Gorge Area have also decreased in recent years (1999 - 2003) by 29%. This data supports that the recent increases in "traveler spending" are less likely attributed to recreation and tourism and more likely to be from services related to the oil and gas industry.

Estimated local tax revenues from traveler spending also increased significantly in 2003. Uintah County experienced a 40.7% increase in local tax revenues from traveler spending in comparison to 2002, up from $1.08 million to $1.5 million. In 2003, Uintah County also ranked eighth in the state from local tax revenues from traveler spending. The State of Utah saw a 19.4% increase in state and local tax revenues from traveler spending at $444 million up from $372 million in 2002. However, local tax revenues decreased 1.0% in 2003. Spending by travelers for the State of Utah was $4.6 billion, down 1.3% from 2002 (Utah Division of Travel Development 2004).

Table 3.14.5. Uintah County Travel-related Spending in 2003

	Traveler Spending	% Change from 2002	Tax Revenue in Traveler Spending	% Change from 2002
State of Utah	$4,631,000,000	-1.3	$444,000,000*	19.4
Uintah County	$72,600,000	40.7	$1,519,500	40.7

*Represents state and local tax revenues from the entire state

Source: Utah Division of Travel Development 2004

Traveler spending and tax revenue includes all visits to the area, whether for recreation, business, or other purposes. While it is a valuable measure for visitation to Uintah County, it does not only

reflect tourism visits. It should be noted that a portion of the tourism related tax dollars, such as transient room tax and restaurant tax, comes from oil and gas development related services (lodging, food, and other services for mining sector employees). While it is nearly impossible to extract whether a tourist dollar was generated from a tourist or a temporary mining employee, both are beneficial to the retail and service sectors of the local economy. A decrease in temporary oil and gas-related jobs may lead to a decrease in "tourism-related" revenue for the county. On the other hand, a decrease in oil and gas-related jobs could lead to an increase in actual tourism-related revenue.

While travel related employment, spending, and local tax revenue do bring increased revenue to Uintah County, the county has indicated additional stress on infrastructure because of growing travelers. Visitors to the area may recreate on BLM property but also depend on the cities and counties for the provision of basic services, such as law enforcement and emergency fire and health services. The county has stated that the burden of infrastructure improvements should be shared with the BLM.

3.14.2.3 GOVERNMENT SETTING

A community's ability to support and pay for necessary public services is based on both the tax base within the community and the portion of that tax base that may be subject to economic change. This analysis of county finance is intended to be used to evaluate public policy decisions as well as the county's future ability to support and pay for necessary public services. Public services are the single largest expense of the county (35%), with public welfare the second large expense (18%; Uintah County 2000).

Uintah County draws its revenues from a wide range of sources, which would seem to protect it against a downturn in any one or a few areas. Because by law mineral lease payments cannot be reflected as county revenue, it is important to note the structure of these lease payments. These funds are not paid to the County directly and therefore do not show up in the general fund. Instead, a special service district administers these funds for use for transportation, roads, recreation and parks, and other items in Uintah County. This income is vital to the local economy.

Local governments such as Uintah County are normally supported by taxes. However, when a local government (such as Uintah County) contains vast expanses of federally owned land, taxes are not collected on that land. The Payments in Lieu of Taxes Act (PILT) provides for payments to local units of government containing certain federally owned lands (such as Uintah County) to assist in financing operations of that local government. Payments may be used by the counties for any governmental purpose. The total PILT payment to Uintah County in 2000 was $685,850. In 2003, this value rose to a high of just under $1.2 million. (www.blm.gov/PILT).

3.14.3 DUCHESNE COUNTY

3.14.3.1 SOCIAL CHARACTERISTICS

From 1995 to the present, the population of Duchesne County has grown steadily, along with the growth of Utah, to peak at 14,371. Moderate growth is anticipated to continue into the next decade. The Census Bureau predicts approximately 2,383 new residents by 2020 (U.S. Census 2000).

Approximately 4,300 (or 30%) of Duchesne County residents live in Roosevelt; 1,408 (or 10%) live in Duchesne; 539 live in Myton; 178 live in Altamont; and 149 live in Tabiona. The balance (54%) live in the unincorporated areas of the county (U.S. Census 2000). The majority of residents of Duchesne County live on farms and ranches and in unincorporated communities, many of which are Tribal communities on the Uintah and Ouray Reservation.

Table 3.14.6. Duchesne County Population, Past, Present, and Projected

	1990	2000	2020
Altamont	178	197	247
Duchesne	1,408	1,497	1,878
Myton	539	525	659
Roosevelt	4,299	4,325	5,427
Tabiona	149	138	174
Unincorporated Duchesne County	6,027	7,831	9,832
Total	**12,600**	**14,518**	**18,216**

Source: 2000 Census, U.S. Census Bureau

Average household size, at 3.11 persons per household, is virtually the same as the average for the state, at 3.13 persons per household. Only 7.3% of households have individuals aged 65 years and over, suggesting that the population of Duchesne County is young in comparison to the rest of Utah (U.S. Census 2000).

Of the 6,988 housing units, 4,559, or 65.2%, are occupied. Over one quarter (26.4%) of the housing stock in Duchesne County is for seasonal, recreational, or occasional use, which is defined by the owners having a primary residence elsewhere. Most (81%) of occupied housing is owner occupied (U.S. 2000).

The Duchesne County School District is a small rural school district with 4,100 students in thirteen schools, which are in six rural communities of the county. There are six elementary schools, three high schools, one junior high school, one K-12 school, and two special schools.

The residents of Duchesne County value the rural character and quiet lifestyle that comprises their communities. The historical land-use practices including farming, ranching, and natural resource development that shaped the culture of the area serve as the foundation for today's rural

community. The practices still occur on the land today and many residents are intimately connected to the traditional agricultural lifestyle. County citizens identify with the rural, small town sense-of–place that has been ever-present throughout the area. While residents of the County support growth and development, it must complement the current quality of life and values held by the citizens. According to the Duchesne County General Plan, residents value the County's "small town" qualities, exiting moral climate, low crime rates, and "neighborly" atmosphere.

3.14.3.1.1 UINTAH AND OURAY RESERVATION

The Uintah and Ouray Reservation is located within the Uinta Basin, covering a large portion of western Uintah and eastern Duchesne Counties. Ownership is a mixture of federal lands, fee lands, Indian Trust lands, and state of Utah lands. The Ute tribe has ownership of almost 1/4 of the total land area of the Uinta Basin. Oil and gas production from this land represents 1/4 of the oil and gas produced in Uintah County.

According to the Tribe's Department of Vital Statistics, the enrolled membership in the Ute Tribe is 3,120 members, up from 2,500 members in 1980. The population is projected to reach approximately 4,600 by 2010. Approximately 85% of the members of the Ute Tribe live within the boundaries of the Reservation (Bureau of Indian Affairs 2002). The median household income within the Reservation is significantly lower than in the national, state, or county median household income.

Table 3.14.7. Median Household Income

Region	Median Income
Duchesne County	26,491
State of Utah	31,417
United States	35,989
Ute Indian Tribe	14,500

Source: U.S. Bureau of Indian Affairs, 2002

Over 30% of the Ute population falls into the very low-income category. The Housing Authority indicates that many families are awaiting affordable housing (Bureau of Indian Affairs 2002).

3.14.3.2 ECONOMIC CHARACTERISTICS

3.14.3.2.1 EMPLOYMENT

Duchesne County has experienced significant changes in its employment base in the past 50 years. Instead of the dominance of the traditional agrarian economy, trade, public employment, and private services together represent 55% of the jobs. The average annual non-farm wage in Duchesne County is $23,769. The average annual non-farm wage in Duchesne County is $28,392 in 2003. The table below shows the distribution of jobs in the county.

Table 3.14.8. Duchesne County Labor Force Statistics

	2000	2001	2002	2003
Construction	311	383	367	374
Ed/Health/Soc. Services	304	421	423	460
Finance/Ins./Real Estate	120	132	129	138
Government	1,538	1,533	1,585	1,658
Information	111	141	166	170
Labor Force	5,881	6,280	6,381	6,381
Leisure /Hospitality	322	293	330	310
Manufacturing	130	128	124	116
Mining – Includes oil and gas employment	517	633	616	451
Non Farm Jobs	4,764	5,126	5,192	5,049
Other Services	120	134	159	150
Prof./ Business Services	138	146	134	142
Trade/Trans./Utilities	1,159	1,182	1,159	1,080

Source: Department of Workforce Services

Unemployment in Duchesne County is consistently higher than the state's, at 6.8% in 2003. Almost one third of Duchesne County employees receive unemployment compensation. This can be attributed to the high Native American population and the very low median income of this population. Although per capita annual income in Duchesne County has grown from $8,197 to $12,326 in the past ten years, it is still considerably less than that of the state ($18,185). The median household income for Duchesne County in 2000 was $21,298 (U.S. Census 2000).

Poverty is determined as households below an annual income of $14,269 (U.S. Census 2000). Duchesne County has the second highest percentage of persons below the poverty line (the highest being San Juan County). Of the total Duchesne County population in 1999 (14,381), 2,178 households (or 15%) reported an income below the poverty line. Nationally, only 11.3% of the population falls below the poverty line.

3.14.3.2.2 AGRICULTURE

The Utah Department of Agriculture reports 932 farms in Duchesne County, with 1,304,716 acres of land being farmed. Livestock is the county's largest source of cash receipts, with a contribution of $32.5 million for livestock and livestock products and $7.7 million for crops. Duchesne County has 50,093 acres of harvested cropland and 94,723 acres of irrigated land (Utah Agricultural Statistics 2001).

3.14.3.2.3 MINERAL RESOURCES

The Department of the Interior's Mineral Management Service identifies gas and oil as mineral resources in Duchesne County. Fluid mineral resource activities include oil production, natural gas exploration, and related mineral exploration. The highest revenue-generator in the county of the resources is oil, generating over 2.8 million in federal royalties in 2001. Both oil and natural gas combined for 90% of the federal Royalty Values generated by Duchesne County in 2001.The following table shows the federal royalty values generated for 1998 and 2001 in Duchesne County. Note that numbers in parenthesis may represent prior fiscal year adjustments, or deductions from net receipts sharing. See Figure 3.14.2 for production amounts of oil and gas development in Duchesne County. The amount of royalty revenue redistributed to Duchesne County in 2001 was approximately $2 million (BLM, 2005).

Table 3.14.9. Federal Royalty Values Generated, 1998 and 2001

	1998	2001
Bonus	$196,264.25	$51,899.50
Gas	890,672.63	1,290,578.68
Oil	2,040,988.31	2,863,660.72
Other Revenues	(34,556.54)	46,386.40
Rent	193,291.90	323,018.46
Total	3,288,834.46	4,575,543.76

Source: Minerals Management Revenue Service, 2001

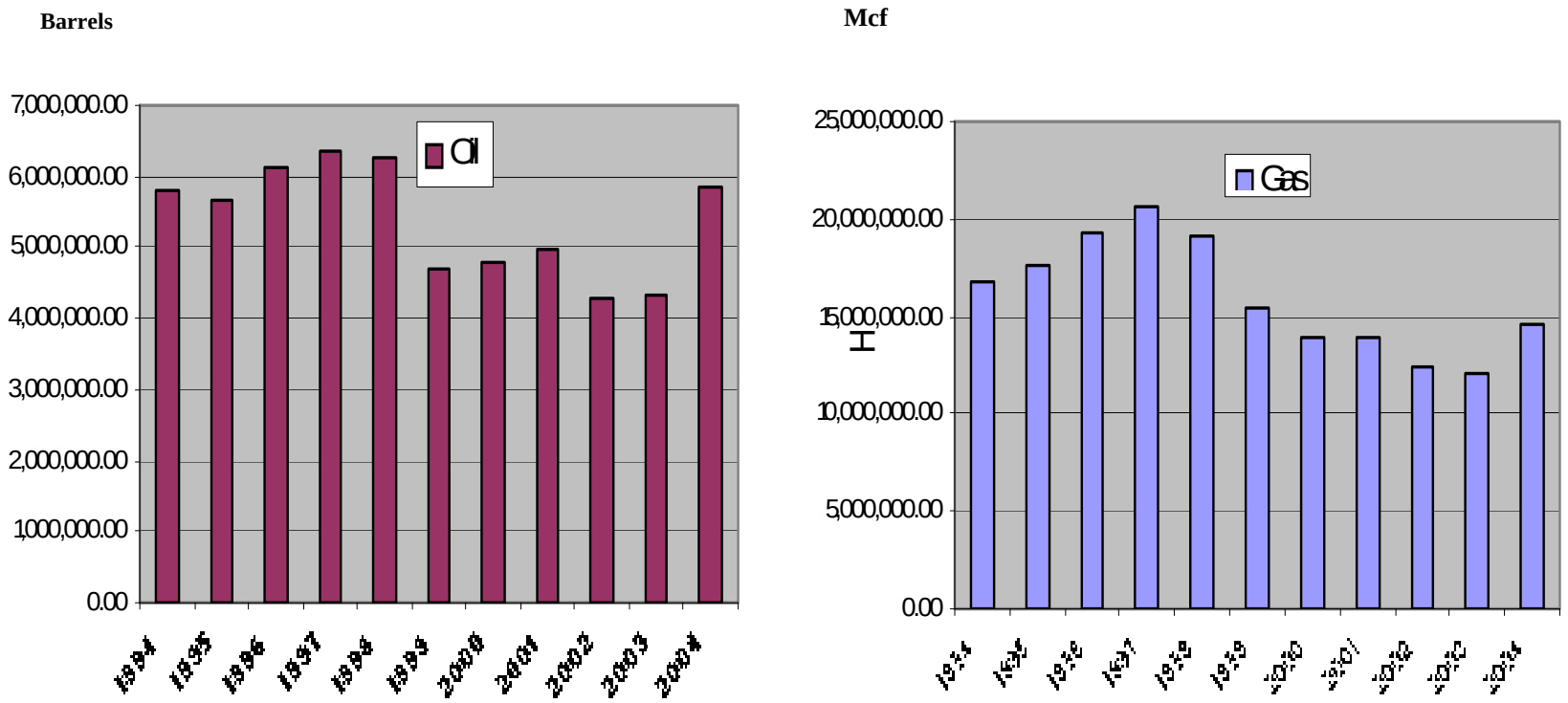

Figure 3.14.2 Duchesne County Oil and Gas Production 1994-2004. Source: Utah State Division of Oil, Gas and Mining, Department of Natural Resources 2004.

Oil and gas production in the state of Utah is impacted by the U.S. and world prices of oil and gas. As those prices rise and fall, oil and gas production in Utah also rises and falls. According to the Energy Information Administration, the average wellhead price for gas in Utah was approximately $7.28 per MCF (thousand cubic feet). The average wellhead price for oil was $60.78 per barrel (Energy Information Administration 2006). In 2001, wells in Duchesne County produced approximately 5 million barrels of oil and approximately 14 million MCF (cubic thousand feet) of gas. These numbers were lower than in 1990, when approximately 7 million barrels of oil and 20 million MCF of gas were produced. Oil and gas production in 2001 represented 32.65% and 4.60% of the state totals, respectively.

3.14.3.2.4 TOURISM AND RECREATION

Recreation is an important component in the quality of life for Uinta Basin residents. In addition to providing recreation opportunity in close proximity to their homes, these residents enjoy a healthy tax base drawn from tourism. Visitors to the Uinta Basin participate in a variety of recreational opportunities including sightseeing, camping, hiking, hunting, mountain biking, fishing, boating, and OHV use. While some of these activities can be engaged in year-round, the busiest months for recreation in the Uinta Basin are the summer months.

Several indicators help detect and explain the impact of the tourism and recreation industries on the local area: job base provided by the tourism industry, traveler spending, and regional visitation. According to the Utah Division of Travel Development, travel and tourism related jobs in Duchesne County decreased 3.1% in 2003 down from 717 in 2002 to 695. Traveler spending in Duchesne County was estimated to be $21.8 million per in 2003; a 0.9% decrease from 2002 (Table 3.14.10). Traveler spending has grown steadily since the early 1990s to 2000 where it peaked at $26.3. Dollars spent by travelers in the County has since decreased to $21.8 in 2003. In 2003, Duchesne County ranked 19th in the state for travel related spending and contributed 0.5% to statewide tourism spending.

Estimated local tax revenues from traveler spending decreased slightly in 2003. Duchesne County experienced a 1.1% decrease in local tax revenues from traveler spending in comparison to 2002, down from $461,400 to $456,200. In 2003, Duchesne County also ranked 19th in the state from local tax revenues from traveler spending. The State of Utah saw a 19.4% increase in state and local tax revenues from traveler spending at $444 million up from $372 million in 2002. However, local tax revenues decreased 1.0% in 2003. Spending by travelers for the State of Utah was $4.6 billion, down 1.3% from 2002 (Utah Division of Travel Development 2004).

Although not traditionally an indicator of overall traveler spending, data on restaurant sales have been gathered for purposes of understanding cumulative effects of tourism spending. Restaurant sales are estimated at $6.0 million per year in Duchesne County.

Table 3.14.10. Duchesne County Travel-related Spending in 2003

	Traveler Spending	% Change from 2002	Tax Revenue in Traveler Spending	% Change from 2002
Duchesne County	$21,800,000	-0.9	$456,200	-1.1
State of Utah	$4,631,000,000	-1.3	$444,000,000*	19.4

*Represents state and local tax revenues from the entire state

Source: Utah Division of Travel Development 2004

Traveler spending includes all visits to the area, whether for recreation, business, or other purposes. While it is a valuable measure for visitation to Daggett County, it does not only reflect tourism visits. It should be noted that a portion of the tourism related tax dollars, such as transient room tax and restaurant tax, could come from oil and gas development related services (lodging, food, and other services for mining sector employees). While it is nearly impossible to extract whether a tourist dollar was generated from a tourist or a temporary mining employee, both are beneficial to the retail and service sectors of the local economy. A decrease in temporary oil and gas-related jobs may lead to a decrease in "tourism-related" revenue for the county. On the other hand, a decrease in oil and gas-related jobs could lead to an increase in actual tourism-related revenue.

While travel related employment, spending, and local tax revenue do bring increased revenue to Duchesne County, the county has indicated additional stress on infrastructure because of growing travelers. Visitors to the area may recreate on BLM property but also depend on the cities and counties for the provision of basic services, such as law enforcement and emergency fire and health services. The county has stated that the burden of infrastructure improvements should be shared with the BLM.

3.14.3.3 GOVERNMENT SETTING

The majority of revenue for Duchesne County comes from charges for services (26%), property taxes (21%) and intergovernmental agreements (18%). The remainder comes from federal and state grants (11%), general sales (9%), fee in lieu (7%), and interest (5%). Duchesne County spends the majority of its income on public safety (35%), streets and highways (22%), and general government (15%). Other expenses include land purchases (9%), community development (6%), and parks, recreation, and culture (3%). The total PILT payment to Duchesne County in 2000 was $425,557. This number rose to approximately $750,000 in 2003 (www.blm.gov/PILT).

3.14.4 DAGGETT COUNTY

3.14.4.1 SOCIAL CHARACTERISTICS

Daggett County is the third smallest county in the state of Utah, with a land area of 698 square miles, or 459,553 acres. Of this land area, 88.8% is owned and managed by the federal and state governments.

Daggett County is one of the least densely populated counties in the state, at 1.32 people per square mile. The Daggett County population in 2000 was 921. This is an increase of 231 persons over the 1990 population of 690 (or a 33.5% increase). Daggett County's population has fluctuated over the years but has shown overall growth from the time it was organized in a split from Uintah County in 1918. Its population varied from 400 in 1920 to a peak of 1,164 in 1960 (related to dam construction). From 1970 to 1990 it was stable, at 600-700 persons. Although population spiked by 33% in 2000 due to construction, moderate growth is anticipated to continue into the next decade, as Daggett County adds approximately 170 new residents by 2020. Births have generally equaled deaths in the county, and all historic growth has come from net in-migration (U.S. Census 2000).

Manila, the county seat and the only incorporated community in the county, has a residential population of 308 persons (or 33% of the county's population). The balance, well over half of all the residents of Daggett County, live on farms and ranches or in unincorporated communities. The 2000 Decennial Census divided Daggett County into two census districts, east and west. The East Census District had a residential population of 149 persons, including the recreational areas around Flaming Gorge and the newly privatized community of Dutch John (U.S. Census 2000). The West Census District, which includes Manila and its surrounds, had a residential population of 722.

Seventy% of the households in Daggett County are family households, but only 27% have children younger than 18 years of age. Average household size in Daggett County, at 2.48 persons per household (less than the state of Utah average of 3.13 persons and less than Wyoming and Colorado) is small and getting smaller. This means that fewer families are having children in Daggett County that will need to be educated and will be seeking jobs. It may also mean that more secondary wage earners will be or are entering the labor market.

An unusually high number of Daggett County residents (60%) are in one- or two-person households. In the state of Utah, only 46.7% of households have two or fewer persons. In this respect, Daggett County households are more similar to Colorado and Wyoming households, at 60.4% and 62.1%, respectively (U.S. Census 2000).

The 2000 Census provides the following information about housing in Daggett County. Unlike Uintah and Duchesne Counties, in which 70-80% of housing units are occupied, only 31.4% of Daggett County's housing units are occupied. One explanation for this difference is that almost two-thirds (63.8%) of the housing stock in Daggett County is for seasonal, recreational, or occasional use, which means that the property owner's primary residence is elsewhere. Approximately 71% of the occupied housing units in Daggett County are owner-occupied (U.S. Census 2000).

With a total of 150 students, the Daggett County School District is the smallest in the state. Enrollment is declining, which is consistent with the declining population and small average household size. The county's three schools include Manila Elementary, Flaming Gorge Elementary and Manila Junior-Senior High School. These schools also serve students from McKinnon and Washam, Wyoming, areas north of the state line.

The residents of Daggett County value the rural character and quiet lifestyle that comprises their communities. The historical land-use practices including farming, ranching, and timber harvesting that shaped the culture of the area serve as the foundation for today's rural community. Today, County citizens identify with the rural, small town sense-of–place that has been ever-present throughout the area. While residents of the County support growth and development, it must complement the current quality of life and values held by the citizens.

3.14.4.2 ECONOMIC CHARACTERISTICS

Daggett County has experienced significant changes in its employment base in the past 50 years (Table 3.14.11). Initially, agriculture-related activities, such as ranching and farming, dominated the economy. The construction of the huge, hydroelectric, Flaming Gorge Dam and Reservoir in the 1960s, as well as the construction of an all-weather highway through the county, changed the local economy forever. Now, the Daggett County economy is dominated by government services associated with the operation of the dam and management of the National Recreation Area and Ashley National Forest. Service-based employment also has become a major contributor to economic vitality, as a result of the growth of tourism and recreational activities. Government services, primarily associated with the operation of Flaming Gorge and Ashley National Forest, provide 47% of Daggett County jobs (UDWS 2001).

Table 3.14.11. Daggett County Labor Force Statistics

	2000	2001	2002	2003
Construction	46	17	14	16
Government	213	223	244	253
Labor Force	474	439	467	470
Leisure Hospitality	164	148	151	136
Mining	0	0	0	0
Non-farm Jobs	467	427	461	445
Trade/Trans/Utilities	30	25	22	25

In 1995, the unemployment rate in Daggett County was significantly higher than the state's, but since then, the county's rates have closely mirrored those of the state. The 2003 unemployment rate in Daggett County was 5.0%, one of the lowest rates in the state. Almost 50% of Daggett County employees receive government subsidy (U.S. Census 2000). From 2000 to 2003, the per capita annual income in Daggett County has grown from $15,201 to $18,161(UDWFS 2003). Median household income in 2000 was $30,833 (U.S. Census 2000).

Approximately 11.7% of the population of Daggett County is below the poverty level (annual household income being less than $14,269), which compares to the national rate of 11.3% (U.S. Census 2000). Daggett County's poverty rate is the sixth highest in the state, and among the counties without significant tribal populations, Daggett County's rate is the second highest in the state (second to Carbon County).

3.14.4.2.1 AGRICULTURE

The Utah Department of Agriculture reports 28 farms in Daggett County in 2003., Livestock and the related ranch operations are the county's largest source of cash receipts, with a contribution of $1.6 million for livestock and livestock products and $500,000 for crops. Daggett County has 3,979 acres of harvested cropland and 8,182 acres of irrigated land, which produce 12,000 tons of hay and alfalfa (Utah Agricultural Statistics 2001).

3.14.4.2.2 MINERAL RESOURCES

Oil and gas production in Daggett County is not a significant contributor to the local economy. Oil and gas production in 2001 represented 0.01% and 0.4% of the state totals, respectively (Utah Division of Oil, Gas and Mining 2002).

3.14.4.2.3 TOURISM AND RECREATION

Recreation is an important component in the quality of life for Uinta Basin residents. In addition to providing recreation opportunity in close proximity to their homes, these residents enjoy a healthy tax base drawn from tourism. Visitors to the Uinta Basin participate in a variety of recreational opportunities including sightseeing, camping, hiking, hunting, mountain biking, fishing, boating, and OHV use. While some of these activities can be engaged in year-round, the busiest months for recreation in the Uinta Basin are the summer months.

Several indicators help detect and explain the impact of the tourism and recreation industries on the local area: job base provided by the tourism industry, traveler spending, and regional visitation. According to the Utah Division of Travel Development, travel and tourism related jobs in Daggett County decreased 0.4% in 2003 down from 258 in 2002 to 257. Daggett County ranks number one in the state for percent of total employment dependant on tourism related jobs. With a total of 443 non-agricultural related jobs reported in 2003, 257 jobs or 58% of total jobs are related to recreation and tourism. Traveler spending in Daggett County was estimated to be $5.1 million per in 2003; a 23.9% decrease from $6.7 million in 2002 (Table 3.14.12). Traveler spending remained fairly steady throughout the 1990s and peaked at $11.7 million in 2000.Traveler spending a decreased continuously since 2000.

The Flaming Gorge National Recreational Area (NRA) is the sixth most popular Utah tourist attraction, generating over one million visitors each year. Flaming Gorge NRA was the only one of Utah's national monuments or recreation areas not to report visitor declines during 2000. Despite these visitation rates and the significance of the recreation economy to Daggett County, the county's tourism represents only 0.1% of traveler spending in the state of Utah and ranks twenty-eighth among counties in Utah. Tourism spending in Daggett County has been growing at less than one half the rate of the state.

Estimated local tax revenues from traveler spending also decreased in 2003. Daggett County experienced a 23.6% decrease in local tax revenues from traveler spending in comparison to 2002, down from $136,600 to $106,700. In 2003, Daggett County also ranked 28th in the state from local tax revenues from traveler spending. The State of Utah saw a 19.4% increase in state

and local tax revenues from traveler spending at $444 million up from $372 million in 2002. However, local tax revenues decreased 1.0% in 2003. Spending by travelers for the State of Utah was $4.6 billion, down 1.3% from 2002.

In contrast to Uintah and Duchesne County where some of the "traveler spending" can be attributed to oil and gas development, it is unlikely that this is the case in Daggett County since less than 0.05% of the State's mineral development occurs here. In Daggett County it is safer to assume that "traveler spending" actually comes from tourists to the area.

Table 3.14.12. Daggett County Travel-related Spending in 2003

	Traveler Spending	% Change from 2002	Tax Revenue from Traveler Spending	% Change from 2002
Daggett County	$5,100,000	-23.9	$106,700	-23.6
State of Utah	$4,631,000,000	-1.3	$444,000,000	19.4

*Represents state and local tax revenues from the entire state

Source: Utah Division of Travel Development 2004

3.14.4.3 GOVERNMENT SETTING

The government setting in Daggett County is different than in Uintah or Duchesne Counties. Parts of the county, specifically Dutch John and the surrounding area, were formerly federal lands associated with Flaming Gorge NRA. Some of those lands have recently been incorporated into the town of Dutch John, and others have been designated as county land.

Charges for public services are an unusually large revenue item in Daggett County, partially due to the large public safety facility in Manila and the county's contracts to house state, federal, and county inmates there. The majority of Daggett County revenues come from charges for services (43%) and sale of property (25%). Federal and state grants, intergovernmental arrangements, transient room taxes, general sales and use, and fee in lieu generate the remainder of the income for the county. The total PILT payment to Daggett County in 2000 was $38,074.

The same public services that generate revenue for the county are also apparently a high expenditure in Daggett County (53%). Other expenditures include general government (12%), streets and highways (10%), and community development (9%).

Another unique characteristic of Daggett County government is the special service districts of the county. The Daggett County Road and Transportation Special Services District is a primary recipient of mineral lease monies administered through the Permanent Community Impact Fund. During 1999, it received $425,000 in mineral lease monies and an additional $166,349 from other state sources, for a total of $591,349. Approximately $373,240 of this was spent for construction, $8,316 was spent on salaries, and $12,750 was spent on debt reduction and interest on that debt. The Daggett County Mosquito Abatement District (MAD) received $18,217 in property taxes or in-lieu fees. Of this, $14,489 was spent on salaries, and $1,126 was spent on an

intergovernmental transfer. Finally, the district called Daggett County Service Area #1 had $1,720 in revenues, $1,000 from property taxes. The only expenses were $136 for salaries.

3.14.5 Region-wide Conclusions

This study has discussed the social, economic, and governmental settings of the three counties that compose the VPA. In addition to the statistics that help describe each county, conclusions can be drawn about the region's history, geography, and economics.

The first conclusion drawn is that, due to the history and geography of the Uinta Basin, much of the population has a common lifestyle and identity. The fact that each of these counties is at least two hours from any major city sustains a rural/small town lifestyle.

The second regional commonality among the counties is their economic dependency on physical resources within the VPA. From municipality to municipality in the region, lower-than-average wages and higher-than-average poverty rates are common. The economy of the region is based on agriculture, oil and gas exploration, and tourism. Major changes in the management of the land in any one of these sectors of the economy will have an effect an on the socioeconomics of the individual counties and the region overall.

3.15 Soil and Water Resources

3.15.1 Regional Overview

The VPA lies within portions of nine catalogued USGS 8-Digit Hydrologic Unit Code (HUC) watersheds located within the Upper Colorado hydrologic region (Region 14). The majority of the VPA is contained within seven watersheds in the Lower Green River drainage, although portions also are associated with the Upper Green River and the Lower White River drainage. Watershed acreages are described in Table 3.15.1.

Table 3.15.1. Watersheds Associated with the VPA

8-Digit HUC	Watershed Name	Acres within VPA
14040106	Upper Green-Flaming Gorge Reservoir	543,564
14060001	Lower Green-Diamond	566,835
14060002	Lower Green-Ashley-Brush	420,697
14060003	Lower Green-Duchesne	1,649,897
14060004	Lower Green-Strawberry	394,405
14060005	Lower Green-Desolation Canyon	645,365
14060007	Lower Green-Price	22,542
14060006	Lower Green-Willow	461,197
14050007	Lower White	797,137

Two municipal watersheds, Ashley Creek and Red Fleet, are also located within the VPA. The Ashley Creek municipal watershed occurs almost entirely upon lands administered by the USFS - Ashley National Forest; however, the BLM administers 670 acres, including Ashley Spring, the access point for the municipal supply. The Red Fleet municipal watershed contains 18,660 acres administered by the BLM, including lands surrounding Red Fleet Reservoir, which is the access point for the municipal supply.

3.15.2 TOPOGRAPHY

The topography of the VPA is primarily defined along its northern portion by the Uinta Mountains. The Uinta Mountains are broad and massive and extend approximately 150 miles east to west. The Uinta Mountains consist of extensively glaciated, sedimentary and metamorphic rocks. Glacial deposition features have created numerous natural dams and small lakes on the slopes of the range. A portion of the VPA lies north of the Uinta Mountains and drains to the Green River below Flaming Gorge Reservoir. The Green River exits the VPA approximately 30 miles downstream of Flaming Gorge at the Utah/Colorado state boundary and reenters the VPA near Diamond Mountain, again along the Utah/Colorado state boundary. Portions of the south side of the Uinta Mountains drain to the Green River below Diamond Mountain through major tributaries such as Ashley Creek, Big Brush Creek, and the Whiterocks River.

The western side of the VPA is drained by the Duchesne River and its major tributary, the Strawberry River. The Duchesne River drains a topographic basin composed of Mesozoic and Tertiary sedimentary rocks characterized by a gently rolling, dissected plateau with deeply cut ravines and alluvial valleys. The Duchesne River enters the Green River near Ouray, in the central part of the VPA.

The eastern and southern part of the VPA, primarily consisting of the Book Cliffs portion of the VPA, is drained by Hill Creek, Bitter Creek, Evacuation Creek, Willow Creek, and the White River; these drainages also enter the Green River near Ouray. This area is part of the Tavaputs Plateau, composed of Tertiary sedimentary rocks and characterized by rugged terrain and deeply incised canyons (UDWaR 1999).

3.15.3 SOIL RESOURCES

Soils in the VPA have developed from bedrock, from rocks/minerals deposited by rivers and glacial activity, and from windblown silt and sand. They were derived primarily from the sedimentary, metamorphic quartzite and volcanic rocks of the Uinta Mountains, Diamond Mountain Plateau, Avintaquin Mountains, East Tavaputs Plateau, West Tavaputs Plateau, Roan Cliffs, and Book Cliffs, which form the boundaries of the Uinta Basin and Browns Park.

Soils in the VPA are composed of a wide variety of soil types and characteristics. Certain soil types have chemical features that limit restoration and make reclamation difficult; these include sodium, soluble salts, carbonates, and gypsum. Physical soil characteristics that may limit reclamation include sandy soils, clayey soils, large coarse fragments (e.g., stones and boulders), shallow depth to parent material, and low organic matter content. A shallow depth to

groundwater limits reclamation in hydric soils. Soils in the VPA are composed of a wide variety of soil types and characteristics. Certain soil types have chemical features that limit restoration and make reclamation difficult; these include sodium, soluble salts, carbonates, and gypsum. Physical soil characteristics that may limit activities or reclamation include: low available water holding capacity, excessive drainage, hardpans, high amounts of rock fragments or large stones and boulders, shallow depth to parent material, high water table, and low organic matter content. Soils with these features are referred to as "limiting soils" in this document.

3.15.3.1 NATURAL RESOURCE CONSERVATION SERVICE (NRCS) SOIL SURVEYS

The Natural Resource Conservation Service (NRCS) has conducted three soil surveys throughout the VPA, with second and third order delineation. The Uintah Area, Utah soil survey includes parts of Daggett, Grand, and Uintah Counties. Portions of Daggett County are also included in the Henrys Fork Area, Utah-Wyoming soil survey. The Duchesne County part of the VPA is covered by the Duchesne Area, Utah soil survey.

3.15.3.1.1 HENRYS FORK AREA, UTAH-WYOMING SOIL SURVEY (USDA 1990)

This soil survey covers the northern parts of Daggett County, as well as parts of Summit County, Utah and parts of Uinta and Sweetwater Counties in Wyoming. The survey, correlated in October 1990, is complete and available in digital and hardcopy formats. Information on soil features and use ratings can be obtained by using either the NRCS Soil Data Viewer or Microsoft Access software. Soil spatial data is available for use with standard GIS software.

3.15.3.1.2 UINTAH AREA, UTAH SOIL SURVEY (USDA 1999)

This soil survey covers Uintah County, part of northern Grand County, and the southern part of Daggett County. The survey, correlated in June 1999, is complete and available in digital format. Information on soil features and use ratings can be obtained by using either the NRCS Soil Data Viewer or Microsoft Access software. Soil spatial data is available for use with standard GIS software.

This soil survey covers the largest portion of the VPA, with 2,477,734 acres of soils surveyed. It ranges from the Diamond Mountain area in the north to the Book Cliffs in the south and from the Duchesne County line in the west to the Colorado state line in the east.

Taxonomic classifications of VPA soils within the boundaries of this survey include a wide variety of soil types. Diagnostic soil features include cryic soils, argillic horizons, mollic epipedons, calcic horizons, petrocalcics, gypsic horizons, psamments, and fluvents. Thirty taxonomic great groups and 151 soil series have been identified in the Uintah Area soil survey.

3.15.3.1.3 DUCHESNE AREA, UTAH SOIL SURVEY

This soil survey includes VPA lands in southeastern Duchesne County, Utah. Most of the fieldwork has been completed for this survey, but final correlation has not been completed. Correlation and final publication of the soil survey data by the NRCS began in late 2005 and

expected to be complete by 2010. Draft spatial soil data has been digitized and can be accessed with standard GIS software. Available information on soil features and use ratings can be obtained from official soil series descriptions and interpretation tables or local NRCS offices. Until final correlation and publication, this data is considered draft and is less accessible to the public than the published survey data from either the Henrys Fork or the Uintah Area soil surveys. Draft data is available by contacting the local NRCS office or BLM office.

This soil survey includes VPA lands in southeastern Duchesne County, Utah. Most of the fieldwork has been completed for this survey, but final correlation has not been completed. Correlation and final publication of the soil survey data by the NRCS is began in late 2005 and expected to be complete by 2010. Draft spatial soil data has been digitized and can be accessed with standard GIS software. Available information on soil features and use ratings can be obtained from official soil series descriptions and interpretation tables or local NRCS offices. Until final correlation and publication, this data is considered draft and is less accessible to the public than the published survey data from either the Henrys Fork or the Uintah Area soil surveys. Draft data is available by contacting the local NRCS office or BLM office.

3.15.3.2 Soil Characteristics of Greatest Management Concern

3.15.3.2.1 Presence of Biological Crusts

The presence of biological crusts in arid and semi-arid lands have a very significant influence on reducing soil erosion by both wind and water, fixing atmospheric nitrogen, retaining soil moisture, and providing a living organic surface mulch. "These crusts are a complex mosaic of cyanobacteria, green algae, lichens, mosses, microfungi, and other bacteria" (BLM 2001:1). They can be used as an indicator of rangelands' ecological health. Development of biological crusts is strongly influenced by soil texture, soil chemistry, and successional colonization by crustal organisms. The type and abundance of biological crust can be used by a land manager to determine the ecological history and condition of a site. Biological crusts are generally found where there are openings in the vascular plant cover and protect open areas from wind and water erosion.

Limited data exists for biological crusts specific to the VPA. However there is some baseline information for parts of the VPA from the early 1970’s and more recent information being collected as part of a National Science Foundation-funded project by Brigham Young University (personal communication, Diana Whittington, FWS – or better yet put in the correct and full citations.) There is also a growing body of literature and data, much of it based on the Colorado Plateau region that would be applicable to the soils and ecosystems of the VPA.

3.15.3.2.2 Salinity

Soil salinity can have significant impacts on soil erosion and reclamation potential. Erosion of saline soils can also have significant impacts on the water quality of downstream watersheds. Soils with electrical conductivity levels of 8 dS/m (deciSeimens/meter) or greater were considered saline in all soil surveys. Saline soils occur in more than 365,851 acres, or

approximately 20% of the BLM-administered lands in the VPA. Add soils data for salinity and other soils features are taken from the SSURGO database.

Saline sediments that originate in the VPA eventually flow into the Colorado River. Salinity levels in the Colorado River are a regional, national, and international issue. Control of sediment discharged from public lands is mandated by the Colorado River Basin Salinity Control Act of 1974. Proper land use is the BLM's preferred method of achieving salinity control, with the planning process being the principal mechanism for implementation. Impacts are to be minimized in areas with saline soils, and revegetation of previously disturbed saline soils is to be promoted to the extent possible.

3.15.3.2.3 SODIUM ABSORPTION RATIOS

Soils with sodium absorption ratios (ratio of sodium salts to other soluble salts) of 13 or greater are considered sodic. Infiltration of precipitation into these soils is reduced by the dispersion of soil particles caused by the higher levels of sodium. Reduced infiltration rates result in greater surface runoff rates and increased soil erosion and sediment yields. Many sodic soils have a thin layer of suitable soil above the sodic horizon, but when this layer is disturbed or removed, the resulting impact can be irreversible. Sodic soils occur in approximately 161,344 acres, or approximately 9% of the BLM-administered lands within the VPA. Management of sodic soils should include minimizing the impacts of grazing and other surface disturbances, such as road construction.

3.15.3.2.4 GYPSUM LEVELS

Soils with gypsum levels equal to or greater than 10% are highly susceptible to water erosion and are difficult to reclaim. Gypsum is very soluble in water, which results in piping and other severe erosion features. Gypsic soils occur in approximately 132,706 acres, or 7% of the BLM administered lands within the VPA. The number of soil map units in the VPA with gypsic soils is relatively small, but nonetheless, these units require careful management to minimize impacts that may cause irreversible damage. Construction of roads and other facilities is difficult in these soils.

3.15.3.2.5 RESPONSE TO DISTURBANCE

Decisions regarding management of a particular soil resource is dependent on the particular soil type's ability to recover from specific disturbances. Gypsum content, salinity level, and sodium content are soil characteristics that can severely limit recovery from a disturbance. Road construction and operation of OHVs commonly impact the soils in the VPA. Additionally, the presence of surface water or groundwater has an influence on the severity of a disturbance and on when the activity may be allowed. Surface disturbances can cause compaction and increased soil erosion by either wind or water.

Use ratings and soil characteristics listed in the soil surveys are intended to be used as general guidelines for land-use planning, but site-specific investigations should be done to determine the suitability of soils at specific locations.

3.15.3.2.6 EROSION

Water Erosion

There is significant potential for severe soil erosion by water at several locations within the VPA. Erosion potential ratings were not available in the NRCS soil surveys at the time this analysis was conducted. The VPA area has determined the approximate locations of soils with potential for severe erosion by evaluating the k-factor, T factor, percent slope, and hydrologic group rating for each soil map unit. These are designations given to soils by the NRCS, which show the relative erodibility of each soil unit. Site specific and map unit specific determinations for erosion hazard ratings will continue to be developed and utilized within the VPA. Additionally, soil surface texture and the presence of surface or ground water have an influence on the severity of a disturbance and on when the activity may be allowed. Surface disturbances can cause compaction and increased soil erosion by either wind or water.

In the interim, for preliminary delineation of water erodible soils, soil mapping units with a k-factor of 0.32 or greater and slopes greater than 10% were considered susceptible to water erosion. Using these factors, water erodible soils were determined to cover 232,042 acres, or approximately 13% of the VPA. Current management activities are designed to minimize impacts so that erosion and sediment yield are not accelerated. Additional mitigation measures are to be taken, as necessary, to minimize impacts on soils determined to have severe erosion hazard potential.

Wind Erosion

Many of the soils in the VPA are coarse-textured and very susceptible to wind erosion when the vegetative community is disturbed. The NRCS soil surveys classify each soil series into wind erodibility groups (1, 2, 3, 4L, 4, 5, 6, 7, and 8). Soils that are in wind erodibility groups 1, 2, 3, or 4L have erosion potentials ranging from extremely erodible to erodible, respectively. Wind erosion increases when the vegetative community is disturbed by intense grazing, fire, road construction, and other events that reduce the amount of vegetative cover. Disturbance of biological crusts on coarse-textured soils will also increase the potential for wind erosion. Wind-erodible soils cover 1,361,645 acres, or 79% of the VPA. To preserve soil resources in these areas, disturbance of the vegetative community and biological crusts are managed and minimized.

Reclamation of Drastically Disturbed Areas

Many of the soils within the VPA have limiting features that make reclamation and revegetation very difficult. These limiting features include salinity, sodium content, clayey and sandy textures, drought conditions, alkalinity, low organic matter content, shallow depth to bedrock, stones and cobbles, and wind erosion. Sometimes the soil limitations are so severe that areas cannot be reclaimed from disturbance. Preventing disturbance to such limited soil resources is the most effective way to reduce impacts of road construction, grazing, fire, and other activities that drastically disturb the soil surface. Whenever impacts are deemed necessary in an area,

salvaging and stockpiling soil materials to replace the disturbed, limited soils is the most effective management decision regarding soils.

Road Construction and Maintenance

Construction and maintenance of roads within the VPA will continue to be a prominent aspect of management. Soil properties that are limiting to construction of roads within the VPA include soils with high sodium content, high gypsum content, high soluble salts, low strength, shrink-swell potential, and frost action. A soil's large-stone content, its depth to hard bedrock, and its slope are also important physical features that must be considered when determining a soil's suitability for road construction.

Suitability ratings for construction of local roads assume that the roads will have an all-weather surface (commonly of asphalt or concrete) and are expected to carry automobile traffic year-round. Since the majority of roads constructed and maintained within the VPA do not have an all-weather surface, it should be assumed that site-specific evaluations would need to be conducted prior to construction of any new roads. Roads are graded to shed water, and conventional drainage measures are installed properly. With the exception of hard surface all-weather roads, most of roads in the VPA are constructed from the local soils, which may or may not be suitable for road construction.

3.15.4 WATER RESOURCES

3.15.4.1 SURFACE WATER SUPPLY AND USE

Surface water in the VPA is used for agricultural, municipal, industrial, power generation, and recreational purposes. Surface water is stored in several large and small reservoirs, both natural and human-made. The largest use of surface water is for agricultural irrigation, with almost 800,000 acre-feet of water per year being diverted to irrigate more than 200,000 acres of land (UDWaR 1999). Water diversions for municipal and industrial purposes (including residential water use, industrial water use, power production, and irrigation of parks, golf courses, and other outdoor areas) average approximately 14,000 acre-feet per year (UDWaR 1999). The Diamond Mountain portion of the VPA also has 15 hydropower site withdrawals covering approximately 93,900 acres along the Green River (BLM 1993).

The hydrology of the VPA is primarily dominated by spring runoff and from brief, intense storms that generally occur in late summer. The several large reservoirs that have been constructed on the Green and Strawberry Rivers have altered the natural hydrology of these major rivers by reducing the annual spring peak and providing higher minimum flows during the summer and winter months. Water diversions for agricultural, municipal, and industrial uses have also altered the natural hydrology of the VPA by reducing instream flows below diversion points.

Surface water flow supports riparian vegetation along the floodplains of the rivers and streams in the VPA. Approximately 92,226 acres of the VPA occur within the 100-year floodplains of the major drainages in the VPA. While the preliminary status of the functioning condition of riparian

vegetation along major waterways has been documented in preparation for this RMP, the condition of the floodplain and the stability of stream banks have not yet been determined for all areas (Strong 2002b). Surface water flow also supports riparian vegetation associated with other water features such as Stewart Lake, Pelican Lake, and the Pariette Wetlands.

3.15.4.2 GROUNDWATER SUPPLY AND USE

The primary use of groundwater in the VPA is for municipal and industrial purposes. Unconsolidated or alluvial aquifers are relatively limited within the VPA, with major use only in the Duchesne-Myton-Pleasant Valley area and east of Neola. Consolidated or bedrock aquifers form a major component of the groundwater system in the VPA. Major consolidated aquifers include sandstone beds within the Uinta Formation and the Bird's Nest and Douglass Creek aquifers within the Green River Formation. Total water withdrawal from all aquifers for municipal and industrial use is approximately 21,000 acre-feet, which is relatively minor compared to the estimated 350,000 acre-feet naturally discharged to streams and springs and the nearly 250,000 acre-feet lost to evapotranspiration (UDWaR 1999).

3.15.4.3 WATER QUALITY

Surface water quality problems are detailed in Utah's 303(d) list of impaired waters, required under the Clean Water Act (Table 3.15.2). Lower Ashley Creek was listed due to total dissolved solids (TDS) and selenium concentrations, likely the result of irrigation return flows. Portions of the Duchesne River and tributaries were listed primarily due to TDS concentrations, also attributable to irrigation return flows. Several reservoirs within the VPA were also listed, mostly for phosphorous levels, dissolved oxygen (DO) levels, and high temperatures.

Water bodies on Utah's 303(d) List of Impaired Waters are listed below in Table 3.15.2.

Table 3.15.2. Water Bodies on Utah's 303(d) List of Impaired Waters, 2000

HUC Code	Name	Stressor
	Calder Reservoir	DO, Total Phosphorous
14060001	Brough Reservoir	DO, Temperature
14060002	Lower Ashley Creek	TDS, Selenium
	Red Fleet Reservoir	DO, Temperature
	Steinaker Reservoir	Temperature
14060003	Antelope Creek	TDS
	Deep Creek	TDS
	Duchesne River from confluence with Green River to Randlett	TDS
	Duchesne River from Randlett to Myton	TDS
14060005	Pariette Draw	TDS, Boron
	Willow Creek from confluence with Green River to confluence with Meadow Creek	TDS

Source: UDEQ 2002

Excess salinity, the major surface water quality problem in the VPA, is of regional significance under the Colorado River Basin Salinity Control Act of 1974. Salinity contributions come from naturally occurring groundwater during low flow periods and from erosion of saline soils. A large part of the saline soil contribution is attributable to poor road construction practices and management (Strong 2002a). Other factors in water quality are salt-loading from irrigated agriculture, water and land contamination due to oil/gas well drilling, and elevated levels of total phosphorous and TDS in several basin streams (UDEQ 2003). Watersheds of particular concern include the Pariette, Red Creek, and Buckskin Hills watersheds.

The groundwater hydrology in the VPA is primarily dependent on rock structure. Concentrations of dissolved solids range from 19 to 112,000 mg/L and depend on changes in rock type and physical environments.

Locally, the groundwater salinity in the VPA is caused by natural geologic sources. The Tertiary Green River, Wasatch, and Uinta Formations and the Mesozoic Mancos Shale range from very saline to briny at depth (>500 ft.) and generally less saline at shallow depths (<500 ft.). High selenium and boron concentrations are of particular concern and have been studied at Stewart Lake, Lower Ashley Creek, and the Pariette Wetlands. The salinity of water produced in oil, gas, and CBNG development may change significantly within a few months or years particularly if vertical movement of water in faults and fractures is induced by the production of hydrocarbons and water from oil and gas wells (USGS 1987).

3.16 SPECIAL DESIGNATIONS

3.16.1 AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

3.16.1.1 CURRENTLY DESIGNATED ACECS

The VFO manages seven ACECs (165,944 total acres) that were designated in 1994 in the record of decision (ROD) for the Diamond Mountain RMP (BLM 1994a). They are, in order of decreasing size, Browns Park, Nine Mile Canyon, Red Mountain-Dry Fork, Red Creek Watershed, Pariette Wetlands, Lower Green River Corridor, and Lears Canyon. Existing ACECs are subject to reconsideration when RMPs are revised. Based on a current analysis of the areas, the present designations have been effective in protecting the relevant values they exhibit, and these will, again, be considered as ACECs in the Vernal RMP.

Table 3.16.1 provides a summary of the relevance and importance criteria for each currently designated ACEC. The management prescriptions for these areas are detailed in Chapter 3 of Diamond Mountain RMP and ROD (BLM 1994a).

Table 3.16.1. Relevance and Importance Criteria of Currently Designated ACECs

Relevance	Importance
Browns Park (52,721 acres) Significant diversity and density of cultural and historical sites, a nationally recognized Class I fishery; has special status plant and animal species habitat, cultural values, crucial deer winter habitat, high quality scenic values.	Has qualities that make it fragile, sensitive, rare, irreplaceable, unique, endangered, and threatened.
Lears Canyon (1,375 acres) Contains a natural system, specifically relict plant and plant communities, serves as a scientific reference area.	Has qualities that make it fragile, sensitive, rare, irreplaceable, unique, endangered, and threatened. Has been recognized as warranting protection in order to carry out the mandates of the Federal Land Policy and Management Act.
Lower Green River Corridor (8,470 acres – lower) Riparian habitat, special status animal species habitat, and high-quality scenic values.	Has more than locally significant qualities, which give it special worth, and distinctiveness.
Nine Mile Canyon (44,181 acres) Nationally significant Fremont, Ute, and Archaic rock art and structures; regionally significant populations of special status plant species, and high quality scenery.	Has more than locally significant qualities, which give it special worth, and distinctiveness.
Pariette Wetlands (10,437 acres) Special status bird and plant species habitat, a wetlands ecosystem, significant population of the federally threatened plant species *Sclerocactus glaucus.*	Has qualities that make it fragile, sensitive, rare, irreplaceable, unique, endangered, and threatened.
Red Creek Watershed (24,475 acres) Regionally significant critical watershed; part of Green River drainage system and its Class I fishery values.	Has more than locally significant qualities, which give it special worth, and distinctiveness.
Red Mountain-Dry Fork (24,285 acres) Significant diversity and density of cultural sites, quality paleontological finds, and two relic vegetation communities.	Has qualities that make it fragile, sensitive, rare, irreplaceable, unique and distinctive.

3.16.1.2 POTENTIAL ACECS

The eight potential ACECs and the expansion of two existing ACECs being considered for possible ACEC designation through this planning process are discussed below. Only those nominated areas determined to meet specific relevance and importance criteria are identified as potential ACECs. The following descriptions generally define the maximum acreage proposed in the alternatives although in some instances variations in the size and location of the proposed ACECs are described for clarification. See Table 4.16.1 in Chapter 4 for a description of the various acreage proposals, Figures 29–32 (in the Maps section) for geographic locations, and Appendix G for more information on ACEC evaluations.

Table 3.16.2. Relevance and Importance Criteria of Potential ACECs

Relevance	Importance
Bitter Creek (68,384 acres) Existence of an old growth forest, significant cultural and historic resources, important watershed, and critical ecosystem for wildlife and migratory birds.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. Ancient (over 1,200 years) pinyon forest; irreplaceable. Ancestral home of the Northern Ute Tribe after relocation in the late 1800s. Many features, including graves, but specific locations are not known. The most extensive wetland in the multi-state Book Cliffs due to uniquely perched water table; a critical ecosystem for migratory birds and a wide variety of wildlife.
Bitter Creek-P.R. Springs (147,425 acres) Same as Bitter Creek.	Same as Bitter Creek.
Coyote Basin ACEC (87,743 acres) Important white-tailed prairie dog complex. Essential habitat for maintaining species diversity and includes one of the largest populations of white-tailed prairie dogs. The white-tailed prairie dog is essential to the survival of the endangered black-footed ferret in this area.	A critical ecosystem for the white-tailed prairie dog, one of 25 complexes nominated for ACEC status in the western states. Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. This species occupies only an estimated 8% of the area it once occupied, and most of this is on public lands. The white-tailed prairie dog is particularly vulnerable to adverse change from a variety of current causes. The U.S. Fish and Wildlife Service has been petitioned to list species.
Coyote Basin Complex (124,161 acres) Same as Coyote Basin.	Same as Coyote Basin.
Four Mile Wash (50,280 acres) Existence of high value scenery, important riparian ecosystem, and special status fish.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. Spectacular scenery viewed by increasing numbers of visitors from many states and countries. Lush riparian vegetation is rare in this desert ecosystem. Critical habitat for four endangered fish - Colorado pikeminnow (Ptychochelius lucius), Bonytail (Gila elegans), Humpbacked chub (Gila cypha), and the Razorback sucker (Xyrauchen texanus).
Lower Green River Expansion (1,700 acres) Existence of significant riparian habitat and outstanding scenic values.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. An extension of the Lower Green River Corridor ACEC, where the significance of these important resources has been recognized. See Table 3.16.1 above.

Table 3.16.2. Relevance and Importance Criteria of Potential ACECs

Relevance	Importance
Main Canyon (100,915 acres) Existence of important cultural and historic resources, and natural systems.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. Numerous sites associated with the historic Northern Ute migration route along Main Canyon. Historic inscription from early French fur trade era. Focus of past proposals to manage for exemplary natural systems. Part of the cooperative BLM/Utah Division of Wildlife Resources Book Cliffs Conservation Initiative. Most of ACEC within the Winter Ridge WSA.
Middle Green (6,768 acres) Existence of an important riparian ecosystem and high value scenery.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. River and adjacent landscape provide spectacular scenery, viewed by increasing numbers of visitors from many states and countries. Lush riparian vegetation rare in this desert ecosystem.
Nine Mile Canyon Expansion (36,987 acres) Existence of significant cultural resources, special status plant species, and high quality scenery.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. An extension of the existing Nine Mile Canyon ACEC, where the significance of these important resources has been recognized. See Table 3.16.1 above.
White River (47,130 acres) Existence of unique geological formations, high value scenery, significant historical events, and riparian ecosystem.	Has significance due to qualities that make it fragile, sensitive, rare, irreplaceable, exemplary, and unique. Unique, spectacular rock spires, named "Goblin City" by the John Wesley Powell 1869 expedition. A popular cottonwood grove campsite; place where the Powell Expedition camped and explored the nearby geological formations. Spectacular scenery viewed by increasing numbers of visitors from several states. Lush riparian vegetation is rare in this desert ecosystem.

3.16.2 WILD AND SCENIC RIVERS

3.16.2.1 REGIONAL OVERVIEW

The Wild and Scenic Rivers Act established a National Wild and Scenic Rivers System (NWSRS) to protect and preserve designated rivers throughout the nation in their free-flowing condition, as well as their immediate environments. It contains policy for managing designated rivers and created processes for designating additional rivers into 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. Wild and scenic river considerations are being made in the Vernal RMP revision.

To determine eligibility, the VFO inventoried all potentially eligible rivers. All rivers nominated during scoping or that appeared on national river lists were automatically considered. In addition, all rivers within the VPA were mapped and reviewed by agency and non-agency subject matter specialists and members of the interested public to identify any additional rivers that could be potentially eligible.

All rivers determined to be eligible for congressional designation into the NWSRS are considered further for suitability in the planning process. Those determined suitable for congressional designation into the NWSRS are recommended to Congress for such designation.

The Upper Green and Lower Green segments of the Green River were found suitable for congressional designation in the ROD for the Diamond Mountain RMP, and are currently managed to protect their free-flowing nature, outstandingly remarkable values, and tentative classifications.

3.16.2.2 River Segments Determined Eligible for Wild and Scenic River Designation

Of the 89 streams segments identified by the VFO as potentially eligible and inventoried, 11 segments involving approximately 112 BLM shoreline miles and 216 total river miles were determined to be eligible for Congressional designation into the NWSRS (Table 3.16.3). Appendix C provides additional information regarding the eligibility review. 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 the BLM has the authority to do so through FLPMA, the Wild and Scenic Rivers Act, and BLM policy. It should be noted that the BLM does not manage all lands through which the proposed wild and scenic river stretches pass, and thus cannot impose restrictions on other land owners and land managers in these areas. Until the ROD for the Vernal 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 Vernal 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 the BLM's 8351 Manual, Section .51.

Table 3.16.3. Summary Information for Eligible Rivers in the VPA

Segment Name	Segment Description	Outstandingly Remarkable Values	Tentative Classification	BLM Shoreline Miles	Total Miles
Argyle Creek	Headwaters to Carbon County line	Scenic	Recreational	4.0	22.0

Table 3.16.3. Summary Information for Eligible Rivers in the VPA

Segment Name	Segment Description	Outstandingly Remarkable Values	Tentative Classification	BLM Shoreline Miles	Total Miles
Bitter Creek	Utah state line to where it enters private property	Fish, Wildlife/habitat, Cultural, Historic, Recreational	Scenic	7.0	22.0
Evacuation Creek	Utah state line to confluence with White River	Historic	Recreational	7.0	21.0
Lower Green River	Between public land boundary south of Ouray and the Carbon County line	Recreational, Fish	Scenic	27.0	30.0
Middle Green River	Between Dinosaur National Monument and the public land boundary north or Ouray	Fish	Recreational	20.0	36.0
Nine Mile Creek (A)	Within Duchesne County between the Carbon County line and the confluence with Gate Canyon	Scenic, Cultural	Recreational	7.0	13.0
Nine Mile Creek (B)	Within Duchesne County between Gate Canyon and the Green River	Scenic, Cultural	Scenic	0.0	6.0
Upper Green River	Between Little Hole and Utah state line	Scenic, Recreational, Fish, Wildlife/habitat, Cultural	Scenic	12.0	22.0
White River (A)	Between the Colorado state line and its confluence with Asphalt Wash	Scenic, Fish, Wildlife/habitat Recreational, Historic	Scenic	8.0	24.0
White River (B)	Between Asphalt Wash to where the river leaves Section 18, T10S. R23 E., SLBM	Scenic, Fish, Wildlife/habitat Recreational, Historic	Wild	10.0	10.0

Table 3.16.3. Summary Information for Eligible Rivers in the VPA

Segment Name	Segment Description	Outstandingly Remarkable Values	Tentative Classification	BLM Shoreline Miles	Total Miles
White River (C)	From where the river leaves Section 18, T10S. R23 E., SLBM to the Indian Trust Land boundary	Scenic, Fish, Wildlife/habitat Recreational, Historic	Scenic	10.0	10.0

Note: River mileage is approximate.

3.16.3 WILDERNESS STUDY AREAS

3.16.3.1 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. The Forest Service, National Park Service, and Fish and Wildlife Service managed most of the land designated as wilderness prior to 1976. With the passage of the Federal Land Policy and Management Act (FLPMA) in 1976, Congress directed the BLM to inventory, study, and recommend which public lands under its administration should be designated wilderness.

In 1979, the BLM began a wilderness inventory of 22 million acres of public land in Utah. By 1985, the BLM established 95 wilderness study areas (WSAs), totaling about 3.3 million acres, which have wilderness character. For the next several years, these areas were studied to determine which would be recommended to Congress for designation as wilderness. In October 1991, the Secretary of the Interior provided the BLM's recommendation to the President. The President recommended that 69 areas, totaling approximately 1.9 million acres in Utah, be designated as part of the National Wilderness Preservation System by Congress. To date, with few exceptions, Congress has not acted on that recommendation.

There is no designated wilderness on public lands in the VFO.

3.16.3.2 PLANNING AREA PROFILE

WSAs are roadless, natural, provide outstanding opportunities for solitude or primitive and unconfined recreation, and may have supplemental values (such as ecological, geological, or other features of scientific, educational, scenic, or historical value).

There are six WSAs in the VFO (Table 3.16.4) (Figure 29 in the Maps section). The WSAs, established and protected under the authority of Section 603 of FLPMA, are managed according to the *Interim Management Policy and Guidelines for Lands under Wilderness Review* (IMP, BLM Manual Handbook H-8550-1), to preserve their wilderness values until Congress either designates them wilderness or releases them for other uses. Only Congress can designate a WSA

as wilderness or release it from the protective mandate of FLPMA. The status of WSAs will not change as a result of this resource management planning process. In October 1991, the Secretary of Interior provided BLM's recommendations to the President. The President recommended that 69 WSAs, totaling approximately 1.9 million acres in Utah be designated as part of the National Wilderness Preservation System by Congress.

Table 3.16.4. Wilderness Study Areas

Name	Acreage
Book Cliffs Mountain Browse ISA	400 acres
Bull Canyon	600 acres
Daniels Canyon	2,496 acres
Diamond Breaks	3,900 acres
West Cold Springs	3,200 acres
Winter Ridge	42,462 acres
Total: 6 areas	**53,058 acres**

3.17 SPECIAL STATUS SPECIES

3.17.1 REGIONAL OVERVIEW

3.17.1.1 FEDERALLY LISTED SPECIES

Special status species include those plant and animal species federally listed as threatened, endangered, proposed and/or candidate, as well as BLM and State of Utah sensitive plant and animal species. The Federal Endangered Species Act (ESA) of 1973 (Public Law 93 - 205, as amended), provides protection to federally listed threatened, endangered, and candidate species from actions that may jeopardize their existence. This could occur through direct harm, activities resulting in increased stress during critical life history stages such as nesting, migration or wintering, loss or degradation of critical habitat, or loss or degradation of occupied or potential habitat.

Table 3.17.1 identifies all threatened, endangered, and candidate species occurring within the VPA area of influence which includes Daggett, Duchesne, Uintah, and the northern portion of Grand County, Utah as of February 26, 2004.[3] The information regarding the status and habitats of federally listed species in Table 3.17.1 is from data provided by the BLM and FWS status data current as of February 26, 2004. Definitions of terms used in Table 3.17.1 are provided below.

Endangered Species – Any species that is in danger of extinction throughout all or a significant portion of its range.

Threatened Species – Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

[3] Only those species that have a known occurrence in the small portion of Grand County within the VPA are represented.

Candidate Species – Any species for which substantial biological information exists to support the biological appropriateness of proposing to list the species as endangered or threatened.

Critical Habitat – Specific areas that contain physical or biological features essential for the conservation of a listed species and that may require special management considerations or protection.

Experimental Population – A population that has been reintroduced outside of its current range but within its historical range.

Recovery Plan – A plan prepared by the US Fish and Wildlife Service for threatened and endangered species that establishes objectives and methods to ensure the survival of the species and recover it sufficiently so that the species can be delisted or removed from the threatened and endangered species list.

There are 13 listed and 2 candidate species within the VPA. All of these species are both known to occur and have additional potential habitat in the VPA. Of these 15 species, there are 4 wildlife, 4 fish, and 7 plant species. Slightly more than half of the species are upland species, dependent on specific soil or geologic formations for suitable habitat, such as white calcareous shale or steep rocky canyons. These species include the Mexican spotted owl, horseshoe milkvetch, Barneby ridge-cress, White River beardtongue, clay reed-mustard, shrubby reed-mustard, Pariette cactus and Uinta Basin hookless cactus. The black-footed ferret is an upland species that requires large contiguous blocks of active prairie dog colonies. The ferret is an endangered species that has been reintroduced to northeast Utah as an experimental population. The ferret reintroduction site was Coyote Basin, in Uintah County, a BLM-managed area within the VPA, but the FWS considers all of Uintah and Duchesne Counties to be within the experimental population area. The Canada lynx is an upland species that is dependent on a montane coniferous forest link in the Diamond Mountain area between lynx habitat in the Uinta Mountains to that in the Colorado Rockies.

The remaining six listed species are species that rely predominantly on the Green River, its tributaries, and the associated riparian habitats up to 100-year floodplain limit. These species include the yellow-billed cuckoo, bonytail, Colorado pikeminnow, humpback chub, razorback sucker, and the Ute ladies'-tresses.

Draft or final recovery plans have been prepared for all threatened and endangered species except the Canada lynx.

Critical habitat has been designated for the four Colorado River fish species (bonytail, Colorado pikeminnow, humpback chub, razorback sucker) and the Mexican spotted owl. Critical habitat for the Colorado River fish species occurs along portions of the Green River downstream of its junction with the Yampa River to the Colorado River, and including sections of the Green River in the VPA within Uintah and Grand Counties. Critical habitat has also been established along the lower portion of the Duchesne River. The critical habitat designation includes the 100-year floodplain.

Critical habitat for the Mexican Spotted Owl has been designated in portions of Carbon and Grand Counties, immediately adjacent to, but just outside of the VPA. Substantial suitable canyon habitat occurs in the adjacent Books Cliffs area.

There are numerous activities (generally referred to as "threats") that have resulted in the listing of these species. These include grazing, oil and gas development, loss of prey bases, habitat fragmentation, agricultural development, forestry practices, changes in natural flow and sediment transport regimes as a result of dam operations, flow depletions from irrigation, loss of riparian and wetland habitat, introduction of non-native species, and loss of habitat within specific soil and geologic formation types. The potential continued threats to these species and how the alternative management strategies for the RMP could change these threats are described in Section 4.17.

3.17.1.2 FEDERALLY ENDANGERED, THREATENED, CANDIDATE, AND PROPOSED SPECIES

Table 3.17.1. Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring in the VPA

Common Name Scientific Name	Protection (Federal/State)	Preferred Habitat	Potential for Occurring on BLM Lands
Black-footed ferret *Mustela nigripes*	Endangered/ Experimental	Grasslands with active prairie dog towns.	Two hundred and fifteen (215) ferrets have been successfully reintroduced into the Coyote Basin since 1999. All active prairie dog towns, or a complex of towns large enough to support ferrets (at least 100 acres) within Duchesne and Uintah Counties, are considered potential black-footed ferret habitat.
Canada lynx *Lynx Canadensis*	Threatened	Montane coniferous forest.	The range of the Canada lynx extends from Canada and Alaska south to Maine, the Rocky Mountains, and the Great Lakes region. Although sightings of the Canada lynx in Utah over the past twenty years have been very rare, the Diamond Mountain area provides a linkage area between lynx habitat in the Uinta Mountains to that in the Colorado Rockies.
Mexican Spotted Owl *Strix occidentalis lucida*	Threatened	Steep rocky canyons; substantial suitable habitat is present, though no critical habitat is present.	The Mexican Spotted Owl (MSO) ranges from southern Utah and Colorado through the mountains of Arizona, New Mexico, and West Texas into the mountains of Central Mexico. They typically prefer old growth mixed conifer ponderosa pine, or evergreen oak forest, and associated deciduous riparian forests. In Utah, MSOs are a permanent resident that nest in the deep, sheer-walled, sandstone or rocky canyons of the Green and Colorado River basins. Forested habitats (old growth mixed conifer ponderosa pine, or evergreen oak forest, and associated deciduous riparian forests) are suitable for foraging and dispersal. There have been two reports of MSOs in the Book Cliffs.
Yellow-billed Cuckoo *Coccyzus americanus occidentalis*	Candidate (State-listed threatened)	Dense lowland riparian habitat at 2,500 to 6,000 feet elevation; usually found within 300 feet of water.	The Yellow-billed Cuckoo is a neotropical migrant that nests in localized riparian valleys throughout Utah. The Ouray Wildlife Refuge and other locations along the Green River sustain the largest breeding population of Yellow-billed Cuckoo in the State of Utah with an estimated 10 to 20 pairs.

Table 3.17.1. Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring in the VPA

Common Name Scientific Name	Protection (Federal/State)	Preferred Habitat	Potential for Occurring on BLM Lands
Bonytail *Gila elegans*	Endangered	The habitat requirements of the bonytail are not well known because the species was extirpated from most of its historic range prior to extensive fishery surveys. Critical habitat has been designated along the Green River in Uintah and Grand Counties.	The bonytail was historically common to abundant in warm-water reaches of larger rivers in the Colorado River Basin from Mexico to Wyoming. It is currently a very rare species in the Colorado River Basin, with only a few individuals having been found in the last decade. Very low numbers of bonytail still occur in the Upper Colorado River basin in Gray Canyon of the Green River and at Black Rocks on the Colorado River and at the confluences of the Green and Yampa rivers and the Green and Colorado rivers. The majority of bonytail are being held in culture facilities and reintroduction efforts are under way. Several thousand hatchery-reared bonytails have recently been reintroduced in the Colorado River near Moab and in the Green River at the confluence with the Yampa River.
Colorado pikeminnow *Ptychocheilus lucius*	Endangered	Adult Colorado pikeminnow use a variety of habitat types, depending on time of year, but primarily use shoreline runs, eddies, backwater habitats, seasonally flooded bottoms, and side canyons. Critical habitat has been designated for Colorado pikeminnow along the Green River in Uintah, Carbon, Emery, and Grand counties. This critical habitat includes the 100-year floodplain.	This species' range is restricted to the Upper Colorado River basin, upstream of Glen Canyon Dam. They are most abundant in the Upper Green River (between the mouth of the Yampa River and head of Desolation Canyon) and Lower Green River (between the Price and San Rafael rivers). Other concentration areas include the Yampa River, the lower 21 miles of the White River, the Ruby and Horsethief Canyon area between Westwater, Utah and Loma, Colorado, and in the San Juan River between Lake Powell and Shiprock, New Mexico.

Table 3.17.1. Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring in the VPA

Common Name Scientific Name	Protection (Federal/State)	Preferred Habitat	Potential for Occurring on BLM Lands
Humpback chub *Gila cypha*	Endangered	Suitable habitat for this species is characterized by a wide variety of riverine habitats, especially canyon areas with fast currents, deep pools, and boulder habitat. Adults require eddies and sheltered shoreline habitats maintained by high spring flows. Young require low-velocity shoreline habitats, including eddies and backwaters, that are more prevalent under base-flow conditions.	This species originally inhabited the mainstem of the Colorado River from what is now Lake Mead to the canyon areas of the Green and Yampa River basins. Currently, it appears restricted in the Upper Basin to the Colorado River at Black Rocks and at Westwater and Cataract Canyons, in the Yampa River at Yampa Canyon, and in the Green River at Desolation/Gray Canyons. In the Lower Basin, humpback chub are only found in the mainstem Colorado River in Marble and Grand Canyons and in the Little Colorado River. Critical habitat has been designated along the Green River in Uintah and Grand counties.
Razorback sucker *Xyrauchen texanus*	Endangered	Habitats required by adults include rivers with deep runs, eddies, backwaters, and flooded off-channel environments in the spring; runs and pools often in shallow water associated with submerged sandbars in summer; and low-velocity runs, pools, and eddies in winter. Young require nursery environments with quiet, warm, shallow water such as tributary mouths, backwaters, or inundated floodplain habitats in rivers, and coves or shorelines in reservoirs. Critical habitat for this species is the same as that of the Colorado pikeminnow.	Historically, the razorback sucker were widely distributed in warm-water reaches of larger rivers of the Colorado River Basin from Mexico to Wyoming, but is currently found in small numbers in the Green River, upper Colorado River, and San Juan River subbasins; lower Colorado River between Lake Havasu and Davis Dam; reservoirs of Lakes Mead and Mohave; in small tributaries of the Gila River Subbasin (Verde River, Salt River, and Fossil Creek); and in local areas under intensive management such as Cibola High Levee Pond, Achii Hanyo Native Fish Facility, and Parker Strip. The largest population of razorback sucker in the Upper Basin is found in the low-gradient, flat-water reaches of the middle Green River between the Duchesne River and Yampa River. Known spawning sites are located in the lower Yampa River and in the Green River near Escalante Ranch between river km 492 and 501.

Table 3.17.1. Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring in the VPA

Common Name Scientific Name	Protection (Federal/State)	Preferred Habitat	Potential for Occurring on BLM Lands
Barneby ridge-cress *Lepidium barnebyanum*	Endangered/NA	This species requires shallow, fine-textured soils intermixed with rock fragments. The Barneby ridge-cress is found along semi-barren ridges in piñon-juniper woodlands, at elevations ranging from 6,100 ft to 6,550 ft (1,860 m to 1,965 m).	There may be suitable habitat for this species on BLM lands, but there are no known populations (UDWR 2002b). The Barneby ridge-cress is located on the Uintah and Ouray Reservation, Utah. The VPA encompasses the total population, located on either side of Indian Creek south of Starvation Reservoir and the town of Duchesne. Three separate stands make up the total population, ranging across approximately five miles (8 km) (USFWS 1993).
White River beardtongue *Penstemon scariosus* var. *albifluvis*	Candidate/ NA	Occurs in pinyon-juniper, desert shrub, and mixed desert shrub communities at elevations ranging 4,600 to 6,800 feet elevation. Found at the lower members of the Green River Formation, growing on sparsely vegetated shale slopes.	White River beardtongue is currently known to occur on surficial outcrops of oil shale on 714 acres in southern Uintah County and southeast Duchesne County, Utah.
Clay reed-mustard *Schoenocrambe argillacea*	Threatened/ NA	Found on the contact zone between the upper Uinta and lower Green River Formations, typically at elevations ranging from 4,800 to 5,800 feet elevation. It inhabits mixed desert shrub communities of Indian ricegrass and pygmy sagebrush on the shale slopes of the Evacuation Creek Member of the Green River Formation. Plants may be found growing on protected north-facing slopes.	Three clay-reed-mustard populations of fewer than 10,000 individuals each are currently known to occur in the Book Cliffs, Uintah County, Utah. The species is known to occur on steep slopes and cliffs overlooking the Green River, Hill Creek and Willow Creek. Currently known populations occur within a 15 mi x 8 mi area (24 km x 12 km; 1,541 acres) along the Green River from Willow Creek to Sand Wash. Populations may also occur above Sand Wash and Nine Mile Canyon on steep slopes that are problematic for population counts and surveys.
Shrubby reed-mustard *Schoenocrambe suffrutescens*	Endangered/ NA	Found on the Evacuation Creek Member of the Green River Shale Formation on calcareous shales in pygmy sagebrush, mountain mahogany, juniper, and mixed desert shrub communities (5,400–6,000 feet).	The shrubby reed-mustard is currently known to occur on 3,150 acres in oil shale lenses in the Hill Creek drainage, Willow Creek drainage, and Badland Cliffs.

Table 3.17.1. Federally Listed Threatened, Endangered, and Candidate Species Potentially Occurring in the VPA

Common Name Scientific Name	Protection (Federal/State)	Preferred Habitat	Potential for Occurring on BLM Lands
Pariette cactus *Sclerocactus brevispinus*	Threatened/ NA (USFWS 2007)	Occurs on fine soils forming desert pavement in clay badlands derived from the Uinta Formation in sparse salt desert shrubland from 4,600 to 4,900 feet elevation	Occurs as a single population of approximately 8,000 individuals within a 50 square-mile (18,000 acre) area from the Pariette Drainage south of Myton, Utah to the mouth of Pariette Draw south or Ouray, Utah (USFWS 2006). The total area of potential habitat includes an estimated 15,000 acres of the VFO (USFWS 2007).
Uinta Basin hookless cactus *Sclerocactus wetlandicus*	Threatened/ NA (USFWS 2007)	Occurs on Quaternary and Tertiary alluvium soils overlain with cobbles and pebbles in cold desert shrub and pinyon-juniper communities on alluvial river terraces, valley slopes, and rolling hills of the Duchesne River, Green River, and Mancos Formations from 4,300 to 6,560 feet elevation.	The current population is estimated at 13,000-26,000 plants that are patchily to densely distributed from the confluence of the Green, White, and Duchesne Rivers near Ouray, Utah south along the Green River to the vicinity of Sand Wash, including concentrations near the mouth of Pariette Draw and along the base of the Badlands Cliffs (USFWS 1990, 2005; SWCA 2006, 2007; Glisson 2007; UDWR 2007).
Ute Ladies'-tresses *Spiranthes diluvialis*	Threatened/ NA	Wet meadow and other riparian habitats that are subject to fluvial erosion and deposition. May also be found near springs, seeps, and lakeshores where there is sufficient ground water. This plant can be found on various substrates in riparian habitats between 4,265 and 6,800 feet elevation.	Ute ladies'-tresses is found in sporadic locations throughout the interior western United States. Within the Uinta Basin, the Ute ladies'-tresses occurs along the Green River in Brown's Park (UT), Browns' Park (CO), Dinosaur National Monument, and near the confluence with the Yampa River. The species also occurs on Ashley Creek, within Ashley Valley, along Big Brush Creek, the upper Duchesne River, and tributaries to the Duchesne River.

3.17.1.3 STATE-LISTED WILDLIFE SPECIES AND BLM-LISTED SENSITIVE PLANT SPECIES

Both the BLM and State of Utah maintain lists of sensitive plant and animal species. The restricted distributions, specialized habitat requirements, and population pressures (human induced and natural) facing special status species contribute to a high potential for federal listing, thus, their populations are of conservation interest. The BLM Manual 6840 specifies that they will manage State-listed plants and animals "to the extent that they are consistent with other Federal laws". BLM policy for BLM-listed sensitive species is to manage the species as if they were candidate species for federal listing so that they do not become listed, while also fulfilling other federal law mandates. The BLM has a policy of entering into conservation agreements and other conservations measures to protect both State- and BLM-listed species.

There are 28 other special status species in the VPA that are listed in Table 3.17.2. This includes 14 wildlife, 4 fish, and 14 plant species. Of the 14 plant species, 13 species are soil endemics, which means that they are restricted to specific soil types. The dependence of these species on locally unique geological formations and soil parent materials make them particularly susceptible to habitat loss.

There are four bird, four fish, and one plant species that are dependent upon streams, rivers and associated wetlands. The remaining species are primarily upland species that have a variety of habitat requirements including grasslands, desert shrub, woodland, mature forest, and caves within forested areas.

Threats to sensitive species that could result in their listing as federally threatened or endangered species are similar to the threats experienced by listed species. These threats include sensitivity to human disturbance, poisoning, changes in flow regimes, loss of riparian wetlands, timber harvesting, restriction to unique soil or geologic formations, competition from non-native species, overgrazing, and habitat degradation or loss due to agricultural practices, oil and gas development, and/or urban encroachment.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
State-listed and BLM-listed Special Status Mammal Species			
Townsend's big-eared bat *Corynorhinus townsendii*	SP/SD	Forested areas; roosts and hibernates in caves, mines, and buildings.	The Townsend's big-eared bat is found throughout much of western North America including areas in the Uinta Mountains and the Book Cliffs. It is a cave-roosting species that move 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.
White-tailed prairie dog *Cynomys leucurus*	SP	Grasslands	White-tailed prairie dogs form colonies in parts of northeastern Utah, Colorado, Wyoming, and Montana. The white-tailed prairie dog is the main food source of the Utah population of the endangered black-footed ferret that were reintroduced to northeastern Utah. Major threats to the white-tailed prairie dog include habitat loss, poisoning, and disease.
State-listed and BLM-listed Special Status Bird Species			
American White Pelican *Pelecanus erythrorhynchos*	SD	Marshes, lakes, and rivers.	American White Pelicans summer in the interior of North America around major water bodies and winter along the shore of the Gulf Coast and Baja California. The species is extremely sensitive to human disturbance on its nesting grounds and is adversely impacted by loss of foraging habitat, environmental contaminants, and water level fluctuations. As many as 200 American white pelicans can be found between Pariette, Pelican Lake, and the Ouray National Wildlife Refuge during the spring and summer.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Bald Eagle *Haliaeetus leucocephalus*	CS	Riparian areas with tall trees.	Migratory Bald Eagles winter throughout the state in riparian, low-elevation forest, and desert habitats. There are several winter roosts along the Duchesne, Green and White Rivers and one nest on the White River a few miles upstream of the Colorado/Utah border. The species is recovering across its range, and it was recently proposed that the species be delisted. However, the number of nesting pairs in Utah has remained extremely low.
Bobolink *Dolichonyx oryzivorus*	SP/SD	Wet meadow, wet grassland, and irrigated agricultural areas.	The Bobolink was historically common but is now a rare nester in flooded grasslands and wet meadows of northern Utah. It summers in the northern regions of North America and winters in South America. Most of the birds migrate east of the Great Plains. The range of the Bobolink has decreased in Utah and across its entire range, because of habitat loss from drought and agricultural practices such as early season hay cutting, grassland conversion, and overgrazing. Habitat for the Bobolink occurs in the mid elevations of the VPA in the Uinta Mountains and the Book Cliffs and has been observed at the Pariette Wetlands.
Burrowing Owl *Athene cunicularia*	SP	Open grassland and prairies.	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. They depend on burrowing mammals for nest sites and are often associated with prairie dog colonies. 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. Habitat for burrowing owls occurs throughout the lower elevations of the Uinta Basin. Many of the areas where Burrowing Owls are nesting have been identified and mapped by VFO personnel.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Ferruginous Hawk *Buteo regalis*	Threatened	Grasslands, agriculture lands, sagebrush/saltbush/greasewood shrub lands, and at the periphery of pinyon-juniper forests. Nests in juniper trees, cliffs, buttes, and creek banks.	The Ferruginous Hawk 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. 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. Habitat for Ferruginous Hawk occurs in the lower and mid elevations of the VPA in the Uinta Mountains and the Book Cliffs and many of the active nest sites in the VPA have been identified and mapped. There are 271 known nesting sites in the VPA, 34 of which are currently active. Eighty-eight percent of these active and inactive nest sites have roads and pipelines within the ½-mile buffer established for these nest sites meant to limit surface-disturbing activities in close proximity to these nests.
Grasshopper Sparrow *Ammodramus savannarum*	SP/SD	Dry grasslands; characterized by short to mid-height clumps of grass with few to no shrubs.	The Grasshopper Sparrow is a neotropical migrant was considered to be historically abundant in the State of Utah; however, there are currently only a few known breeding sites in the grasslands of northern Utah. The Grasshopper Sparrow ranges over most of the United States during the summer and in the south and in Mexico during the winter. Much of this species' former habitat has been lost to agricultural and urban encroachment and overgrazing. These birds nest in semi-colonial groups in dry grasslands, characterized by short to mid-height clumps of grass with few to no shrubs. Habitat for Grasshopper Sparrow occurs in the grasslands of the Uinta Basin although there has been no documented occurrences in the VPA.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Greater Sage-grouse *Centrocercus urophasianus*	SP/SD	Sagebrush plains, foothills, and mountain valleys.	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. Habitat for Greater Sage-grouse occurs in the mid elevations of the VPA in the Uinta Basin and the Book Cliffs. Many studies have been conducted on Sage-grouse in Utah and in the Uinta Basin. One of the strongest populations in the State of Utah has been shown to occur on Diamond Mountain. Many of the active leks and nesting areas in the VPA have been identified and mapped.
Lewis' Woodpecker *Melanerpes lewis*	SP/SD	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 (cottonwood) forests. Dead trees and stumps are required for nesting. Wintering grounds are over a wide range of habitats, but oak woodlands are preferred.	The Lewis' Woodpecker is a year-round resident to western North America and, in Utah, is occasionally found in the riparian habitats of the Uinta Basin and along the Duchesne and Green Rivers. They breed in open Ponderosa Pine forests and cottonwood dominated riparian bottoms and winter primarily along low-elevation cottonwood dominated riparian bottoms. Nests have been found on the Green River, Lake Fork River, and in Ponderosa Pine forests on the Uinta Mountains. 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.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Long-billed Curlew *Numenius americanus*	SP/SD	Uncultivated rangelands and pastures near water.	The Long-billed Curlew is a neotropical migrant that summers in the upland meadows and rangelands of western North America. It forages in moist meadow wetlands and upland habitats. The curlew is adversely affected by human disturbance and habitat loss from agricultural practices. Habitat for long-billed curlew occurs in the mid elevations of the Uinta Mountains and the Book Cliffs and it has been observed in the VPA.
Northern Goshawk *Accipiter gentilis*	CS	Mature mountain forest and riparian zone habitats.	The Northern Goshawk is a neotropical migrant that occurs across the northern regions of North America in scattered populations primarily in mature mountain forest and valley cottonwood habitats. The species is adversely affected by loss of habitat from timber harvest and development in riparian areas. Because Goshawks occur in low-density populations, they are particularly susceptible to population loss. Goshawk populations appear to have declined across their range, particularly in the Colorado Plateau ecoregion. Areas of potentially suitable nesting habitat for Northern Goshawk consist of coniferous forest and mixed-aspen forest types, dominated by spruce, fir, pine, and aspen. Populations of Northern Goshawk have been identified in the mid elevations of the VPA in the Uinta Mountains and the Book Cliffs.
Three-toed Woodpecker *Picoides tridactylus*	SD	Coniferous forests, generally above 7,800 feet elevation.	The Three-toed Woodpecker nests and winters in northern coniferous forest and mixed-aspen forest types dominated by spruce, fir, pine, and aspen, usually above 7,800 feet elevation, in the northern regions of North America and the Rocky Mountains. Small populations have been located along the highest elevations of the Book Cliffs and possibly Diamond Mountain. The species is negatively affected by forest management practices such as clear cutting and fire suppression.
State-listed and BLM-listed Special Status Reptile Species			
Smooth greensnake *Opheodrys vernalis*	SP/SD	Moist grassy areas and meadows.	The smooth greensnake typically inhabits meadows, grassy marshes, and moist grassy fields along forest edges. Its distribution ranges from northeastern Utah into central Colorado and northern New Mexico, and into the Northern Plains from the Canadian border south to Kansas and Missouri.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
State-listed and BLM-listed Special Status Fish Species			
Bluehead sucker *Catostomus discobolus*	SP	Fast flowing water in high gradient reaches of mountain rivers.	The bluehead sucker are typically associated with fast flowing rocky riffles in higher gradient reaches of small to large rivers in the Colorado River drainage including the Green, White, and Duchesne rivers and their tributaries as well as in the Bonneville and Snake River basins. Flow alteration, habitat loss/alteration, and the introduction of non-native fish species have been identified as significant causes of the decline of this species.
Colorado River cutthroat trout *Oncorhynchus clarki pleuriticus*	CS	Cool, clear water of high-elevation streams and lakes.	There are 20 known populations of purestrain Colorado River cutthroat trout in northeastern Utah. Most existing populations of this species are restricted to areas above 7,000 feet elevation. These populations are being managed by the State of Utah under a multiagency conservation agreement aimed a reducing or eliminating the threats to this species (CRCT Task Force 2001). Habitat alteration and the introduction of non-native fish species have been identified as the primary threats to this species. UDWR currently has plans to reestablish Colorado River cutthroat trout in the Bitter Creek and Upper Willow Creek areas of the Book Cliffs. Habitat restoration activities have been ongoing and these areas will be chemically treated prior to reintroduction of Colorado River cutthroat trout to remove non-native fish species. The only existing population of Colorado River cutthroat trout on BLM lands in the VPA is found in Sears Creek (water code: II BQ).
Flannelmouth sucker *Catostomus latipinnis*	SP	Large rivers, where they are often found in deep pools of slow-flowing, low-gradient reaches.	Flannelmouth sucker are typically associated with rocky pools and slow flowing, low-gradient reaches in the large rivers of the Colorado River drainage including the Green, White, and Duchesne rivers. Flow alteration, habitat loss/alteration, and the introduction of non-native fish species have been identified as significant causes of the decline of this species.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Roundtail chub *Gila robusta*	Threatened	Large rivers, and is most often found in murky pools near strong currents.	Roundtail chub are found in moderate-sized rivers in the Colorado River drainage including the Green and Duchesne rivers. Adults are generally associated with pools and eddies with overhead cover, often congregating below rapids while juveniles generally inhabit shallower habitats than adults. Roundtail chubs are also found in large reservoirs in the drainage. They are carnivorous, opportunistic feeders, taking terrestrial and aquatic insects, especially midges, mayflies, and caddis flies, as well as snails, crustaceans, fish, and sometimes-filamentous algae. This fish was once much more common throughout the Colorado River system than it is today. Habitat modification (e.g., stream channelization, damming, removal of riparian vegetation) and establishment of non-native predators are probably the primary factors contributing to the decline of this species.
State-listed and BLM-listed Special Status Plant Species			
Park rockcress *Arabis vivariensis*	Sensitive	Occurs on the Weber Formation sandstone and limestone outcrops in mixed desert shrub and pinyon-juniper communities at 5,000 to 6,000 feet elevation.	The park rockcress is found in Dinosaur National Monument and on 30 acres on Diamond Mountain and Cliff Ridge.
Hamilton milkvetch *Astragalus hamiltonii*	Sensitive	Occurs on Asphalt Ridge, Mowry, Dakota and Wasatch Formations and Lapoint and Dry Gulch Members of the Duchesne Formation in pinyon-juniper and desert shrub communities at 5,240 to 5,800 feet elevation.	The Hamilton milkvetch is currently known from only 19 sites (329 acres) between Lapoint and Vernal, Utah.
Owenby's thistle *Cirsium owenbyii*	Sensitive	Occurs on the east flank of the Uinta Mountains in the sagebrush, juniper, and riparian communities at 5,500 to 6,200 feet elevation.	The Owenby's thistle is currently known from only a few sites in Brown's Park (53 acres), Diamond Mountain and Cliff RIdge.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Goodrich stinkweed (Cleomella palmeriana var. goodrichii)	Sensitive	Typically occurs in heavy clay soils on eroded clay and shale slopes of the Mancos, Tropic and Morrison Formations in salt desert shrub communities from 4,000 to 6,000 feet elevation.	Goodrich stinkweed is known only from Rainbow Draw in Uintah County, Utah and from the Salmon-Baker area in Lemhi County, Idaho. The size and distribution of extant populations is not known.
Untermann daisy *Erigeron untermanii*	Sensitive	Occurs in the pinyon-juniper communities on calcareous shales and sandstones of the Uinta and Green River formations at 7,000 to 7,800 feet elevation.	The Untermann daisy is an endemic to the West Tavaputs Plateau in Duchesne County, Utah.
Alcove bog-orchard *Habenaria zothecina*	Sensitive	Occurs on moist stream banks, seeps, and hanging gardens of the Weber Sandstone Formation in mixed-desert shrub, pinyon-juniper, and oakbrush vegetation communities from 4,000 to 8,690 feet elevation.	Potential alcove bog-orchid habitat occurs in Dinosaur National Monument and elsewhere in Uintah County. There are currently no confirmed populations within the VFO (personal communication between J. H. Hornbeck, SWCA, and Clayton Newberry, BLM, June 30, 2008).
Rock hymenoxys *Hymenoxys lapidicola*	Sensitive	Occurs on rock crevices in the pinyon-juniper woodland or ponderosa pine-manzanita woodland communities from 5,700 to 8,100 feet elevation.	The rock hymenoxys is endemic to Cliff Ridge in Uintah County, Utah and adjacent regions of Dinosaur National Monument.
Huber's pepperweed *Lepidium huberi*	Sensitive	Rock crevices, eroding parent material and alluvial soils of the Chinle, Park City and Weber Formations in the Uinta and Green River Formation in the Book Cliffs. 5,000-8,000 ft.	Huber's pepperweed is known to occur in Big Brush Creek Gorge in the Uinta Mountains and has the potential to occur on the Utah side of the East Tavaputs Plateau.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Goodrich blazingstar (Mentzelia goodrichii)	Sensitive	Occurs on steep, highly erosive, marly-calciferous shale escarpments of the Parachute Creek Member of the Green River Formation from 8,100 to 8,800 feet elevation.	Goodrich blazingstar is a narrow endemic of the West Tavaputs Plateau in southern Duchesne County, Utah. It is known from the escarpments of Argyle, Indian, Sowers and Willow Canyons, the margin of Avintaquin Canyon and Gray Head Peak, and adjacent regions in the Badlands Cliffs. The size and distribution of extant populations is not known.
Stemless penstemon *Penstemon acaulis*	Sensitive	Occurs on semi-barren substrates in pinyon-juniper and sagebrush-grass communities at 5,840 to 7,285 feet elevation.	The stemless penstemon is currently known from nine sites in Brown's Park, Daggett County, Utah.
Gibbens penstemon (Gibbens beardtongue) *Penstemon gibbensii*	Sensitive	Occurs on sandy and shaley (Green River Shale) bluffs and slopes with juniper, thistle, Eriogonum, Elymus, serviceberry, rabbitbrush, and Thermopsis at 5,500 to 6,400 feet elevation.	Gibbons penstemon is currently known at only one site (6 acres) in Brown's Park, Daggett County, Utah.
Goodrich penstemon (Goodrich beardtongue) *Penstemon goodrichii*	Sensitive	Occurs on the Duchesne River Formation on blue-gray to reddish bands of clay badlands at 5,590 to 6,215 feet elevation.	Goodrich penstemon is currently known from 24 sites in the Lapoint-Tridell-Whiterocks area.
Graham's beardtongue *Penstemon grahamii*	Sensitive	Occurs on gravelly clay soils in pinyon-juniper woodlands on semi-barren knolls of white calcareous shale in sparsely vegetated desert shrub and pinyon-juniper communities from 4,691 to 6,758 feet elevation.	Graham's Beardtongue is currently known to occur on 1,287 acres in East Duchesne and Uintah Counties, Utah.

Table 3.17.2. State-listed and BLM-listed Special Status Species Potentially Occurring in the VPA.

Common Name Scientific Name	Protection*	Preferred Habitat	Potential for Occurring on BLM Lands
Uinta greenthread (*Thelesperma caespitosum*)	Sensitive	Occurs on dry, poorly developed soils on shale or marl slopes and benches and multicolored clay hills of the Parachute Creek Member of the Green River Formation or the Uinta Formation in mountain shrub/pinyon-juniper woodland communities from 5,900 to 8,860 feet elevation.	Endemic to Sweetwater County, Wyoming and the West Tavaputs Plateau of the Uinta Basin, Duchesne County, Utah. The size and distribution of extant populations is not known.

*Protection:

CS: A species of concern being managed under a multi agency conservation agreement with the goal to keep the species from being federally listed.

Sensitive: Listed by the State of Utah, or BLM for plants, as a species sensitive to disturbance.

SD: Listed by the State of Utah as a species of special concern due to its limited distribution within the state.

SP: Listed by the State of Utah as a species of special concern due to declining population sizes within the state.

Threatened: Listed by the State of Utah as a species faced with substantial risk of extinction.

3.18 VEGETATION

3.18.1 DOMINANT VEGETATION COMMUNITIES

The vegetation on lands administered by the BLM within the VPA was mapped in conjunction with the Natural Resources Conservation Service (NRCS). Lands within the VPA under other jurisdictions were not analyzed. Because the soil associations were mapped to a minimum size of 50 acres, the designated vegetation associations only show changes in community types of a minimum of 50 acres as well, making the complex mosaic of natural vegetation not visible at this level of detail. The vegetation associations within the VPA were then classified using vegetation categories defined by the BLM and by GAP analysis (Edwards et al. 1996).

Vegetation across the VPA ranges from desert shrub to boreal forest. The following seven vegetation types are identified in the VPA: plains grassland/herbaceous, desert shrub, sagebrush/perennial grass, pinyon-juniper, mountain shrub, and conifer, which includes aspen/forb. Other minor vegetation/cover types are riparian areas and wetlands, and badlands. Descriptions of the identified vegetation types, including their associated plant species and general locations within the VPA, are provided below. The following associations occur intermixed throughout the VPA.

3.18.1.1 PLAINS GRASSLAND/HERBACEOUS

This vegetation type is dominated by herbaceous species and includes a few solitary shrubs. The plains grassland/herbaceous type is found in only a small portion of the VPA, but many of the species that compose it are found in the understory of the other associations. Most wildlife species use this area at some time during the year.

3.18.1.2 DESERT SHRUB

Vegetation of the desert shrub type typifies the cold desert environment. It composes approximately 20% of the VPA, mainly in the center of the planning area (e.g., Antelope Flat, Clay Basin, and half of the Myton Bench Area), and is located at the lower elevations from 4,800 to 6,000 feet. This type is characterized by shrubs such as shadscale, winterfat, Mormon tea, Gardner's saltbush, mat saltbush, four-winged saltbush, rabbitbrush, and greasewood (Table 3.18.1). The understory is sparse and may contain Indian ricegrass, galletta, scarlet globemallow, bud sagebrush, spring parsley, and textile onion. Soil salinity is relatively high.

Vegetation treatments or manipulations are not very successful in this type of community, due to the shallow soils and low moisture availability.

Table 3.18.1. Common Plants in the Desert Shrub Community in the VPA*

Scientific Name	Common Name
Shrubs	
Atriplex canescens	Four-winged saltbush
Atriplex confertifolia	Shadscale
Atriplex corrugata	Mat saltbush
Atriplex gardneri	Gardner's saltbush
Artemisia spinescens	Bud sage
Ceratoides lanata	Winterfat
Chrysothamnus spp.	Rabbitbrush species
Ephedra nevadensis	Mormon tea
Sarcobatus vermiculatus	Greasewood
Grasses and Forbs	
Agropyron dasystachyum var. *dasystachyum*	Thickspike wheatgrass
Allium textile	Textile onion
Arenaria spp.	Sandwort
Cymopterus spp.	Spring parsley
Eriogonum spp.	Buckwheat
Descurainia pinnata	Tansy mustard
Hilaria jamesii	Galleta
Phlox spp.	Phlox
Poa sandbergii	Sandberg bluegrass
Poa spp.	Bluegrasses
Sitanion hystrix	Squirreltail
Sphaeralcea spp.	Globemallow
Sporobolus airoides	Alkali sacaton
Stipa hymenoides	Indian ricegrass

*Plant names follow A Utah Flora (Welsh et al. 1993).

3.18.1.3 SAGEBRUSH/PERENNIAL GRASS

The sagebrush association covers approximately 57% of the VPA. This association is composed mainly of black sagebrush, basin big sagebrush, Wyoming big sagebrush, and mountain big sagebrush (Table 3.18.2). Other important shrubs are rabbitbrush, Mormon tea, and bitterbrush. Basin big sagebrush and Wyoming big sagebrush dominate the zone between 5,000 and 7,000 feet. Typically, the basin big sagebrush is found in areas of well-drained soils that receive 10-16 inches of annual precipitation, and Wyoming big sagebrush occupies drier, shallow soils that receive 8-12 inches of annual precipitation. Mountain big sagebrush is dominant in areas over 7,000 feet in elevation that receive 14-20 inches of annual precipitation (Welsh et al. 1993).

The herbaceous understory is typically composed of bluebunch wheatgrass, Idaho fescue, western wheatgrass, Junegrass, Indian ricegrass, and many needlegrasses. Many forbs also occur in this area and are an important resource for Sage-grouse. Common forb species include balsamroot, mules ears, Indian paintbrush, sego lily, larkspur, phlox, and mustards (Edwards et al. 1994).

Wyoming and mountain big sagebrush are declining throughout the VPA, as evidenced by the existing, decadent, even-aged stands. Beginning in the late 1990s, drought accelerated the decline, which resulted in a sage die off and die back. Some areas had sagebrush mortality while others had re-growth of sagebrush in subsequent years. Where sagebrush died and the understory was cheat grass, the density of cheat grass increased. The native perennial grassland understory has also been invaded by annual species such as cheatgrass; some invasions cover thousands of acres. Prescribed burning may be used to treat these areas, which would also benefit wildlife habitat and the wildland urban interface. The sagebrush association provides important wildlife habitat in the form of crucial winter range for deer and elk and essential habitat and forage for Sage-grouse. Domestic livestock grazing occurs in this association, as does recreation.

Table 3.18.2. Species Commonly Associated with Sagebrush/ Perennial Grassland Communities in the VPA*

Scientific Name	Common Name
Shrubs	
Artemisia nova	Black sagebrush
Artemisia tridentata ssp. *tridentata*	Basin big sagebrush
Artemisia tridentata ssp. *vaseyana*	Mountain big sagebrush
Artemisia tridentata ssp. *wyomingensis*	Wyoming big Sagebrush
Chrysothamnus viscidiflorus	Douglas rabbitbrush
Ceratoides lanata	Winterfat
Ephedra nevadensis	Mormon tea
Purshia tridentata	Antelope bitterbrush
Grasses and Forbs	
Astragalus spp.	Milkvetch
Balsamorhiza spp.	Balsamroot species
Brassica spp.	Mustards species
Calochortus nuttallii	Sego lily
Delphinium spp.	Larkspur species
Erigeron spp.	Fleabane species
Elymus cinereus var. *cinereus*	Great Basin wildrye
Elymus smithii	Western wheatgrass
Elymus spicatus	Bluebunch wheatgrass
Erysimum asperum	Wallflower
Festuca spp.	Fescue species
Koeleria macrantha	Junegrass

Table 3.18.2. Species Commonly Associated with Sagebrush/ Perennial Grassland Communities in the VPA*

Scientific Name	Common Name
Lupinus spp.	Lupine species
Phlox spp.	Phlox species
Stipa spp.	Needlegrass species
Stipa hymenoides	Indian ricegrass
Wyethia amplexicaulis	Mules ears

*Plant names follow A Utah Flora (Welsh et al. 1993).

3.18.1.4 PINYON-JUNIPER

This association occurs at slightly higher elevations than the sagebrush. Typically, there is a wide transition zone from juniper-sagebrush to juniper, so the boundaries between these associations are indistinct.

In the juniper-dominated areas, the understory's percent cover generally decreases. Therefore, this association has many management challenges. Vegetation manipulation, in the form of chaining and prescribed burns, has been used in the past. (In the 1960s and 1970s, 11,600 acres in the VPA were chained and reseeded successfully, and in the 1980s, chaining occurred in Wood Canyon in the Nine Mile area and in Browns Park.) Through vegetation manipulation, openings that are beneficial to wildlife and ecosystem health can be created. Dense stands of juniper provide high-quality nesting habitat and thermal cover, but little forage value. Many more animal species can use this association if the juniper stands have a varied age class and structure. Common plant species in this association are shown in Table 3.18.3.

Table 3.18.3. Species Commonly Associated with Pinyon-Juniper Communities in the VPA*

Scientific Name	Common Name
Trees	
Pinus edulis	Pinyon pine
Juniperus osteosperma	Juniper
Shrubs	
Artemisia tridentata ssp. *tridentata*	Basin big sagebrush
Chrysothamnus spp.	Rabbitbrush species
Ceratoides lanata	Winterfat
Ephedra nevadensis	Mormon tea
Grasses and Forbs	
Astragalus spp.	Milkvetch species
Erigeron spp.	Fleabane species
Elymus cinereus var. *cinereus*	Great Basin wildrye

Table 3.18.3. Species Commonly Associated with Pinyon-Juniper Communities in the VPA*

Scientific Name	Common Name
Elymus smithii	Western wheatgrass
Erysimum asperum	Wallflower
Festuca spp.	Fescue species
Koeleria macrantha	Junegrass
Lupinus spp.	Lupine species
Phlox spp.	Phlox species
Stipa hymenoides	Indian ricegrass

*Plant names follow A Utah Flora (Welsh et al. 1993).

3.18.1.5 MOUNTAIN SHRUB

This association is sometimes called browse, because a large proportion of the species in this association are of high forage and cover value for wildlife. Dominant shrub species include serviceberry, gamble oak, mountain mahogany, snowberry, squaw apple, antelope bitterbrush, and sagebrush (Table 3.18.4). The sagebrush may occasionally grow densely in areas, but generally, it is less than 50% of the overall composition in this association. Common herbaceous species include showy goldeneye, whorled buckwheat, hoary aster, sticky geranium, and a variety of native grasses. Mountain shrub occurs in more sheltered microclimates within the VPA than the sagebrush/perennial grass association.

Table 3.18.4. Species Commonly Associated with Mountain Shrub Communities in the VPA*

Scientific Name	Common Name
Shrubs	
Artemisia tridentata	Sagebrush
Ceanothus spp.	Buckbrush species
Cercocarpus montanus	Mountain mahogany
Amelanchier spp.	Serviceberry species
Purshia tridentata	Antelope bitterbrush
Quercus gambelii	Gamble oak
Ribes cereum	Wax currant
Symphoricarpos oreophilus	Mountain snowberry
Grasses and Forbs	
Agastache urticifolia	Hyssop
Delphinium spp.	Larkspur species
Elymus glaucus	Blue wildrye
Elymus trachycaulus	Slender wheatgrass
Eriogonum heracleoides	Whorled buckwheat

Table 3.18.4. Species Commonly Associated with Mountain Shrub Communities in the VPA*

Scientific Name	Common Name
Eriogonum spp.	Buckwheat species
Erigeron spp.	Fleabane species
Festuca spp.	Fescue species
Geranium viscosissimum	Sticky geranium
Viguiera multiflora	Showy goldeneye
Mahonia repens	Oregon grape
Machaeranthera canescens	Hoary aster
Lupinus spp.	Lupine species
Phlox spp.	Phlox species
Poa spp.	Bluegrass species
Penstemon spp.	Penstemon species
Senecio spp.	Groundsel species
Stipa spp.	Needlegrass species
Trifolium spp.	Clover species

*Plant names follow A Utah Flora (Welsh et al. 1993)

3.18.1.6 CONIFER FOREST: CONIFER/ASPEN, ASPEN/FORB, AND SPRUCE/FIR

These three smaller vegetation associations combine to form the conifer forest association. The conifer forest association occurs at the highest elevations, mostly at the outer fringes of the VPA, covering approximately 4% of the total land area within the VPA. Douglas fir, spruce, ponderosa pine, and aspen communities are scattered throughout the higher elevations (7,500–10,500 feet). Because of the elevation, cheatgrass is not a significant threat. Elk, deer, and grouse frequently use this association in the summer. Domestic livestock also use this association for its forage and cover resources. Common species are shown in Table 3.18.5.

Table 3.18.5. Species Commonly Associated with Conifer Forest Community in the VPA*

Scientific Name	Common Name
Trees	
Pseudotsuga menziesii	Douglas fir
Abies spp.	Fir species
Picea spp.	Spruce species
Pinus ponderosa	Ponderosa pine
Pinus spp.	Pine species
Populous tremuloides	Quaking aspen
Shrubs	
Ribes spp.	Currant species

Table 3.18.5. Species Commonly Associated with Conifer Forest Community in the VPA*

Scientific Name	Common Name
Rosa woodsii	Wood rose
Salix spp.	Willow species
Sambucus pubens	Elderberry
Symphoricarpos oreophilus	Snowberry
Grasses and Forbs	
Achillea millefolium	Western yarrow
Aquilegia coerulea	Columbine
Delphinium occidentale	Tall larkspur
Elymus trachycaulus	Slender wheatgrass
Frasera speciosa	Green gentian
Festuca spp.	Fescue species
Geranium spp.	Geranium species
Heracleum lanatum	Cow parsnip
Melica bulbosa	Oniongrass
Lupinus spp.	Lupine species
Mertensia spp.	Bluebell species
Phleum alpinum	Alpine timothy
Stipa spp.	Needlegrass species

*Plant names follow A Utah Flora (Welsh et al. 1993).

3.18.1.7 RIPARIAN AREAS AND WETLANDS

Approximately 16,000 acres of floodplains are found along the Green and White Rivers and Bitter, Evacuation, Sweetwater, and Willow Creeks in the Book Cliffs portion of the VPA. The Diamond Mountain portion of the VPA contains 15,650 acres of riparian areas as well as perennial and intermittent streams (BLM 1993b).

The ecological condition of the wetland and riparian areas in the VPA is considered to be threatened by flow alterations, non-native plant species, and grazing. Whitetop and tall whitetop are firmly established in the Green River watershed and in moist places that receive high pressure from recreation. Tamarisk is also well established along the river corridors, and *Phragmites* stands are increasing in size and distribution.

3.18.1.8 BADLANDS

In the Uinta Basin, badlands are characterized by Mancos shales, which occur as red and gray banded, eroded mudstones and sandstones and shale layers of the Uinta Formation. Mancos shales are high in selenium, and sometimes they have a sandstone cap layer. The badlands association is scattered throughout the resource area, but it comprises only 3% of the total area.

Vegetation on the badlands is very sparse; extensive areas of bare ground occur. Vegetation generally grows in areas where water can collect and at the base of slopes. A few annuals are tolerant of the side slopes in wet years, but such seasons are short. Gardner's saltbush and mat saltbush are the dominant species.

Antelope use these areas for forage and bedding, especially in the winter. Domestic sheep use the shrubs on the base slopes and in transition zones with other vegetation types. Some steeper, vertical slopes and knobs are used by raptors for nest sites. Wildlife use of this community is low in comparison to other communities, but it is relatively important to the wildlife that do use it.

3.18.2 INVASIVE SPECIES AND NOXIOUS WEEDS

At least 23,000 acres of noxious and undesirable weeds are a management concern, spreading and becoming a common threat to many areas, within the VPA (BLM 2001). Many large infestations in the area also occur on private and Tribal lands adjacent to or near BLM lands. Of particular management concern are potential and existing populations of invasive species in the oil and gas fields that are receiving increased activity and interest. Human activities, OHV use and vehicles, construction activities, soil disturbance, wind, wildlife movement, and domestic livestock grazing activities can increase the spread and establishment of noxious weeds.

Noxious weeds are identified and recognized by the federal government, the state, and local counties. Within the VPA, the BLM office would control all weeds designated as noxious, as per regulations. For a list of the noxious weeds for the VPA, refer to Table 3.18.6.

The Upper Green River Cooperative Weed Management Area, which includes Daggett County in Utah and Sweetwater County in Wyoming, was formed to manage weeds across lands under various jurisdictions and to pool resources for weed control activities and education. The Uinta Basin Cooperative Weed Management Area was organized in 2003 to meet similar objectives. Current collaborative weed management agencies include the NPS, BLM, USFS, UDWR, Ute Tribe, and SITLA. One result of collaborative efforts is the Red Creek Tamarisk Project. The tamarisk is being controlled both in Wyoming and Utah on the Red Creek watershed.

Russian knapweed, spotted knapweed, Canada thistle, tall whitetop, whitetop, musk thistle, Scotch thistle, and leafy spurge have been singled out as the most invasive species and have become the priority for management and control due to their expanding populations on BLM lands in the VPA. Russian knapweed occurs from Myton to Browns Park with large infestations on private and Tribal lands in the Roosevelt area and the Green River corridor. Also of concern are the increasing populations of Russian knapweed in the oil and gas fields. So far, two populations of spotted knapweed are known: one is located on Diamond Mountain, the other on Blue Mountain. An infestation of diffuse knapweed was located on Blue Mountain, resulting in a special emphasis area for control. One infestation of leafy spurge occurs on BLM lands; however, there are also populations on nearby private land. Canada thistle is a problem in moist areas, especially where livestock use is prevalent. Scotch thistle is coming in as patches scattered throughout the VPA. Whitetop is a problem scattered across the VPA and is increasing in the oil and gas fields. Tall whitetop has major infestations on all land ownerships in all three counties, especially in the Green River corridor.

Henbane and houndstongue are undesirable plants that are targeted by the BLM for control on the VPA due to the increased infestations on native rangelands. These species are prevalent in the Argyle Ridge area, and Nine Mile Canyon. In the Book Cliff portion of the VPA they are prevalent on Seep Ridge and in the Willow Creek watershed. Henbane is a threat in the Browns Park area due to heavy infestations in Wyoming, where it is not controlled.

Russian thistle, halogeton, and cheatgrass are undesirable weed species that occur throughout the Uinta Basin, Clay Basin, and Browns Park. These three plants are already heavily established along the roadsides, and the populations increase with oil field development. Cheatgrass has become so widespread that control efforts are focused on reducing its density through large-scale habitat manipulation programs, and not by individual sprayings. In 1992, a cheatgrass inventory identified 55,700 acres as having greater than 60% cheatgrass cover, and 162,000 acres were identified as having 10-60% cheatgrass cover. The cheatgrass infestation in the VPA has increased and is a major management concern.

Tamarisk has effectively established itself along all the riparian ecosystems, as well as in patches where moisture accumulates in the desert shrub and sagebrush/grass communities. Some control has been gained over the tamarisk infestations via herbicide use in Red Creek and Browns Park. Some areas of tamarisk within Utah are currently protected as designated critical habitat for the federally endangered southwestern willow flycatcher, which further complicates its management. However, it should be noted that the VPA does not contain designated critical habitat for the southwestern willow flycatcher. Tamarisk was listed as a county noxious weed in Uintah County as of 2003.

Table 3.18.6. Noxious Weeds and Undesired Plant Species

Common Name	Scientific Name	Status	Known Distribution
Bermudagrass	*Cynodon dactylon*	State Noxious Weed	No populations known at this time
Dyer's woad	*Isatis tinctoria*	State Noxious Weed	Found on private land in Duchesne and Uintah Counties
Field bindweed (wild morning glory)	*Convolvulus arvensis*	State Noxious Weed	Occasional. Heavy infestations in farm and city lands
Johnsongrass	*Sorghum halepense*	State Noxious Weed	No populations known at this time
Knapweed, diffuse	*Centaurea diffusa*	State Noxious Weed	One population on Blue Mountain
Knapweed, Russian	*Centaurea repens*	State Noxious Weed	Heavy infestations especially in Pelican Lake area, Green River, Browns Park and adjacent lands to Myton, to Roosevelt. Increasing in the oil and gas fields
Knapweed, spotted	*Centaurea maculosa*	State Noxious Weed	Known populations on Diamond Mountain and Blue Mountain

Table 3.18.6. Noxious Weeds and Undesired Plant Species

Common Name	Scientific Name	Status	Known Distribution
Knapweed, squarrose	*Centaurea squarrosa* or *Centaurea virgata*	State Noxious Weed	No populations known at this time
Leafy spurge	*Euphorbia esula*	State Noxious Weed	Small population on ditch area, some on private lands
Medusahead	*Taeniatherum caput-medusae*	State Noxious Weed	No populations known at this time
Purple loosestrife	*Lythrum salicaria*	State Noxious Weed	Coming into east Duchesne County. No populations known on BLM lands at this time
Quackgrass	*Agropyron repens* or *Elytrigia repens*	State Noxious Weed	Occasional
Tall whitetop (perennial pepperweed)	*Lepidium latifolium*	State Noxious Weed	Very prevalent along all riparian areas and moist patches
Canada thistle	*Cirsium arvense*	State Noxious Weed	Scattered along riparian areas
Musk thistle	*Carduus nutans*	State Noxious Weed	Scattered
Scotch thistle (cotton thistle)	*Onopordum acanthium*	State Noxious Weed	Scattered
Whitetop (hoary cress)	*Cardaria draba*	State Noxious Weed	Very prevalent along all riparian areas and moist patches
Yellow starthistle	*Centaurea solstitialis*	State Noxious Weed	No populations known at this time
Russian olive	*Elaeagnus angustifolia*	Duchesne and Uintah County Noxious Weed	Scattered along riparian areas
Salt cedar	*Tamarix ramosissima*	State Noxious Weed	Riparian areas, seeps, springs, wetlands, wash beds & wash banks, roadsides, stock ponds, occasionally in open areas with high water table
Other Undesirable Plant Species			
Black henbane	*Hyoscyamus niger*	Undesired Plant Species	Very prevalent in Book Cliffs, Nine Mile Canyon, and Argyle
Bull thistle	*Cirsium vulgare*	Undesired Plant Species	Occasional
Buffalobur	Solanum *rostratum*	Undesired Plant Species	No populations known at this time
Camelthorn	*Alhagi camelorum*	Undesired Plant Species	Occasional
Common cocklebur	*Xanthium strumarium*	Undesired Plant Species	Occasional

Table 3.18.6. Noxious Weeds and Undesired Plant Species

Common Name	Scientific Name	Status	Known Distribution
Common crupina	*Crupina vulgaris*	Undesired Plant Species	No populations known at this time
Goat's rue	*Galega officinalis*	Undesired Plant Species	No populations known at this time
Jointed goatgrass	*Aegilops cylindrica*	Undesired Plant Species	No populations known at this time
Low larkspur	*Delphinium nuttallianum*	Undesired Plant Species	No populations identified for control. Common native plant
Poison hemlock	*Conium maculatum*	Undesired Plant Species	No populations known at this time
Poverty weed	*Iva axillaris*	Undesired Plant Species	Occasional
Purple starthistle	*Centaurea calcitrapa*	Undesired Plant Species	No populations known at this time
Silverleaf nightshade	*Solanum elaeagnifolium*	Undesired Plant Species	No populations known at this time
St. John's wort	*Hypericum perforatum*	Undesired Plant Species	No populations known at this time
Velvetleaf	*Abutilon theophrasti*	Undesired Plant Species	No populations known at this time
Water hemlock	*Cicuta douglasii*	Undesired Plant Species	No populations identified for control. Common native plant
Wild proso millet	*Panicum miliaceum*	Undesired Plant Species	No populations known at this time
Yellow nutsedge	*Cyperus esculentus*	Undesired Plant Species	No populations known at this time
Toadflax, Dalmatian	*Linaria dalmatica*	Undesired Plant Species	No populations known at this time
Toadflax, yellow	*Linaria vulgaris*	Undesired Plant Species	One population known in Chipita
Whorled or poison milkweed	*Asclepias subverticillata*	Undesired Plant Species	Occasional
Halogeton	*Halogeton glomeratus*	Undesired Plant Species	Numerous infestations
Cheatgrass	*Bromus tectorum*	Undesired Plant Species	Numerous major infestations
Houndstongue	*Cynoglossum officinale*	Undesired Plant Species	Very prevalent in Book Cliffs, Nine Mile Canyon, and Argyle
Common teasel	*Dipsacus fullonum*	Undesired Plant Species	Becoming common along Upper Green River

3.19 VISUAL RESOURCES

The current management objective for visual resources is to manage the public lands in such a way as to preserve those scenic vistas that are deemed most important and to design or mitigate all visual intrusions so that the intrusions do not exceed the established Visual Resource Management (VRM) class objectives. Activities within the VPA that could potentially cause visual intrusions and have an impact on scenic quality are primarily surface-disturbing activities, including minerals exploration and development, OHV use, trail and/or road development, and fire management.

3.19.1 VISUAL RESOURCE MANAGEMENT (VRM) CLASSES

The BLM uses the VRM system to inventory, manage, and set objectives for visual resources. The VRM system uses visual management classes (Class I through IV, Class I and Class II being the most protective) to designate permissible levels of landscape alteration, with the broad goal of protecting the visual quality of public lands. The assignment of VRM classes is based on the management decisions made in the RMP. All actions proposed during the RMP process that would result in surface disturbance must consider the importance of the visual values and the impacts that proposed actions could have on these values. The VRM class objectives are described in Appendix J. However, a brief summary of the VRM classes objectives are: VRM Class I: preserve the existing character of the landscape; VRM Class II: retain the existing character of the landscape with a low level of landscape change; VRM Class III: partially retain the existing character of the landscape with only moderate change to the landscape: VRM Class IV: major modifications are allowed to the existing character of the landscape, and the level of change can be high.

An area is assigned a VRM class objective based on its scenic quality, the level of visual sensitivity of the area, and the viewing distance of the area. Once an area has been assigned a VRM class, the area classification can be used to determine the impacts of proposed activities on visual resources and to analyze the level of disturbance that an area can tolerate before the proposed activity exceeds the VRM objectives for the area (BLM 1992).

3.19.2 REGIONAL OVERVIEW

The entire VPA has been visually inventoried and classified according to the VRM classification system. As the VPA is located in the Uinta Basin, its visual quality is diverse, ranging from areas that are visually homogeneous to areas with unique and spectacular visual quality. The areas of highest scenic quality are found along the Book Cliffs, in the Bitter Creek Drainage, along portions of the White and Green River corridors, within the Browns Park ACEC, in the vicinities of Red Mountain and Diamond Mountain, and areas that border Dinosaur National Monument (Bartel 2002; see Figure 32 in the Maps section).

Areas being managed as VRM Class I include: Winter Ridge, Bull Canyon, West Cold Springs, Diamond Breaks, and Daniels Canyon WSAs, and the Book Cliffs Mountain Browse Natural Area/Instant Study Area (ISA).

Areas being managed as VRM Class II are: Nine Mile Canyon, the Upper Book Cliffs, the White River Corridor, the Upper Green River and the Green River Corridor from Dinosaur National Monument to State Highway 40, and Red Mountain-Dry Fork ACEC.

The remainder of the VPA is being managed as either VRM Class III or VRM Class IV.

Throughout the VPA, unmanaged OHV use is visually evident which, although localized, is long-term. New roads and trails are being created by OHV use, and OHVs are cutting trails across and over highly visible ridgelines. At present, the only area managed for OHV use is near Fantasy Canyon (including Devils Playground). The areas of highest OHV use (and corresponding visual degradation) are:

1. in the vicinity of Buckskin Hills, north of the town of Vernal;
2. an area to the north of Red Wash, in the vicinity of Bourdette Draw; and
3. an area south of the Bonanza Power Plant and north of the White River corridor.

Throughout the VPA, the rapid increase of petroleum and natural gas exploration and extraction are also visually evident. However, through visual mitigation and careful placement of drilling well pads, this development is not presently exceeding VRM class objectives.

The proximity of intense exploration and development near areas of high scenic quality and the increasing number of people seeking recreation in the VPA are creating resource-use conflicts, particularly in the White River corridor and the Book Cliffs Divide.

3.20 WILD HORSES

This section describes the affected environment concerning wild horses in the Bonanza Herd Area (HA), the Hill Creek HMA, and the Winter Ridge Herd Area (HA). Approximately 2,340 animal unit months (AUMs) are currently allocated to support 195 horses in the Hill Creek Herd Area. No forage has been allocated for horses in the Bonanza Herd Area and the Winter Ridge Herd Area.

3.20.1 BONANZA HERD MANAGEMENT AREA

In 1984, the wild horse population in the Bonanza Herd Area was estimated at approximately 40 horses (BLM 1985a). Prior to completion of the 1985 Book Cliffs RMP, plans were discussed to limit the herd to approximately 50 horses. However, the final decision was to remove all wild horses because of management conflicts. The rationale for the decision was based on unresolved conflicts associated with the manageability and protection of the horses. There was a perception that the horses could not be managed to achieve and maintain a thriving natural ecological balance, as required by the Wild Horse and Burro Act (BLM 2001).

In 1986, the BLM conducted a wild horse gather within the Bonanza HA. The Ute Tribe filed a complaint alleging ownership of the gathered horses. A national organization, Wild Horse Organized Assistance (WHOA), notified the BLM that if all of the horses were removed they

would bring suit against the BLM, citing as precedent an Interior Board of Land Appeals decision disallowing total removal from a herd area in Nevada. Consequently, the horses removed during the 1986 gather were returned to the Ute Tribe, based on Consent Decree 86-C-0821G issued by the United States District Court, Central Division. In turn, the Ute Tribe relinquished all claims on 13 wild horses within the herd area that had not been gathered. As part of the court order, and at the intercession of WHOA, the Ute Tribe agreed to deliver 26 unbranded wild horses to the BLM from the Pyramid Lake Paiute Reservation in Nevada. These horses were subsequently released into the Bonanza HA.

In 1998, as a result of detection of equine infectious anemia (EIA) disease in horses gathered by the Ute Tribe from lands adjacent to the HA, the BLM, the Animal Plant Health Inspection Service (APHIS), the Utah Department of Agriculture and Food, and the Ute Tribe entered into an agreement to gather and test all horses in the Uinta Basin, including the Bonanza horses, for EIA. In 1999, the BLM gathered the Bonanza wild horses and tested them for EIA. Some wild horses tested positive for EIA, were subsequently disposed of, and in June 2000, 72 disease-free horses were returned to the HA.

As mentioned above, in July 2001 the Book Cliffs RMP decision regarding the Bonanza HA was amended. The amended plan established the herd area as a herd management area (HMA) and provided guidelines for the long-term management of wild horses at an appropriate management level (AML) of 85 horses. However, the Bonanza herd (at a population of 92 individuals) was gathered in November 2001 to comply with a court order, which required the BLM to remove all of the wild horses from the HMA. The horses were placed either in the BLM's Adopt-A-Horse program or in sanctuaries.

Approximately 16 miles of the western boundary of the Bonanza HA (fenced) abuts the Uintah and Ouray Indian Reservation.

3.20.2 WINTER RIDGE HERD AREA

According to the 1985 Book Cliffs RMP, the Winter Ridge wild horses were to be gathered and removed; however, the decision has not been implemented. The rationale for the 1985 decision to remove this herd was that the area might not be suitable habitat for wild horses. Because of the high elevation of the area, deep snow (24-40 inches annually) can accumulate during the winter months, putting a wild horse herd in this area at risk. In 2003, 40 wild horses were gathered and removed from the Winter Ridge Herd Area to ease stress on native rangelands caused by grazing and to maintain the well-being of the wild horses remaining in the area.

This herd area is bordered by state grazing allotments that permit domestic horses to graze. Currently, there is little or no fencing between the state and federal allotments. Should Winter Ridge be designated as an HMA, a fenceline agreement may need to be negotiated between the state, the permittee, and the BLM to minimize possible trespass situations between wild and domestic horses, or the BLM may need to negotiate with the state of Utah to eliminate domestic horses from those adjacent state allotments.

3.20.3 HILL CREEK HERD MANAGEMENT AREA

The Hill Creek Extension of the Uintah and Ouray Indian Reservation separates the Hill Creek HMA into two parts: the northwestern and the southeastern.

In 2001, lands within the northwestern part, known as Naval Oil Shale Reserve Number 2 (NOSR-2) lands, were transferred to the Ute Tribe. Until the date of transfer, the BLM managed the surface resources on these lands, including wild horses, but the transfer allowed the Ute Tribe to manage, protect, and assert control over any horse located or found within the boundary of this parcel. The northern boundary of the transferred parcel is unfenced, so wild horses and Tribal horses, particularly those on either side of the unfenced boundary have been intermingling. Tribal and wild horses can potentially intermingle even in areas where fences exist: most existing fences are in need of maintenance or replacement.

As a result of the transfer of the NOSR-2 lands, the Hill Creek HMA can no longer be managed as one unit without greatly impacting Tribal lands. Thus, for the purposes of analysis in the VPA, the Hill Creek HMA will be considered as two herd areas: 1) Hill Creek Northwest/Wild Horse Bench and 2) Hill Creek Southeast/Agency Draw.

3.20.3.1 HILL CREEK NORTHWEST/WILD HORSE BENCH

The transfer of the NOSR-2 lands to the Tribe resulted in the reduction of the HMA by 48,000 acres, or approximately 35%. This part of the HMA was estimated to contain approximately 50-60% of the total wild horse habitat. In the Wild Horse Bench portion of the Hill Creek Herd Area is a resident herd of approximately 100 horses, composed of several bands.

Livestock grazing within the HMA has been permitted to the Ute Tribe, although the Tribe has not used this allotment for over twenty years. The livestock grazing allotment is called Lower Showalter.

Wild horses are also currently using an area north of and adjacent to the HMA, bordered on the east by Tribal Lands and on the west by the Green River. Comprising approximately 30,347 acres, the horses have established home ranges there. Up until now, the area has not been considered crucial to the long-term survival of the herd and was not included in the original delineation of the HMA (BLM 1983a).

3.20.3.2 HILL CREEK SOUTHEAST/AGENCY DRAW

This portion of the Hill Creek HMA comprises approximately 55% private land (owned by Utah Oil Shale Corporation), 35% BLM land, and 10% state land. Maintaining wild horses in an area in which 65% of the land is in non-federal ownership could severely limit the ability of the BLM to manage them. If the BLM were requested to remove the wild horses from the private and state land, Southeast/Agency Draw would essentially be split into two parts. However, in the past, these two owners have not objected to wild horses grazing their land.

The HMA is bordered on the south by Tribal lands. In this area, horses move freely between public and Tribal lands. As Tribal lands are higher in elevation, during the winter season, horses tend to move from Tribal lands in the south onto public lands to the north. As a result of this seasonal migration, winter census counts for the HMA are typically two to three times higher than late summer counts (150-170 horses in winter, compared to 40-50 in summer). During the summer, the few springs and ponds in the herd area provide only enough water to support a resident herd of 40-50 horses, and so the majority of the horses move back to the Tribal land at that time. The population estimate for BLM/Tribal horses that use this portion of the HMA is presently unknown. The BLM and the Tribe gathered over 510 horses from this general area in 2002–2003 because drought conditions were negatively impacting the herds and range conditions.

Similar to horses in the Wild Horse Bench area, horses in the Agency Draw area are also using land outside the herd area boundary. This 22,865-acre area, Big Pack Mountain, has not been considered crucial to the long-term survival of the herd and was not included in the original delineation of the HA (BLM 1983a). Big Pack Mountain is bordered on its other three sides by private or Tribal lands.

3.21 WILDLIFE AND FISHERIES RESOURCES

The terrestrial wildlife species found in the VPA are typical of the intermountain region of the United States. These species include big game species such as mule deer, Rocky Mountain elk, pronghorn antelope, bighorn sheep, moose, black bear, and mountain lion. Additional species of concern in the VPA fall within the general categories of upland game species, raptors, waterfowl and shorebirds, fish and aquatic species, neotropical migrants, and small mammals and reptiles. Wildlife resources in the VPA are currently managed as directed by the Diamond Mountain RMP and Book Cliff RMP. These RMPs focus on managing habitat conditions instead of wildlife populations. Management goals for most wildlife populations in the VPA are determined primarily by UDWR, with the exception of federally protected wildlife populations, which are determined by USFWS. The current VPA RMPs allocate forage for elk, deer, and antelope. Additionally the Diamond Mountain RMP allocates forage for moose and bighorn at the level identified by the UDWR's prior stable numbers and long-term wildlife population management goals. Resource allocations for raptors, reptiles, amphibians, and other non-game species in the VPA are limited to protecting individuals and the habitat of state and federally listed species, and designating spatial and temporal buffers for nesting raptors.

The BLM's management of wildlife habitat in the VPA has had, and will continue to have, an impact on both local communities and those that exist outside of the Uinta Basin. There is considerable regional interest in the overall condition and management of the VPA. 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 VPA, 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 VPA 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 VPA.

The UDWR has designated five wildlife management units within the VPA to aid in the management of these wildlife species. Seventy-six percent of Unit 17 (Wasatch Mountains) is located outside of the VPA. Of the remaining lands within the VPA designated part of this unit, the BLM administers only 1,245 acres, therefore, the wildlife management goals and objectives relative to this unit were not included in this analysis. The remaining four wildlife management units, and their sub-units, are outlined in Table 3.21.1. UDWR has developed, or is presently developing, wildlife management plans for the aforementioned big game wildlife species as well as fisheries and upland game populations.

Table 3.21.1. Wildlife Management Units within the VPA

Unit/Sub-unit number	Unit/Sub-unit name	Acres of Unit in the VPA	Acres of Unit in the VPA Managed by BLM
8,	North Slope Uinta Mountains	365,651	62,528
8b	West Daggett		(17% of Unit)
8c	Three Corners		
9	South Slope Uinta Mountains	2,775,395	711,092
9a	Yellowstone		(26% of Unit)
9b	Vernal		
9c	Diamond Mountain		
9d	Bonanza		
10	Book Cliffs	1,225,726	652,440
10a	Bitter Creek and Little Creek		(53% of Unit)
11	Nine Mile	706,163	296,756
11a	Anthro		(42% of Unit)

3.21.1 WILDLIFE ASSOCIATED WITH THE VPA

3.21.1.1 MULE DEER

Mule deer occupy most ecosystems in Utah but generally attain their greatest densities in shrublands in areas characterized by rough, broken terrain and abundant browse and cover. Many mule deer populations migrate between summer and winter ranges. Mule deer summer range habitat types on BLM-administered lands in the VPA consist primarily of oak, sagebrush, Douglas fir, and Utah juniper vegetation types. Winter range habitat primarily consists of Utah juniper, prickly pear, sagebrush, galleta, greasewood, and Fremont cottonwood vegetation types. Areas of high winter use in the Book Cliffs included areas of open pinyon/juniper woodland interspersed with four-wing saltbush and sagebrush in Lower McCook Ridge, Indian Ridge, and Big Park (Karpowitz 1984).

The amount of overall crucial winter range and the migration corridor for mule deer that the BLM manages is outlined in Table 3.21.2. The target wintering mule deer herd size and annual harvest for these three wildlife management units are described in Table 3.21.3.

Table 3.21.2. Mule Deer Habitat in the VPA

Unit	Overall range		Crucial winter range		Migration corridor	
	Total Area (acres)	Acres Managed by BLM	Total Area (acres)	Acres Managed by BLM	Total Area (acres)	Acres Managed by BLM
Book Cliffs	1,203,853	651,819	355,992	58,361	58,361	47,091
Nine Mile	667,440	262,357	39,959	0	0	0
North Slope Uinta Mountains	349,738	61,526	105,949	0	0	0
South Slope Uinta Mountains	2,774,731	0	479,253	0	0	0
Total	**4,995,762**	**975,702**	**981,153**	**58,361**	**58,361**	**47,091**

Table 3.21.3. Wildlife Management Goals for Mule Deer

Unit Number	Unit Name (subunit)	Estimated Population Size*[1]	Population Objective[1**]	Buck-to-Doe Ratio	Buck Size	Annual Harvest
8b, 8c	North Slope (West Daggett and Three Corners)	5,000	6,200	15:100	30% being 3 point or better	600
9a	South Slope (Yellowstone)	11,200	13,000	15:100	30% being 3 point or better	1,500
9b, 9c	South Slope (Vernal and Bonanza)	10,100	13,000	15:100	30% being 3 point or better	1,000
9d	South Slope (Diamond Mountain)			25:100	30% being 3 point or better	Limited Entry
10a	Book Cliffs (Bitter Creek and Little Creek)	7,200	15,000	25:100	30% being 3 point or better	Limited Entry
11a	Nine Mile (Anthro)	2,950	8,500	15:100	30% being 3 point or better	250

*Some of these units are estimated at about ½ of population objectives due to drought impacts and low productivity.

** Population objectives are updated on an annual basis.

[1] Hersey and Aoude 2006.

3.21.1.2 ROCKY MOUNTAIN ELK

The season and function of use of elk 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). Crucial winter range is considered to be the part of the local deer and 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 amount of crucial winter range for elk that the BLM manages is outlined in Table 3.21.4. The management goals for these four wildlife management subunits are described in Table 3.21.5.

Table 3.21.4. Rocky Mountain Elk Habitat in the VPA

Unit	Overall range		Crucial winter range	
	Total Area (acres)	Acres managed by BLM	Total Area (acres)	Acres managed by BLM
Book Cliffs	1,006,347	524,893	418,140	207,418
Nine Mile	450,518	171,070	76,996	2,489
North Slope Uinta Mountains	303,644	54,041	51,836	2,975
South Slope Uinta Mountains	1,694,137	251,978	328,916	73,469
Total	**3,454,646**	**1,001,982**	**875,888**	**286,351**

Table 3.21.5. Wildlife Management Goals for Rocky Mountain Elk

Subunit number	Subunit Name	Estimated population size[1]	Population objective[1*]	Bull/cow ratio	Bull age
8a, 8b	North Slope (Summit and West Daggett)	1,295	1,600	8:100	50% of bulls 3½ years or older
8c	North Slope (Three Corners)	1,075	500	8:100	50% of bulls 3½ years or older
9a	South Slope (Yellowstone)	5,600	5,500	8:100	50% of bulls 2½ years or older
9b, 9c, 9d	South Slope (Vernal, Bonanza, and Diamond Mountain)	3,030	2,500	8:100	50% of bulls 2½ years or older
10a	Book Cliffs (Bitter Creek and Little Creek)	3,900	7,500	8:100	50% of bulls 2½ years or older
11a	Nine Mile (Anthro)	1,000	700	8:100	50% of bulls 2½ years or older

[1] Hersey and Aoude 2006.

* Population objectives are updated on an annual basis.

3.21.1.3 PRONGHORN

Pronghorn are common in Utah, where it primarily occurs in desert, grassland, and sagebrush habitats where they feed mainly on browse. Pronghorn are often found in small groups, and are usually most active during the day.

The lower elevations of the VPA sustain several pronghorn herds, which are highly valued by local sportsmen and wildlife enthusiasts. The BLM and UDWR maintain several guzzler systems in these areas to provide a water source for pronghorn during summer months. The pronghorn populations in the VPA have been adversely affected by historic range degradation and habitat loss in the sagebrush steppe habitat type as well as periodic drought conditions. The management goals for the pronghorn herds in these wildlife management units have not been finalized (UDWR 2001). Locations and total acreage of pronghorn habitat managed by the BLM in the VPA are shown in Table 3.21.6. Current population trends are given in Table 3.21.7. Population objectives are not currently available.

Table 3.21.6. Pronghorn Habitat in the VPA

Unit	Total Area (acres)	Acres managed by BLM
Book Cliffs	122,968	85,973
Nine Mile	317,512	179,321
North Slope Uinta Mountains	108,612	57,799
South Slope Uinta Mountains	592,313	410,235
Total	**1,141,405**	**733,328**

Table 3.21.7. Pronghorn Population Trends in the VPA[1]

Subunit Number	Subunit Name	2006 Estimated Population Size	2007 Buck/Doe Ratio	2006 Annual Harvest
8b, 8c	North Slope (West Daggett and Three Corners)	605	59:100	30
9b, 9c	South Slope (Vernal and Bonanza)	205	21-32:100	41
9d	South Slope (Diamond Mountain)	589		
10a	Book Cliffs (Bitter Creek)	283	50:100	7
11a	Nine Mile (Anthro)	327	67:100	22

[1] Hersey and Aoude 2006.

3.21.1.4 BIGHORN SHEEP

Rocky Mountain bighorn sheep can be found in small herds in northern-eastern Utah. Bighorn sheep have experienced significant declines in numbers in the early 1900s due to disease, habitat degradation, and hunting. Bighorn sheep require separation from domestic sheep to prevent the transmission of diseases, against which they have no natural defenses. Utah has been involved in an aggressive program for the past 30 years to restore bighorn sheep to their native habitat. Bighorn sheep currently exist in two areas in northern-eastern Utah, including areas adjacent to BLM-administered lands along the upper Green River, and in the Book Cliffs area. The current population estimate for bighorn sheep along the upper Green River (the West Daggett (8b) and Three Corners (8c) subunits of the North Slope wildlife management unit) is 182 individuals (Hersey and Aoude 2006). The total 2006 bighorn harvest from these management units was 4 individuals. Occasional sightings have also been documented in the Book Cliffs. These herds are all the result of reintroduction efforts and will likely continue to be augmented with additional reintroductions. Additional bighorn sheep reintroductions are proposed in the Browns Park/Diamond Mountain area. Water and vegetation improvements have also benefited these bighorn sheep populations. A management plan for bighorn sheep in the state of Utah has been developed. Locations and acreage of bighorn sheep habitat in the VPA is shown in Table 3.21.8.

Table 3.21.8. Rocky Mountain Bighorn Sheep Habitat in the VPA

Unit	Total Area (acres)	Acres managed by BLM
Book Cliffs	633,271	228,002
North Slope Uinta Mountains	95,751	14,740
South Slope Uinta Mountains	405,481	38,805
Total	**1,134,503**	**281,547**

3.21.1.5 MOOSE

Moose occur in the Rocky Mountains and the northeastern portion of the Intermountain West (Zeveloff and Collett 1988). Prior to 1918, moose were not known to occur in Utah. Since that time, they have been recorded on the north slope of the Uinta Mountains where their numbers have slowly increased. This increase has been attributed to an increase in beaver populations and the subsequent proliferation of marsh areas with which moose are typically associated (Zeveloff and Collett 1988). From the Uinta population, moose have dispersed and/or been transplanted to a variety of locations throughout the state. Although they may range widely across habitat types, moose are primarily associated with boreal forests and riparian areas. Moose are predominantly browsers and rely on the stems, bark, and leaves of a variety of trees and shrubs for forage. Year-round forage includes willow, fir, and quaking aspen. During the summer, grasses, forbs, and aquatic vegetation typically compose a large portion of the moose diet (Zeveloff and Collett 1988).

There are resident populations of moose in the North Slope Uinta Mountains, South Slope Uinta Mountains, Book Cliffs, and Nine Mile wildlife management units. Acreage of habitat in these units is shown in Table 3.21.9. Moose habitat is generally associated with early stages of seral development and shrub growth. Annual flooding and habitat management techniques, such as

prescribed burnings, are thought to improve habitat for moose. Current population trends are given in Table 3.21.10.

Table 3.21.9. Moose Habitat in the VPA

Unit	Total Area (acres)	Acres managed by BLM
Book Cliffs	0	0
Nine Mile	98,090	19,893
North Slope Uinta Mountains	217,029	21,381
South Slope Uinta Mountains	1,095,295	71,342
Total	**1,410,414**	**112,616**

Table 3.21.10. Moose Population Trends in the VPA[1]

Subunit number	Subunit Name	2005 Estimated population size	Population Objective*	2007 Bull/cow ratio	2006 Annual Harvest
8a	North Slope (Summit)	200	400	108:100	37
8b, 8c	North Slope (West Daggett and Three Corners)			115:100	13
9a	South Slope (Yellowstone)	200	225	105:100	8
9b, 9d	South Slope (Vernal and Diamond Mountain)			100:100	3
10a	Book Cliffs (Bitter Creek)	-	100	-	-
11a	Nine Mile (Anthro)	-	40	-	-

[1] Hersey and Aoude 2006.

* Population objectives are updated on an annual basis.

3.21.1.6 BISON

The Ute Tribe maintains an introduced bison population on tribal lands in the Hill Creek portion of the Book Cliffs. These bison can be frequently found on BLM lands adjacent to Ute Tribal lands in the southern Book Cliffs where suitable bison habitat has been identified.

3.21.1.7 BLACK BEAR

In the VPA, black bears are typically associated with forested or brushy mountain environments and wooded riparian corridors and seldom use open habitats (Zeveloff and Collett 1988). Black bears tend to be nocturnal and tend to shy away from human contact. They are generally omnivorous with preferred foods including 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 thick layer of fat (Zeveloff and Collett 1988).

The VPA sustains several large populations of black bear, some of which are traditionally thought to be the highest density black bear population in the state of Utah. A long-term study being conducted by BYU has shown that the black bear population in the Book Cliffs area has local concentrations of individuals in the Horse Canyon, Main Canyon, and Trail Canyon areas. The factors that make these areas support such high bear populations are still being investigated, but initial studies have shown that good habitat conditions with respect to elevation, permanent water sources, cover, and diversity of food, as well as isolation from human disturbance has raised concerns about potential impact on resource development in these areas on these populations (Pers. Comm. Hal Black, 1/13/04). The amount of black bear habitat that the BLM manages in the VPA is outlined in Table 3.21.11.

Table 3.21.11. Black Bear Habitat in the VPA

Unit	Total Area (acres)	Acres managed by BLM
Book Cliffs	232,792	108,291
Nine Mile	156,051	32,144
North Slope Uinta Mountains	155,511	0
South Slope Uinta Mountains	1,044,332	56,304
Total	**1,588,686**	**196,739**

3.21.1.8 MOUNTAIN LION

The mountain lion 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 generally parallel those of mule deer.

Mountain lions are widespread and occur frequently throughout middle and upper elevations of the VPA where populations are considered stable. The amount of winter range for mountain lions that the BLM manages is the same as the mule deer habitat outlined in Table 3.21.2.

3.21.1.9 UPLAND SPECIES

Upland game in the VPA include populations of Blue Grouse, California Quail, Chukar Partridge, Greater Sage-grouse, Ruffed Grouse, Mourning Dove, Ring-necked Pheasant, Rio Grand Turkey, Merriam's Wild Turkey, and desert and mountain cottontail rabbit. Annual fluctuations for most upland game bird and small mammal populations 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 during the early summer, especially in 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 the degradation and loss of important sagebrush steppe and grassland habitat (UDWR 2000). The Greater Sage-grouse is discussed further in the sensitive species section (Section 3.17).

3.21.1.10 WATERFOWL, SHOREBIRDS, AND WADING BIRDS

The VPA is associated with the western portion of the Central Flyway, which guides migrating birds along the Rocky Mountains and the Great Plains. Because of the arid climate of the VPA, migration routes are often associated with riparian corridors and wetland or lake stopover areas. There are several important waterfowl habitats in the VPA including the Pariette Wetlands, Pelican Lake, and the Green and White rivers. Waterfowl, shorebirds, and wading bird populations are primarily associated with the Pariette Wetlands, Ouray National Wildlife Refuge, and other wetland areas such as Browns Park waterfowl management area (WMA), Mallard Springs WMA, Stewart Lake WMA, and Pelican Lake. These wetlands are an oasis in the Uinta Basin, surrounded by the harsh, arid desert landscape of northeast Utah. Mallard, Gadwall, Cinnamon Teal, Pintail, and Canada Geese are the most common waterfowl species observed in these areas. Herons, egrets, Black-necked Stilts, and various sandpipers are the more common wading birds seen. Other kinds of birds less frequently seen are American White Pelican, Sandhill Crane, American Bittern, and White-faced Ibis.

The Pariette Wetlands Refuge managed by the BLM includes over 9,000 acres (6,504 acres of desert uplands and 2,529 acres of open water, wetland, and riparian habitat) in Pariette Draw. The wetlands feature a perennial flowing stream, 23 man-made freshwater ponds with alkali bulrush, and other emergent vegetation. The marshes, wet meadows, grain fields, and irrigation structures in Pariette have been constructed to improve available habitat for waterfowl and other wildlife species in the area.

The Ouray National Wildlife Refuge consists of approximately 19 square miles of bottomland and river surface along 12 linear miles of the Green River. The Ouray refuge was originally established to provide habitat for breeding and migrating waterfowl. More specifically, the primary objective was to provide food and cover for 14 species of nesting ducks. While the purpose for which the Refuge was established has not changed, the methods of achieving the purpose have changed. Management strategies today are focused on managing water to mimic the natural floodplains that existed before dams were erected along the Green River. Portions of protective levees throughout the Refuge have been removed to allow more frequent flooding. The river feeds five bottomlands within the river floodplain, including Johnson Bottom, Leota Bottom, Wyasket Lake, Sheppard Bottom, and Woods Bottom, as it winds through the Wildlife Refuge. In late May, as natural flooding occurs, ponds are formed, spurring the growth of semi-aquatic plants which provide food and cover for ducks and other wildlife. In addition, these ponds serve as nurseries for the endangered fish species of the Colorado River system.

3.21.1.11 RAPTORS

There are 20 species of raptors found in the VPA, all of which are federally protected under the Migratory Bird Treaty Act. In addition, several raptor species are Utah State-protected. These raptor species are discussed further in the Special Status Species section (Section 3.17). Special

habitat needs for all of these raptor species include the protection of 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 VPA are generally found along riparian areas, juniper-desert shrub transition areas, and cliff faces.

An inventory of raptors within the Vernal Field Office boundary was completed in August 2003 by Utah State University – Uinta Basin. This study focused on determining the nesting requirements and the seasonally important raptor habitats located on public lands within the VPA boundary. GIS locations and the demographics of each raptor nest site identified during the inventory were recorded. This information was added to an expandable GIS database that will track nest site and other important raptor habitat locations. Special habitat needs relative to raptors are generally associated with limiting disturbance during the nesting season and maintaining small mammal populations as a prey base. Electrocution from power lines and environmental contaminants continue to be a threat to some raptor species in the VPA.

3.21.1.12 OTHER NON-GAME SPECIES

Because of the variety of habitats found within the VPA, the VPA contains a high diversity of non-game species such as neotropical migrants and other birds, small mammals, amphibians, and reptiles. The VPA contains various riparian, marsh, talus slope, aspen-conifer, pinyon-juniper, and ridge top habitats used by these wildlife species. A list developed by the USFWS, UDWR, Partners in Flight of neotropical migrants, and other sensitive bird species found in the VPA is provided in Appendix H, Table 33. Other common neotropical migrants and other bird, small mammal, amphibian, and reptile species to the VPA include the American Crow, American Kestrel, Black-capped Chickadee, Common Raven, Green-tailed Towhee, Horned Lark, House Finch, Song Sparrow, Vesper Sparrow, Western Kingbird, Western Meadowlark, black-tailed and white-tailed jackrabbits, golden-mantled ground squirrel, raccoon, red fox, coyote, common sagebrush lizard, common side-blotched lizard, gopher snake, and greater short-horned lizard. Several small mammal, amphibian, and reptile surveys have been conducted in the VPA. Many of these non-game species are also harder to study and monitor because of low population sizes and/or secretive behavior. However, the BLM is acquiring basic habitat and population information on non-game species listed by state and federal agencies as special status species.

Neotropical migrants, small mammals, amphibians, and reptiles often have special habitat needs. Areas in the VPA with the highest concentrations and diversity of these species are generally associated with riparian areas. Amphibian populations have been shown to be particularly susceptible to disturbance activities and increases in chemical pollutants in their habitats. A study of the reptile, amphibian, and small mammal species found in the Book Cliffs area was conducted by Brigham Young University in 1995 and 1996. These studies concluded that a large proportion of small mammals and all amphibian species in the study area had the potential to be significantly impacted by grazing in riparian and wetland areas. Most of the reptile species were associated with talus slopes and rock faces and appeared to be at little risk from all conceivable management options. Additionally, the UDWR has identified that many neotropical migrants rely on riparian areas and corridors for nesting and migration purposes.

3.21.1.13 FISHERIES AND AQUATIC SPECIES

The riparian and aquatic habitat in the VPA is generally associated with the Green and White river drainages. Aquatic species in the VPA include several special status fish species such as bonytail, Colorado pikeminnow, humpback chub, razorback sucker, roundtail chub, bluehead sucker, Colorado River cutthroat trout, and flannelmouth sucker, which are discussed further in the special status species section. The Green and White rivers provide critical habitat for several of these fish species. A primary concern with the riparian areas in the VPA is the effect of decreased regeneration of cottonwood and willow stands and the invasion of non-native plant species such as salt cedar (*Tamarix* sp.*)* and Russian olive (*Elaeagnus angustifolia*) on riparian and aquatic wildlife species.

There are several important cold- and warm-water fisheries within the VPA, including Matt Warner, Calder, Crouse, Steinaker, Red Fleet, Cottonwood, and Brough reservoirs; Pelican Lake; and the White and Green rivers and their tributaries. Most of the reservoirs in the resource area are managed as cold-water fisheries and are stocked with salmonids by the UDWR. The Green River below Flaming Gorge Dam and Pelican Lake have been designated by the state of Utah as waters to be managed under the Blue Ribbon Fisheries Initiative because of the quality angling they provide. The Pariette Wetlands have also been identified as an important aquatic area in the VPA. However, maintenance of the nonnative fisheries associated with the VPA have adversely impacted the recovery of several special status fish species found in the VPA, including the Colorado River cutthroat trout, bonytail, Colorado pikeminnow, humpback chub, and razorback sucker (Hawkins and Nesler 1991).

Aquatic species are often used as indicator species of ecosystem health. These species often need protection from resource utilization such as recreation, grazing, mineral extraction, and invasive non-native species. These species may be impacted by resource management decisions made outside the VPA (e.g., the operation of Flaming Gorge Dam on the Green River).

3.21.2 HABITAT FRAGMENTATION

Habitat fragmentation is a process that causes the disruption and transition of once large continuous blocks of wildlife habitat into less continuous habitat, primarily through human disturbances such as land clearing and other surface disturbances, and the conversion of vegetation from one type to another. Wildlife habitats in the VPA include aquatic, riparian, grassland, desert shrub, badlands, sagebrush steppe, pinyon/juniper woodland, mountain shrub, and conifer forest. These vegetation types are also discussed further in the Vegetation Section. Fragmentation of these habitat types due to activities such as oil and gas development, road and pipeline construction, fence construction on rangelands and dam construction on waterways, or other resource development and land conversion can have a number of detrimental impacts on wildlife species. Habitat fragmentation generally results in some direct impact on wildlife from the initial loss of habitat associated with the alteration. Additional indirect impacts of this habitat loss may also affect the surrounding habitats by increasing the amount of transitional and avoidance space associated with the surrounding habitats. Increasing the edge habitats has been shown to accelerate ecological processes, increase the ability of invading plant or animal species to becoming established in the interior of the patch, and decrease functional habitat use for a variety of wildlife species. Interior species also become more vulnerable to decreasing chances

of successful dispersal from occupied patches and colonization to unoccupied patches because of the decreased size and connectivity of the patches.

The VPA presently contains large areas of disturbed wildlife habitat. Fragmentation has become an issue in areas where mineral, agriculture, and other types of land development is currently occurring. Reducing the effects of habitat fragmentation on wildlife species include determining thresholds for disturbance, conserving existing habitats on an ecosystem level, providing usable corridors between neighboring patches, and controlling the invasion of undesirable species into these refuges. UDWR maintains a database that identifies important areas for many of the game and sensitive species in the VPA including intact riparian areas, important habitats for mule deer, Rocky Mountain elk, Greater Sage-grouse, Ferruginous Hawk, black-footed ferret, etc. The impacts on wintering mule deer and other big game animals from an increasing density of natural gas wells, roads, and associated human activities in the northern Book Cliffs area was analyzed in a four-year baseline study (1998–2002) by the UDWR. The UDWR identified that accelerated oil and gas development in the Book Cliffs area has the potential to further displace big game animals and increase habitat fragmentation during the winter period, thereby lowering the relative carrying capacity of the range. The UDWR recommended that this baseline study be continued for an additional three years to establish long-term distributional trends of wintering big game populations and to determine the potential impact that oil and gas development may have on these populations in the north Book Cliffs area. Efforts will continue to be made to identify and maintain existing important habitats and their interconnecting corridors. A description of the existing habitat fragmentation can be found in Tables 20 to 32 in Appendix H.

3.22 WOODLANDS AND FOREST RESOURCES

3.22.1 REGIONAL OVERVIEW

Woodland resources comprise lands producing forest tree species that may be used as non-sawtimber products and sold in units other than board feet. By contrast, forest resources are used for sawtimber products and may be sold in board feet. For management purposes in the VPA, forest resources have been grouped with woodland resources.

Woodland resources within the VPA begin at mid-elevations, where sagebrush communities of the lower, more arid areas become dominated by pinyon pine and juniper (5,000 to 8,000 ft). Generally, woodland resources within the VPA consist of pinyon pine, Utah juniper, and Gambel oak. Forest species, the source of most forest resources, are found at higher elevations (Colorado Plateau 2002). Forest resources include ponderosa pine, aspen, Douglas fir, and minor quantities of spruce, white fir, limber pine, and subalpine fir. The stands with commercial value are located south of the town of Myton, in the Five Mile, Trail Canyon, and Big Wash areas; the south Diamond Mountain Rim; the northern slopes of Diamond Mountain; in Browns Park, near Diamond Mountain; in the drainages that flow into Argyle Canyon; and the southern portions of the Book Cliffs (BLM 1990, 2002).

In the southern part of the VPA, in the vicinity of the Book Cliffs, the principal woodland species consist of pinyon pine, Utah juniper, and Rocky Mountain juniper. High-production

areas containing these species generally have slopes of less than 25% and have not been recently burned. In the higher elevations, Douglas fir and aspen generally grow on northern and eastern slopes (at 6,000–8,500 feet) and at the heads of canyons, where soil moisture is near the surface. Cottonwoods grow along the White and Green River bottoms and generally do not grow more than 100 yards from the rivers' edges. Stands also include Russian olive and tamarisk. Mature, single-storied stands of cottonwood grow along old river channels, oxbows, and sandbars. Some areas near Diamond Mountain in the northern portion of the VPA support forest species such as Douglas fir, ponderosa pine, and aspen. Douglas fir is the dominant species in these higher elevation areas, composing up to 70% of the canopy coverage (Diamond Mountain MSA 1990). Approximately 2,000 acres of ponderosa pine exist here as well, some as relict stands.

3.22.2 WOODLAND AND FOREST PRODUCTS

The most desirable woodland and forest products, sought after by both commercial and private interests, include sawtimber, fuelwood, posts, and Christmas trees. Interest in biomass is increasing and is expected to continue to grow as new uses and technologies develop. There is also a limited demand for other woodland products such as shrubs, trees, and seeds. The demand for woodland products continues to increase; however, the ability to satisfy the demand for woodland products is limited by the available woodland resource.

Commercial sales or commercial harvesting of forest resources are permitted by the BLM., Douglas fir, ponderosa pine, limber pine, aspen, and cottonwood trees may be sold in designated areas to protect forest stands from disease or to prevent wildland fires (BLM 1996).

Historically, pinyon pine has been the preferred species for fuelwood, but juniper has become popular as well. In the past, both of these woodland species were harvested following chainings, but most of the wood within these areas has been removed. Cutting of green wood is now a more common practice for commercial woodcutters.

Trees used as posts are generally found on the more productive, pinyon-juniper sites, where the soils are deep and well drained. Trees suitable for posts have become more difficult to find because they have been searched out and cut by local residents for many years. The areas where significant numbers of post-trees still grow are remote and not easily reached.

The annual demand for cut Christmas trees remains high, but the quantity of good-quality pinyon pine, the Christmas tree of choice, is limited (BLM 2002). Demand for Christmas trees from the VPA is primarily local, but each year, enough trees are sold to only partially satisfy local demand. Past sales of Christmas trees for personal use have been limited to approximately 600-800 trees. Live pinyon pine are also sold for landscaping.

Current management of woodland resources focuses on prescribed burns, burning of slash piles, and commercial and personal greenwood sales of pinyon pine and juniper. The BLM monitors commercial woodcutting periodically to ensure that woodcutters remain in compliance with permit stipulations.