

## 3.0 - AFFECTED ENVIRONMENT

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### 3.1 INTRODUCTION

This chapter presents the potentially affected environment (i.e., the physical, biological, social, and economic values and resources) of the SCPA, and provides the baseline for comparison of impacts/consequences described in **Chapter 4**.

The SCPA is located about 40 miles south of Vernal, Utah in the eastern half of the Uinta Basin. The Project Area is characterized by low rolling hills, incised canyons, and rock outcrops representative of the high desert plains. A segment of the White River flows through the northwestern corner of the Project Area and is intersected by Evacuation Creek which effectively bisects the SCPA. The vegetation in the Project Area is typical of the arid to semi-arid Uinta Basin floristic region, where precipitation and soil parent material are controlling factors for plant composition. Vegetation often appears sparse, especially on badland areas. Elevations within the SCPA average approximately 5,403 feet amsl.

Resources considered in this EA include the environmental elements (listed in **Appendix A**), as well as other resources/issues of concern raised by the BLM and the public. The resources that are analyzed in detail in this chapter include Geology, Paleontology, Air Quality, Cultural Resources, Soils, Water Resources (including Floodplains), Vegetation (including Special Status Plant Species & Invasive, Non-native Weeds), Wildlife and Fisheries (including Special Status Species), Livestock and Grazing, Recreation, Visual Resources, Potential Areas of Environmental Concern (ACECs), and Wild and Scenic Rivers. Other environmental elements were considered but dismissed from further analysis because either the alternatives would have no measurable effect on the resource or issue, or because ACEPMs, described in **Section 2.5**, would reduce the impacts of the Alternatives to negligible levels. Dismissed issues/resources are listed in the Interdisciplinary Team (IDT) Analysis Record Checklist, along with the rationale for dismissal. A copy of the IDT Checklist is included as **Appendix A**.

### 3.2 GEOLOGY, MINERALS, AND PALEONTOLOGY

#### 3.2.1 PHYSIOGRAPHY AND GEOLOGY

The Project Area lies within the Central Badlands District in the southern portion of the Uinta Basin, south of the White River. The Central Badlands District encompasses a region with strong relief, and includes badland topography consisting of steep erosional slopes, narrow ridges, gullies, and dry washes adjacent to broad areas of pediment and plateaus. Gravelly and sandy pediment slopes, sandy washes, low bluffs and cliffs, ledges and ridges of sandstone, and sandy shale characterize the surface exposures in much of the Project Area. Elevations within the Project Area range from about 4,900 feet amsl along the White River to about 5,980 feet, for a total relief of about 1,080 ft.

Bedrock exposures in the Project Area consist of the Eocene Uinta Formation, and the Evacuation Creek and Parachute Creek members of the Green River Formation (Cashion 1973; Rowley et al. 1985). The Uinta Formation is comprised of multi-colored fine-grained sandstone, siltstone, shale, mudstone, and marlstone, and was deposited as river and lake deposits. The base of the Uinta Formation is conformable with the underlying Parachute Creek Member. The Parachute Creek Member of the Green River Formation consists of gray marlstone and yellow-brown siltstone, sandstone, and tuff. A rich oil shale sequence referred to as the Mahogany Zone occurs

about 500 feet below the contact with the Uinta Formation and is about 100 feet thick. The Parachute Creek Member overlies the Douglas Creek Member of the Green River Formation, the Wasatch Formation, and the Mesaverde Group.

Quaternary alluvium occurs on floodplains, low-lying river terraces, alluvial fans, and within dry washes, especially along the White River and Evacuation Creek. These deposits consist of unconsolidated silt, clay, sand, and gravel. Thin unconsolidated colluvial deposits of Quaternary age are found on steeper slopes in the area, and consist of large flattened rock slabs in an unsorted matrix of silt, sand, and gravel.

Within portions of the Project Area, vertical fractures in the Uinta Formation extend downward into the Green River Formation and are sometimes filled with Gilsonite, a solid, brittle hydrocarbon that is mined to the north of the Project Area near Bonanza.

### **3.2.2 MINERAL AND ENERGY RESOURCES**

The Uinta Basin contains extensive deposits of oil and natural gas, and has been producing mineral and energy resources for over 50 years. Exploration and development of large oil and gas fields is currently proposed or underway for areas to the north and west of the Project Area in the Willow Creek/Hill Creek Area, the Love Unit, the Bonanza and West Bonanza Areas, and the Rock House Area. In addition to oil and gas reserves, the Uinta Basin also contains deposits of oil shale, “Gilsonite” (also known as asphaltum, uintaite, or uintahite), and tar sands.

Potentially minable deposits of oil shale are present within the Uinta Basin, including portions of the Project Area. Oil shale is a compact, sedimentary rock containing large quantities of organic matter that yields oil when distilled (BLM 2005). Oil occurs as kerogen within marlstones of the Parachute Creek Member of the Green River Formation. The Mahogany Zone is the most notable kerogen-bearing unit of the Green River Formation. The Mahogany Zone varies in thickness throughout the Uinta Basin, and generally thickens toward the east (Cashion 1967). In the Project Area, the Mahogany Zone is reported to be about 100 feet thick with the richest bed about 10 feet thick (BLM 2007a).

In 1981, the USGS established the Southeastern Uinta Basin Known Oil Shale Leasing Areas (KOSLA), which have a minimum oil shale yield of 25 gallons per ton, a minimum thickness of 25 feet, and a maximum depth to the deposit of 3,000 feet below ground surface. It is estimated that 90 to 115 billion barrels of oil are contained in these deposits (BLM 2007a). Portions of the Project Area within T10S, R24E are within a designated KOSLA. This area is considered to be suitable for underground oil shale development and contain between 70,000 and 100,000 barrels of oil per acre (BLM 1984).

In 2006, OSEC was granted a lease on 160 acres of land within the Project Area to conduct a RD&D project to evaluate oil shale extraction technologies. This RD&D lease is located on the site of the White River Corporation Mine. Initial testing has shown that the shale in this area will produce about 30 gallons of oil per ton over a 58-foot mining interval (Vernal Express, December 17, 2007). Pilot testing on approximately 10,000 tons of stockpiled shale at the site is currently proceeding. Phase II of the project will involve reopening the White River Mine and testing fresh shale. During Phase III, a 250 ton/hour demonstration retort plant will be constructed on site and is expected to process up to 1.5 million tons of shale per year for two years. Construction of Phase III will begin in 2009 or 2010. If the demonstration plant proves to be operationally, environmentally, and financially successful, OSEC may be granted an additional 4,960 acres of preferential lease rights within the Project Area.

Gilsonite is composed of black, brittle hydrocarbon resins that resemble tar or asphalt. It is used in over 160 products, including printing inks, paints, drilling muds, asphalt, and chemical products. The deposits occur in vertical to near-vertical, long, thin northwest-trending veins that are between a few inches and 30 feet wide and occur primarily in the Green River, Uinta, and lower Duchesne River Formations. Several former and current Gilsonite mines, including the Little Emma, Bonanza, and Little Bonanza mines, are located to the north of the Project Area, north of the White River, where individual veins are mined primarily by shaft and stoping and open-trench methods. This is currently the only Gilsonite producing area in the world, with annual production of about 60,000 tons (WVU 2005). A few known (but unmined) Gilsonite veins are also located within the northwest corner of the Project Area (Cashion 1973).

Deposits of tar sands are located along the margins of the Uinta Basin (BLM 1984). These tar sand deposits contain heavy hydrocarbon residues such as bitumen (a general name for various solid and semi-solid hydrocarbons that are fusible and soluble in carbon bisulfide), tar, and degraded oils that have lost their volatile components. The bitumen fills the pore spaces in coarse sandstones or forms cement in loose, unconsolidated sands (Pruitt 1961). Certain tar sand deposits in the Uinta Basin have been divided into seven Special Tar Sand Areas (STSAs) designated by the USGS under direction from Congress pursuant to the Combined Hydrocarbon Leasing Act of 1981. None of these STSAs are located within the Project Area. Other minor tar sand deposits are located within the Uinta Basin (Blackett 1996).

Sand and gravel deposits exist along the White River and Evacuation Creek. However, there is no active exploitation of these materials in the Project Area. In addition, stones used for decorative building purposes are mined from the Green River Formation in the Uinta Basin. No active decorative stone collecting sites are located within the Project Area. There are no known metal deposits or minable coal deposits within the Project Area.

### **3.2.3 PALEONTOLOGY**

Few if any paleontological surveys have been conducted within the Project Area. According to the BLM (2003), an intensive study was conducted immediately to the east of the Project Area. This study, conducted by Hamblin (1991), resulted in the identification of many vertebrate, invertebrate, and plant fossils in the Uinta and Green River Formations.

The Potential Fossil Yield Classification System, recently developed by the BLM (2007), classifies geologic units based on the relative abundance of vertebrate fossils or scientifically important invertebrate and plant fossils, and their sensitivity to adverse impacts. This classification is applied to a geologic formation, member, or other distinguishable unit. This new classification system recognizes that although significant fossil localities may occasionally occur in a geologic unit, a few widely spaced localities do not necessarily indicate a higher class. Instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment. The classification system is as follows:

- **Class 1 – Very Low** – Geologic units that are not likely to contain recognizable fossil remains, including units consisting of volcanic or metamorphic rocks, or are PreCambrian in age or older.
- **Class 2 - Low** – Sedimentary geologic units that are not likely to contain vertebrate fossils or significant nonvertebrate fossils. Vertebrate or significant invertebrate or plant fossils are absent or very rare. These units include formations younger than 10,000 years

before present, recent aeolian deposits, and sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

- **Class 3 – Moderate or Unknown** – Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units with unknown fossil potential. These units are often marine in origin with sporadic occurrences of vertebrate fossils, or units where vertebrate or significant nonvertebrate fossils are known to occur intermittently. This class is subdivided into **Class 3a – Moderate Potential**, and **Class 3b – Unknown Potential**.
- **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. This class is subdivided into **Class 4a** and **Class 4b**. **Class 4a** units are exposed with little or no soil or vegetative cover. Outcrop areas are extensive and exposed bedrock often covers areas larger than 2 acres. **Class 4b** units have a high potential but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to bedrock.
- **Class 5 – Very High** – Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils. Surface-disturbing activities may affect paleontological resources in many cases. This class is subdivided into **Class 5a** and **Class 5b**. **Class 5a** units are exposed with little or no soil or vegetative cover. Outcrop areas are extensive and exposed bedrock often covers areas larger than 2 acres. These units are frequently the focus of illegal collecting activities. **Class 5b** units have a very high potential but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to bedrock.

Geologic units with a classification of **Class 4** or higher often require a field survey by a qualified paleontologist to assess local conditions. Mitigation may be necessary prior to and during surface-disturbing activities.

Much of the Project Area is underlain by exposed bedrock of the Uinta and Green River formations. These units have documented occurrences of vertebrate and scientifically important invertebrate and plant fossils. Soils are generally less than 50 cm deep, and bedrock outcroppings are found throughout the Project Area. However, the occurrence of fossils in both formations is sporadic and unpredictable. Therefore, both of these units are classified as **Class 4a (High)** under the new classification system.

### 3.3 AIR QUALITY AND CLIMATE

Regional air quality is influenced by a combination of factors including climate, meteorology, the magnitude and spatial distribution of local and regional air pollution sources, and the chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality within the SCPA and surrounding region.

### 3.3.1 CLIMATE

The SCPA is located in the Uinta Basin, which has a semiarid mid-continental climate regime typified by dry windy conditions and limited precipitation. The Uinta Basin is bordered by the Wasatch Range to the west, which extends north and south through the middle of the State, and the High Uinta Mountains to the north, which extend east and west through the northeast portion of the State. Elevation of the SCPA ranges from 4,902 feet above mean sea-level (famsl) to 5,974 famsl, with an average of 5,403 famsl.

#### 3.3.1.1 Winds and Atmospheric Stability

The transportation and dilution of air pollutants are primarily a function of wind speed and direction. Winds dictate the direction in which pollutants are transported. As wind speed increases, the dispersion of emitted pollutants also increases, thereby reducing pollutant concentrations.

Wind data within the Project Area have not been directly measured. Local terrain effects will influence the wind profiles specific to the Project Area. However, representative wind speed and direction data for the area are available at the Canyonlands National Park for the years 1995, 1996, 1997, 1998, and 1999 as part of the Clean Air Status and Trends Network (CASTNET) operated by the US Environmental Protection Agency (USEPA) and National Park Service (NPS). This data was prepared for use in the Draft West Tavaputs Plateau Natural Gas Full Field Development Plan EIS (BLM 2008b). **Figure 3.3-1** presents a wind rose depicting wind speed and direction for all five years of data. Note that the data represent the direction from which the wind is blowing (Wind Direction Origin). For example, winds blowing from the north would transport pollutants to the south. As shown, winds originate predominately from the east-southeast about 18.1 percent of the time. The average measured wind speed is 3 meters per second.

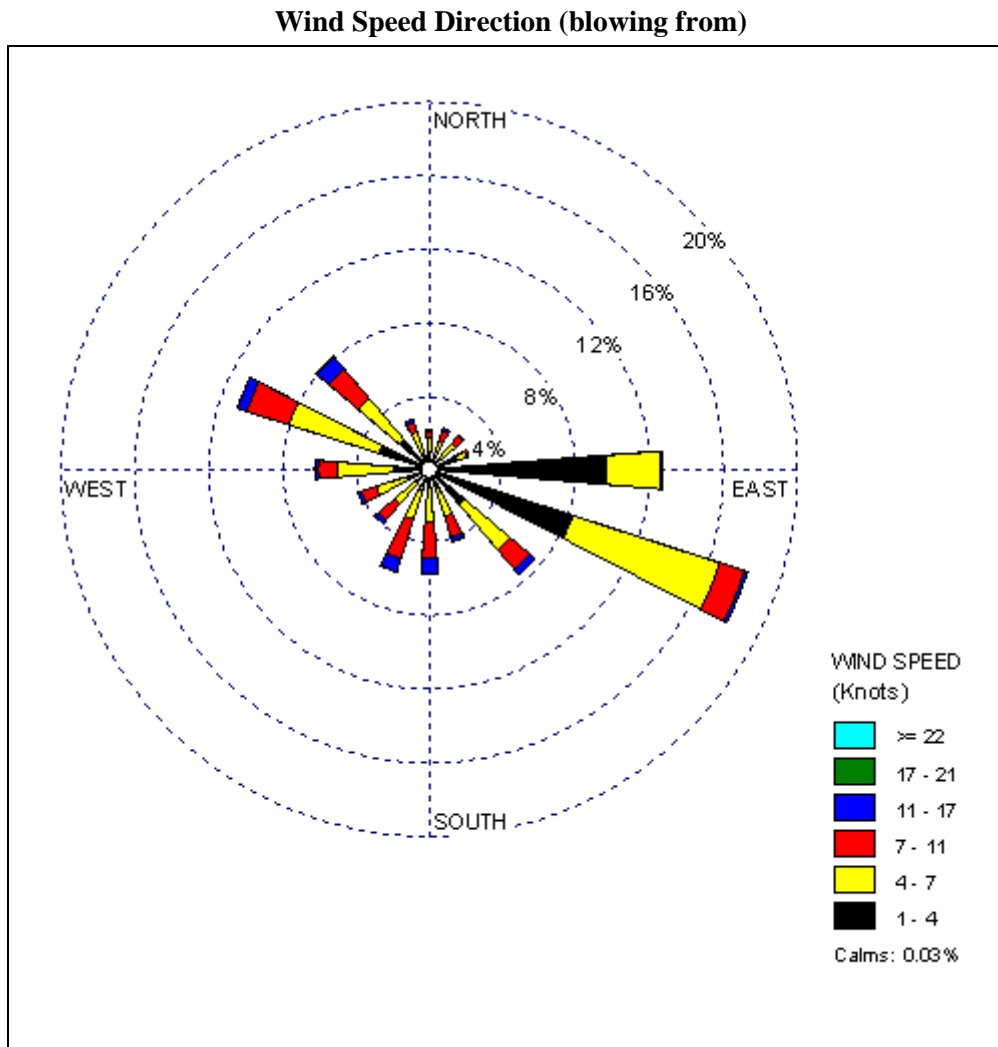
The degree of stability in the atmosphere is also important to the dispersion of emitted pollutants. During stable conditions, vertical movement in the atmosphere is limited and the dispersion of pollutants is inhibited. Temperature inversions can result in very stable conditions with virtually no vertical air motion, thereby restricting dispersion. Conversely, during convective conditions, upward and downward movement in the atmosphere prevails, and vertical mixing of pollutants in the atmosphere is enhanced.

The potential for atmospheric dispersion is relatively high for the Project Area due to the frequency of strong winds. However, calm periods and nighttime cooling may enhance air stability, thereby inhibiting air pollutant transport and dilution. The region can experience frequent temperature inversions in winter when cold stable air masses settle into the valleys, and snow cover and shorter days inhibit ground-level warming. Temperature inversions are less common during the summer months when daytime ground-level heating rapidly leads to inversion break-up and increased vertical mixing. The higher locations of the Project Area generally will remain warmer at night and are less prone to temperature inversions common to the valleys and drainages.

Mixing height is defined as the thickness of the air mass above ground within which rising warm air from the surface mixes by convection and turbulence. Local atmospheric conditions, terrain configuration, and source location determine the degree to which pollutants are diluted in this mixed layer. Mixing heights vary diurnally, with local weather systems, and seasonally.

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Figure 3.3-1. Wind Rose from AERMET Canyonlands NP Data 1995-1999



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### 3.3.2 AIR QUALITY

#### 3.3.2.1 Existing Sources of Air Pollution

The Uinta Basin has seen recent oil and gas development on Tribal, Federal, State, and private lands. Fugitive dust is the most prominent air pollutant in the region and in the proposed Project Area, and is intermittent depending on winds and dust-causing activities.

Existing point and area sources of air pollution within the Project Area and surrounding region include the following:

- Exhaust emissions from existing natural gas fired compressor engines used in production of natural gas;
- Natural gas dehydrator still-vent emissions;
- Gasoline and diesel-fueled vehicle tailpipe emissions;
- Combustion and fugitive dust emissions from coal-fired power plants and coal mining and processing;
- Fugitive dust from vehicle traffic on unpaved roads, wind erosion in areas of soil disturbance, and road sanding during winter months; and
- Long-range transport of pollutants from distant sources contributing to regional haze.

#### 3.3.2.2 Regulatory Environment

##### Criteria Pollutants

National and Utah Ambient Air Quality Standards (NAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Pollutants for which standards have been set include sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), and particulate matter less than 10 or 2.5 microns in aerodynamic diameter (PM<sub>10</sub> and PM<sub>2.5</sub>). Existing air quality in the region is acceptable based on EPA standards for the protection of human health. The Uinta Basin is designated as an attainment area, meaning that the concentrations of criteria pollutants in the ambient air are less than the NAAQS. Site-specific air quality monitoring data are not available for the Project Area; however, background criteria pollutant concentrations for the Uinta Basin were provided by the Utah Department of Environmental Quality Division of Air Quality (Prey 2008), as shown in **Table 3.3-1**.

Ground-level ozone (O<sub>3</sub>) is a secondary pollutant that is formed by a chemical reaction between nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs) in the presence of heat and sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, some tree species emissions, and chemical solvents are some of the major sources of NO<sub>x</sub> and VOCs that help to form ozone. Sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. As a result, it is generally known as a summertime air pollutant. Ozone can be transported great distances and therefore contributes to air pollution issues on a regional scale. Primary health effects from O<sub>3</sub> exposure range from breathing difficulty to permanent lung damage. Ground-level ozone also contributes to plant and ecosystem damage.

Note that the NAAQS has been recently revised to reflect changes to the PM<sub>10</sub>, PM<sub>2.5</sub>, and O<sub>3</sub> standards. The changes reflect a tighter PM<sub>2.5</sub> 24-hour standard for the 98<sup>th</sup> percentile of a three

year average [lowered from 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to  $35\text{-}\mu\text{g}/\text{m}^3$ ] and elimination of the  $\text{PM}_{10}$  annual standard. The  $\text{O}_3$  standard was changed from 0.08-part per million (ppm) (equivalent to 0.084-ppm) for the three-year average of the 4<sup>th</sup> highest 8-hour (hr) measurements to 0.075-ppm for the three-year average of the 4<sup>th</sup> highest 8-hr measurements.

Under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act (CAA), incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. The area surrounding the SCPA is designated as PSD Class II. For Class II areas, incremental increases in ambient pollutant concentrations are allowed as a result of controlled growth. The PSD increments for Class II areas are presented in **Table 3.3-1**

**Table 3.3-1. Ambient Criteria Pollutant Concentrations in the Uinta Basin**

Pollutant	Averaging Period(s)	Uinta Basin Background Concentration <sup>a</sup> ( $\mu\text{g}/\text{m}^3$ )	NAAQS ( $\mu\text{g}/\text{m}^3$ )	PSD Class II Increments ( $\mu\text{g}/\text{m}^3$ )
$\text{SO}_2$	Annual	5	80	20
	24-hour	10	365	91
	3-hour	20	1,300	512
$\text{NO}_2$	Annual	5	100	25
$\text{PM}_{10}$	24-hour	63.3	150	30
$\text{PM}_{2.5}$	Annual	9	15	None
	24-hour	25	35	None
CO	8-hour	1,111	10,000	None
	1-hour	1,111	40,000	None
$\text{O}_3$ <sup>b</sup>	8-hour	105	147	None

<sup>a</sup> Source: Dave Prey, Utah Division of Environmental Quality - Division of Air Quality (UDAQ), Personal Communication, June 13<sup>th</sup>, 2008. The State of Utah currently does not require  $\text{PM}_{2.5}$  modeling for new sources and does not have an official background. Mr. Prey recommended using the values presented in the table for now.

<sup>b</sup> EPA published a final rule on August 3, 2005, identifying areas for which the one-hour ozone standard was revoked. In that notice, the one-hour ozone standard was revoked effective June 15, 2005, for all areas of Utah. Another final rule was published March 27, 2008 decreasing the 8-hour NAAQS to 0.075 ppm, effective May 27<sup>th</sup> 2008; the value in the table is equivalent to 0.075 ppm.

### Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The EPA has classified 187 air pollutants as HAPs. Examples of listed HAPs associated with the oil and gas industry include formaldehyde, BTEX compounds (benzene, toluene, ethylbenzene, isomers of xylene), normal-hexane (*n*-hexane), and acrolein.

There are no applicable Federal or State of Utah ambient air quality standards for assessing potential HAP impacts to human health. However, in order to provide a basis for assessing HAP exposures, reference concentrations (RfC) for chronic inhalation exposure, and Reference Exposure Levels (REL) for acute inhalation exposures are applied as evaluation criteria. **Table 3.3-2** provides the RfCs and RELs. RfCs represent an estimate of the continuous (i.e., annual average) inhalation exposure rate to the human population (including sensitive subgroups such as children and the elderly) without an appreciable risk of harmful effects. The REL is the acute

(i.e., one-hour average) concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects.

**Table 3.3-2. HAP Reference Exposure Levels and Reference Concentrations**

Hazardous Air Pollutant (HAP)	Reference Exposure Level [REL 1-hr Average] ( $\mu\text{g}/\text{m}^3$ )	Reference Concentration <sup>a</sup> [RfC Annual Average] ( $\mu\text{g}/\text{m}^3$ )
Benzene	1,300 <sup>b, c</sup>	30
	160,000 <sup>d</sup>	-
Toluene	37,000 <sup>b</sup>	5,000
Ethylbenzene	350,000 <sup>d</sup>	1,000
Xylenes	22,000 <sup>b</sup>	100
n-Hexane	390,000 <sup>d</sup>	700
Formaldehyde	94 <sup>b</sup>	9.8
Acrolein	0.19 <sup>b</sup>	0.02
	69 <sup>e</sup>	-

<sup>a</sup> EPA Air Toxics Database, Table 1 (EPA 2007) <http://www.epa.gov/ttn/atw/toxsource/summary.html>

<sup>b</sup> EPA Air Toxics Database, Table 2 (EPA 2007)

<sup>c</sup> REL for benzene is based on a 6-hr exposure (OEHA 1999), predicted concentration is a 6-hr average.

<sup>d</sup> Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA 2007) since no available REL

<sup>e</sup> Acute exposure guideline level (AEGL) for mild effects from EPA Air Toxics Database, Table 2 (EPA 2007).

### 3.4 CULTURAL RESOURCES

A Class I cultural resource inventory was conducted for the SCPA, located on public lands administered by the BLM Vernal Field Office, and SITLA. The objective of the inventory was to identify the extent of previous cultural resource investigations within the Project Area and the number, locations, types, and significance of those previously documented cultural resources. The Class I data review conducted for the Project Area is used to make predictions about the type and potential site density of cultural resources within the Project Area, and provides a basis for assessing the potential impact to archaeological sites in the event that lands are developed for oil and gas exploration.

The cultural resource inventory was conducted in compliance with Federal and State legislation including Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, the National Environmental Policy Act (NEPA) of 1969, the Archaeological and Historic Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, and the American Indian Religious Freedom Act of 1978. The NHPA sets forth national policy and procedures regarding “historic properties”—that is, regions, sites, buildings, structures, and objects included in or eligible for the National Register of Historic Places (NRHP). Section 106 of the NHPA requires Federal agencies to consider the effects of their undertakings on such properties, following regulations issued by the Advisory Council on Historic Preservation (ACHP) (36 CFR 800).

The cultural-chronological sequence in Project Area includes the Archaic stage (7000 B.C. to A.D. 400), which can be further subdivided into Early, Middle, Late, and Terminal periods; the Formative stage (A.D. 700 to A.D. 1250), which is largely associated with the San Rafael Fremont in the Project Area; the Protohistoric stage (A.D. 1200 to A.D. 1750), largely associated with Numic-speaking (Ute) peoples; and the historic period, which began with the arrival of Europeans in the eighteenth century.

### 3.4.1 SUMMARY OF INVENTORY RESULTS

The Class I inventory resulted in the identification of 38 previous cultural resource inventories that have been conducted in the Project Area. Most of the inventories were conducted in advance of oil and gas development, including seismic lines, well pad, and pipeline corridor construction. Twenty four (63 percent) of these previous cultural resource inventories resulted in a finding of no cultural resources. Fourteen (37 percent) of these previous cultural resource inventories identified a total of 32 archaeological sites within the Project Area (**Table 3.4-1**). Of the 32 known archaeological sites that are located within the Project Area, nine (28 percent) were evaluated to be eligible for listing on the NRHP, eight (25 percent) were evaluated to be ineligible for listing on the NRHP, and 15 (47 percent) remain unevaluated, need additional data, or their evaluation is unknown. Prehistoric site types within the Project Area consist of rock shelters, lithic scatters, temporary camps, and rock art. Historic site types within the Project Area consist of temporary camps, ranches/homesteads, corrals, trash scatters, and oil shale mining sites.

**Table 3.4-1. Known Archaeological Sites within the Project Area**

Site Number	Site Type	NRHP Assessment	Utah Project Number
42UN106	Camp and storage cist	Unevaluated	U-55-UA-001
42UN118	Rock Shelter	Unevaluated	U-55-UA-001; U-65-CJ-001; U-75-UC-0034
42UN324	Rock Shelter	Unevaluated	U-75-UC-0034
42UN352	Open ranch or homestead	No data	U-75-UC-0034
42UN354	Rock Shelter	No data	U-75-UC-0034
42UN366	Rock Shelter with Pictographs	Eligible	U-75-UC-0034
42UN367	Rock Shelter	Unevaluated	U-75-UC-0034
42UN368	Open lithic	Unevaluated	U-75-UC-0034
42UN369	Open lithic	Eligible	U-75-UC-0034
42UN370	Open lithic	Unknown	U-75-UC-0034
42UN371	Pictograph, open camp?	Eligible	U-75-UC-0034
42UN372	Open lithic	Not Eligible	U-75-UC-0034
42UN373	Open lithic	Unevaluated	U-75-UC-0034
42UN374	Open lithic	Unevaluated	U-75-UC-0034
42UN375	Open lithic	Unevaluated	U-75-UC-0034
42UN376	Open lithic	Not Eligible	U-75-UC-0034
42UN380	Open lithic	Not Eligible	U-75-UC-0034
42UN381	Rock Shelter	Not Eligible	U-75-UC-0034

Site Number	Site Type	NRHP Assessment	Utah Project Number
42UN401	Open campsite and historic structure	Unevaluated	U-75-UC-0034
42UN407	Rock Shelter	Unevaluated	U-75-UC-0034
42UN409	Rock Shelter	Unevaluated	U-75-UC-0034
42UN971	Rock Shelter	Eligible	U-80-BL-XXXX
42UN999	Homestead	Not Eligible	U-81-BL-0690 b
42UN1013	Petroglyph	Eligible	U-81-BL-0690 b
42UN1780	Prehistoric Campsite	Eligible	U-89-AF-687 b, s, p
42UN2548	Historic Corral	Eligible	U-98-SJ-0211
42UN2557	Historic Can and Glass Scatter	Not Eligible	U-98-A1-0327 b, p, s
42UN2558	Prehistoric Open Camp and Historic Ranching and Oil Shale Mining (Multicomponent)	Eligible	U-98-A1-0327 b, p, s
42UN2597	Habitation/Oil Shale Exploration	Eligible	U-98-A1-0641 b, p, s
42UN2606	Historic Trash Scatter/Campsite	Not Eligible	U-98-SJ-0782 b, s
42UN3083	Historic Temporary Camp	Not Eligible	U-02-MQ-0243 b, p, s
42UN5376	Historic structure/camp	Unevaluated	U-06-RL-0806 b

Using the results of the Class I inventory, predictions about site density, location, type, and sensitivity within the Project Area as a whole can be made only tentatively. Because inventories in the Project Area have been done mostly in response to clearances required for individual projects, their findings may not be representative of the entire Project Area. However, given the available information, we can anticipate that sites will most likely be associated with temporary use of the area during the prehistoric time period. The available documentation indicates that sensitive sites (eligible to the NRHP) having additional research potential may be common in the immediate study area.

## 3.5 SOILS

The development of soils is governed by many factors, including climatic conditions (e.g., the amount and timing of precipitation, temperature, and wind), the parent material that the soil is derived from, topographic position (e.g., slope, elevation, and aspect), geomorphic processes, and vegetation type and cover.

### 3.5.1 PROJECT AREA SOIL TYPES

The Soil Survey of Uintah Area, Utah – Parts of Daggett, Grand, and Uintah Counties, published by the U.S. Department of Agriculture (USDA) Soil Conservation Service, is the primary source

of information concerning soils in the Project Area (USDA 2003). This survey has been supplemented by additional information available on the USDA National Resource Conservation Service (NRCS) soils web site (USDA-NRCS 2007).

Soils in the Project Area are developed on the side slopes of canyons, benches, ridges, hills, alluvial fans, and floodplains. These units cover areas as small as 0.05 acre to as large as 3,615 acres. **Table 3.5-1** summarizes the soil textures, parent materials, landforms, slopes, depth class, runoff speed, and other factors of the soil map units in the Project Area that are relevant to erosion and reclamation potential.

**Table 3.5-1. Characteristics of Soils within the Project Area**

Map Unit Name and Number	Acreeage in Project Area	Soil Unit Name	Soil Teture	Parent Material	Landforms	Percent of Soil Complex	Slope	Depth Class	Drainage Class	Salinity Class	Sodium Class	Reclamation Source Material Rating <sup>1</sup>	Runoff Speed	Water Erosion Kw
Badland-Rock outcrop complex (12)	0.1	Badland	--	Shale and siltstone of the Green River and Uinta Fms	Erosional remnants, hills, and ridges	50	1 to 75%	Very shallow	Somewhat excessively drained	Strongly saline	Strongly sodic	Poor (Cl, D, O, B, S)	Very high	0.10
		Rock outcrop	--	Sandstone and shale bedrock	Cliffs, escarpments, ledges, erosional remnants	35	1 to 100%	Very shallow	--	--	--	--	Very high	--
Badland-Walknolls-Rock outcrop complex (14)	999.1	Badland	--	Shale and siltstone of the Green River and Uinta Fms	Erosional remnants, hills, and ridges	50	1 to 75%	Very shallow	Somewhat excessively drained	Strongly saline	Strongly sodic	Poor (Cl, D, O, B, S)	Very high	0.10
		Walknolls	Very channery sandy loam	Aalluvium derived from sandstone	Hills	35	50 to 90%	Shallow	Well drained	Non-saline	Slightly sodic	Poor (D, B, S, Ca)	Very high	0.10
		Rock outcrop	--	Sandstone and shale bedrock	Cliffs, escarpments, ledges, erosional remnants	35	1 to 100%	Very shallow	--	--	--	--	Very high	--
Cadrina extremely stony loam-Rock outcrop complex (36)	0.3	Cadrina	Extremely stony loam	Slope alluvium and colluvium over residuum derived from shale and sandstone	Hills	65	25 to 50%	Shallow	Well drained	Very slightly saline	Slightly sodic	Poor (St, D, B, O, Co)	Very high	0.05
		Rock outcrop	--	--	Cliffs, escarpments, ledges, erosional remnants	20	25 to 50%	--	--	--	--	--	Very high	--

Map Unit Name and Number	Acreage in Project Area	Soil Unit Name	Soil Texture	Parent Material	Landforms	Percent of Soil Complex	Slope	Depth Class	Drainage Class	Salinity Class	Sodium Class	Reclamation Source Material Rating <sup>1</sup>	Runoff Speed	Water Erosion Kw
Cadrina-Casmos-Rock outcrop complex (38)	118.7	Cadrina	Extremely stony loam	Slope alluvium over residuum derived from shale and sandstone	Hills	40	2 to 25%	Shallow	Well drained	Very slightly saline	Slightly sodic	Poor (St, D, B, O, Co)	Very high	0.05
		Casmos	Channery loam	Slope alluvium over residuum derived from sandstone, siltstone and shale	Hills	30	2 to 40%	Shallow	Well drained	Very slightly saline	Slightly sodic	Poor (D, B, Alk, O, S)	Very high	0.05
		Rock outcrop	--	--	Cliffs, escarpments, ledges, erosional remnants	15	2 to 25%	Very shallow	--	--	--	--	Very high	--
Green River-Fluvaquents complex (90)	123.5	Green River	fine sandy loam, coarse sand	alluvium derived from shale and sandstone	Floodplains	70	0 to 2%	Deep	Moderately well drained	slightly saline	Moderately sodic	Fair (O, S, D, WE)	Very slow	0.37
		Fluvaquents	Fine sand, fine sandy loam, loam	Alluvium derived from sandstone, limestone, quartzite, and shale	Floodplains, oxbows	15	0 to 1%	Deep	Very poorly drained	Non-saline	Non-sodic	Fair (S, WE)	Very slow	0.37
Pherson-Hickerson complex (179)	322.4	Pherson	Very gravelly loam, very gravelly sandy loam	Alluvium derived from sandstone and shale	Drainageway	45	2 to 8%	Deep	Well drained	Very slightly saline	Moderately sodic	Fair (D, S, O)	Slow	0.15
		Hickerson	Loam, silty clay loam,	Alluvium derived	Floodplains, alluvial flats	40	1 to 4%	Deep	Moderately well drained	Very slightly saline	Moderately sodic	Fair (S, O)	Medium	0.15

Map Unit Name and Number	Acreeage in Project Area	Soil Unit Name	Soil Tecture	Parent Material	Landforms	Percent of Soil Complex	Slope	Depth Class	Drainage Class	Salinity Class	Sodium Class	Reclamation Source Material Rating <sup>1</sup>	Runoff Speed	Water Erosion Kw
			sandy clay loam	from sandstone, limestone, quartzite, and shale										
Uffens loam (249)	7.7	Uffens	Clay loam	Alluvium derived from sandstone, limestone and shale	Stream terraces	35	3 to 8%	Very deep	Well drained	Moderately saline	Strongly sodic	Poor (S, Alk, O, Sal, WE)	High	0.43
Walknolls extremely channery sandy loam-Gilston association (257)	3,615	Walknolls	Very channery sandy loam	Slope alluvium and colluvium derived from sandstone	Hills	50	2 to 50%	Very shallow	Well drained	Non-saline	Slightly sodic	Poor (D, B, S, Ca)	High	0.05
		Gilston	Sandy loam, gravelly sandy loam, gypsum loam	Alluvium derived from sandstone	Drainageway	35	2 to 8%	Very deep	Well drained	Moderately saline	Strongly sodic	Poor (Alk, S, Sal, O)	Slow	0.05
Walknolls very channery loam (258)	3,139	Walknolls	Very channery sandy loam	Colluvium derived from sandstone	Hills	85	25 to 50%	Shallow	Well drained	Non-saline	Slightly sodic	Poor (D, B, S, Ca)	High	0.10
Walknolls-Bullpen association (260)	1,882	Walknolls	Very channery loam	Slope alluvium derived from sandstone	Hills	60	2 to 50%	Shallow	Well drained	Non-saline	Slightly sodic	Poor (D, B, S, Ca)	Medium	0.10
		Bullpen		Slope alluvium over residuum derived from sandstone	Hills	30	2 to 25%	Deep	Well drained	Very slightly saline	Moderately sodic	Poor (Alk, O, S, WE)	Medium	0.10

Map Unit Name and Number	Acreage in Project Area	Soil Unit Name	Soil Texture	Parent Material	Landforms	Percent of Soil Complex	Slope	Depth Class	Drainage Class	Salinity Class	Sodium Class	Reclamation Source Material Rating <sup>1</sup>	Runoff Speed	Water Erosion Kw
Walknolls-Gilston association (262)	340.1	Walknolls	Very channery sandy loam	Slope alluvium derived from sandstone	Hills	55	4 to 25%	Shallow	Well drained	Non-saline	Slightly sodic	Poor (D, B, S, Ca)	Medium	0.10
		Gilston	Sandy loam, gravelly sandy loam, gypsum loam	Alluvium derived from sandstone	Drainageway	35	2 to 8%	Very deep	Well drained	Moderately saline	Strongly sodic	Poor (Alk, S, Sal, O)	Slow	0.10

### **3.5.2 EROSION AND RECLAMATION POTENTIAL OF PROJECT AREA SOILS**

For evaluation of potential environmental impacts to soils, the key attributes are their erosion potential and ease of reclamation after soil disturbance. Soil mapping conducted by the NRCS under the USDA typically provides information about each soil type within the mapped area that can be used to evaluate the erosion potential and reclamation potential of each soil unit (USDA-NRCS 2007).

#### **3.5.2.1 Erosion Potential**

Erosion potential can vary widely among soil units within a given area, and is dependent on the particle size distribution of the soil, the slopes on which it is found, and the amount and type of vegetative cover. The USDA-NRCS typically rates each of the soil units according to its water erosion potential ( $K_w$ ). The erosion potential indicates the general susceptibility of a soil to sheet and rill erosion. The value of  $K_w$  ranges from 0.02 to 0.69. The higher the  $K_w$  value of a soil type, the more susceptible the soil type is to sheet and rill erosion. Erosion hazards become critical issues when protective vegetation is removed during and following activities such as access road and well pad construction. Typically, soils found on steeper slopes have a higher erosion hazard than those found on gentler slopes. Soils with more fines are at greater risk of wind erosion, and soils with more gravel and/or stones have a lower risk of wind erosion.

Most of the soil types within the Project Area have erosion potentials of 0.15 or less, indicating a low to moderate water erosion potential. Higher erosion potentials of 0.37 to 0.43 are given for the Green River-Fluvaquents complex (map unit 90) and the Uffens loam (map unit 249). These soils are located on floodplains and stream terraces. In addition, the Bullpen soils (map unit 260) are identified by the reclamation source material ratings as having high water erosion potential. All soils on slopes greater than 40 percent and badland areas could be considered to have severe water erosion potentials.

#### **3.5.2.2 Reclamation Potential**

Reclamation potential is dependent on the soil structure, pH conditions, and soil salinity, among other factors. Excessive salinity (salt content) or sodicity (sodium content) can inhibit the growth of desirable vegetation and therefore, successful reclamation.

The USDA has provided reclamation material source ratings for the soils in the Project Area on the Web Soil Survey (USDA-NRCS 2007). The Green River-Fluvaquents and Pherson-Hickerson soils (map units 90 and 179) are considered to be fair as a source of reclamation material. All of the other soils in the Project Area are rated poor for reclamation potential based on the attributes of the primary soil type. The poor ratings are generally due to the shallow depth to bedrock, low organic matter content, high clay, stone, or cobble content, drought conditions, excessive salinity or sodicity, and high water erosion potential.

## **3.6 WATER RESOURCES**

### **3.6.1 HYDROLOGIC SETTING**

The Project Area lies in the Uinta Basin of northeastern Utah. The Uinta Basin is drained by the Green River and its tributaries. The Green River originates in Wyoming along the Continental

Divide and joins the Colorado River about 110 miles south of Green River, Utah. Major tributaries to the Green River include the Duchesne River and the White River. The White River drains the eastern portion of the basin, including those portions of the basin within Colorado and all of the Project Area.

### 3.6.2 SURFACE WATER

The Project Area lies to the south of the White River, as shown on **Figure 3.6-1**. The Project Area is drained by Evacuation Creek, Southam Canyon, and numerous ephemeral tributaries to these streams. Evacuation Creek, Southam Canyon, and some of the larger ephemeral washes have floodplains associated with them. The ephemeral streams only flow in direct response to rainfall events. They have developed a dendritic drainage pattern and are incised with rills and gullies typical of badland topography.

#### 3.6.2.1 Stream Classification

The Utah Water Quality Board classifies Utah surface water resources according to quality and degree of protection (UDEQ 2000). All streams and water bodies in Utah are assigned to one of five classes. All streams within the Project Area are classified as Class 2B, 3A, and 4. Class 2B streams are protected for secondary contact recreation such as boating, wading, or similar uses. Class 3A streams are protected for cold water species of game fish and other cold water aquatic life. Class 4 streams are protected for agricultural uses including irrigation of crops and stock watering.

#### 3.6.2.2 Surface Water Flow

The USGS formerly maintained a surface water gauging station on the White River at the confluence with Asphalt Wash and five stations along Evacuation Creek. None of these stations were monitored for discharge beyond 1983, but these data are still useful for determining flow conditions for the White River and the other streams in the Project Area.

**Table 3.6-1** presents summary flow data for the period of record for two of these gauging stations. Mean monthly stream flow over the period of record for the White River at the gauging station at Asphalt Wash is relatively steady between August and April, ranging from 295 cubic feet per second (cfs) to 497 cfs. The White River is perennial with high flows occurring in spring responding to snowmelt in the mountains of Colorado. During May, June, and July, high flows ranging from about 1,000 cfs to 4,300 cfs often occur due to short duration, high intensity thunderstorms and contributions from snowmelt. Flow in Evacuation Creek ranges from zero (less than one percent of the time) to over 200 cfs (rarely), but is typically less than 0.5 cfs (72 percent of the period of record).

**Table 3.6-1. Stream Flow Data for USGS Gauging Stations**

USGS Gauging Station ID	Range of Monthly Mean Discharge (cfs)	Peak Daily Discharge (cfs)	Mean Annual Discharge (cfs)	Period of Record
Evacuation Creek near Mouth near Watson, Utah 09306430	0.06 (December) to 4.0 (May)	258 (February 19, 1980)	1.55	October 1974 – September 1981

USGS Gauging Station ID	Range of Monthly Mean Discharge (cfs)	Peak Daily Discharge (cfs)	Mean Annual Discharge (cfs)	Period of Record
White River at Asphalt Wash 09306700	295 (December) – 1,412 (June)	4,380 (June 10, 1975)	535	October 1974 – September 1977

Source: <http://waterdata.usgs.gov/nwis>

### 3.6.2.3 Surface Water Quality

Important indicators of water quality include temperature, specific conductance (a measure of the ability of water to conduct electric current), and pH (a measure of the hydrogen ion activity). A pH less than 7 indicates the water is acidic and a pH greater than 7 indicates alkaline water. Chemical water quality is determined by the concentration of various chemical constituents in the water, including metals, ionic constituents such as chloride and bicarbonate, and total dissolved solids (TDS). Hardness (a measure of the amount of calcium and magnesium) is also an important indicator and is reported as milligrams per liter (mg/L) of calcium carbonate (CaCO<sub>3</sub>). Hardness determines the soap-consuming capacity of water as well as the tendency to leave a mineralized crust on plumbing fixtures. For a more thorough discussion of water quality, see Fetter (1980).

#### Water Quality Standards

The U.S. Environmental Protection Agency has established primary and secondary drinking water standards (EPA 2003) for approximately 90 water contaminants as required by the Safe Drinking Water Act, as amended in 1996, and Clean Water Act (CWA) of 1987, as amended. These regulations specify maximum contaminant levels (MCLs) and secondary standards for specific contaminants. The MCLs are health-based. Although these MCLs legally apply only to public drinking water supplies, they are also useful as general indicators of water quality. The secondary standards are for constituents that cause cosmetic effects (such as skin or tooth discoloration) or esthetic effects (such as taste, odor, or color) in drinking water. The CWA delegated the administration of these standards to cooperating States and Tribes, so long as the State and Tribal standards were at least as stringent as the Federal standards. Most states, including Utah, now have primacy for the administration of the CWA and have also adopted state water-quality standards (UDEQ 2000).

#### Salinity and Sodium Hazards

Excessive salinity and sodium content is a special water quality concern in portions of the Colorado River Basin and in other areas. Sodium is part of the total salinity portion of water quality and may be a contributor to crop failure. The sodium hazard of irrigation water is estimated by the sodium adsorption ratio (SAR), which is the proportion of sodium to calcium plus magnesium in the water. Waters with SARs in the range 0 to 6 can generally be used on all soils with little problem of a sodium buildup. When SAR's range from 6 to 9, chances for soil permeability problems increase (Hergert and Knudsen 1997). Water with an SAR greater than 9 should not be used for irrigation, even if the total salt content is relatively low. Continued use of water having a high SAR leads to a breakdown in the physical structure of the soil. The sodium replaces calcium and magnesium adsorbed on the soil clays and causes dispersion of soil particles. This dispersion results in breakdown of soil aggregates and causes the soil to become hard and compact when dry and increasingly impervious to water penetration.

Salinity and sodium hazard classes developed by the U.S. National Salinity Laboratory (1954) are presented in **Tables 3.6-2** and **3.6-3**.

**Table 3.6-2. Salinity Hazard Classes**

Salinity Hazard Class	Specific conductance (µS/cm at 25° C)	Characteristics
<b>Low</b>	0-250	Low salinity water can be used for irrigation on most soil with minimal likelihood that soil salinity will develop.
<b>Medium</b>	251-750	Medium salinity water can be used for irrigation if a moderate amount of drainage occurs.
<b>High</b>	751 – 2,250	High salinity water is not suitable for use on soil with restricted drainage. Even with adequate drainage, special management for salinity control may be required.
<b>Very High</b>	> 2,250	Very high salinity water is not suitable for irrigation under normal conditions

Source: U.S. National Salinity Laboratory 1954.

**Table 3.6-3. Sodium Hazard Classes**

Sodium Hazard Class	SAR (at SC = 2,250)	Characteristics
<b>Low</b>	0 to 4	Low sodium water can be used for irrigation on most soil with minimal danger of harmful levels of exchangeable sodium.
<b>Medium</b>	4 to 9	Medium sodium water will present an appreciable sodium hazard in fine textured soil having high cation exchange capacity.
<b>High</b>	9 to 14	High sodium water may produce harmful levels of exchangeable sodium in most soils.
<b>Very High</b>	More than 14	Very high sodium water is generally unsatisfactory for irrigation purposes.

Source: U.S. National Salinity Laboratory 1954.

Project Area Surface Water Quality

The following section describes the chemical quality of surface waters in the Project Area, based on data collected by the USGS at the two gauging stations listed above (Evacuation Creek near Mouth near Watson, Utah, 09306430; and White River at Asphalt Wash 09306700), and data collected by the State of Utah at two water quality monitoring stations (UDEQ White River station 4933970 and UDEQ Evacuation Creek station 4933870). The locations of these four stations are shown on **Figure 3.6-1**.

**Table 3.6-4** provides a summary of the data collected at USGS station 09306700 on the White River at Asphalt Wash. For this station, samples for chemical analysis were collected from August 1974 to July 1978, and from April 1981 to August 1983. Waters in the White River are described as calcium-sodium sulfate-bicarbonate type waters with moderate to very high hardness (140 – 400 mg/L as CaCO<sub>3</sub>). TDS content is variable during the year, ranging from 222 mg/L to 892 mg/L, and averages 509 mg/L, slightly above the secondary standard of 500 mg/L. The waters are generally neutral to alkaline with pH ranging from 6.50 to 8.60. The maximum values of iron and sulfate are above the secondary standards of 250 mg/L and 300 µg/L, respectively.

However, sulfate exceeded the secondary standard three times and iron only once during the period of record. In addition, concentrations of ammonia, aluminum, and copper exceeded the State of Utah aquatic standards once, six times, and twice, respectively. Total suspended solids (TSS) range from 46 mg/L to over 8,000 mg/L during high-intensity runoff events, and exceeded the aquatic standard of 90 mg/L for all but two measurements conducted during the period of record.

**Table 3.6-4. Summary of Water Quality Analyses for White River at Asphalt Wash, USGS Gauging Station 09306700**

Parameters	Standards		Summary Statistics		
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	Range	Mean
<b>General Water Quality Indicators</b>					
Temperature (°C)			108	0 – 23.5	8.93
Specific Conductance (uS/cm)			56	320 – 1,650	752
Dissolved Oxygen (mg/L)		Min 6.5	23	<b>3.8</b> - 11.9	8.43
pH (standard units)	6.5-9.0 <sup>2</sup>	6.5-9.0	42	6.5 - 8.6	8.02
Total Hardness (mg/L)			50	140 - 400	273
Total Dissolved Solids (mg/L)	500 <sup>2</sup>	1,200	52	222 - <b>892</b>	<b>509</b>
Total Suspended Solids (mg/L)		90	63	46 – <b>8,700</b>	<b>1,400</b>
<b>Ionic Constituents</b>					
Calcium (mg/L)			52	36 - 83	66.4
Magnesium (mg/L)			52	11 - 48	26.0
Sodium (mg/L)			52	13 - 180	65.9
Potassium (mg/L)			52	1.1 - 6.1	2.3
Chloride (mg/L)	250 <sup>2</sup>		52	5.8 - 230	37.7
Sulfate (mg/L)	250 <sup>2</sup>		52	<b>55 - 470</b>	175
Fluoride (mg/L)	4 <sup>1</sup> , 2 <sup>2</sup>	1.2 - 2.4 <sup>4</sup>	52	0.1 - <b>2</b>	0.35
Ammonia (mg/L)		0.11 – 2.49 <sup>4</sup>	51	<0.01 – <b>0.15</b>	0.035
Silica (mg/L)			52	7.1 – 17	13.0
Bicarbonate (mg/L)			46	125 - 280	226
Nitrite & Nitrate (mg/L)	10 <sup>1</sup>	4	52	0.01 - 0.97	0.15
<b>Trace Metals</b>					
Aluminum (µg/L)	50 - 200 <sup>2</sup>	750 <sup>3</sup>	39	<10 – <b>460</b>	46.0
Arsenic (µg/L)	10 <sup>1</sup>	190	36	<1 – 4	1.24
Barium (µg/L)	2,000 <sup>1</sup>	1,000	32	<35 – 300	66.6
Boron (µg/L)			34	30 – 100	49.1
Copper (µg/L)	1,300 <sup>1</sup> , 1,000 <sup>2</sup>	12	6	<2 – <b>105</b>	<b>27.2</b>

Parameters	Standards		Summary Statistics		
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	Range	Mean
Iron (µg/L)	300 <sup>2</sup>	1,000	36	<10 - <b>1,750</b>	77.5
Manganese (µg/L)	50 <sup>2</sup>		52	11 – 48	26.0
Selenium (µg/L)	50 <sup>1</sup>	5	30	0.5 – 3	1.17
Strontium (µg/L)			30	<60 – 1,300	760
Zinc (µg/L)	5,000 <sup>2</sup>		18	10 – 210	33.3

All samples are dissolved (filtered) unless otherwise noted

Average values calculated using one-half the detection limit for non-detect values

Bolded values exceed standards

<sup>1</sup>Federal Drinking Quality Standards Primary Maximum Contaminant Level (MCL)

<sup>2</sup>Federal Drinking Quality Standards Secondary Maximum Contaminant Level (SMCL)

<sup>3</sup>Aquatic life (Utah Water Quality Standards, R317-2 Utah Administrative Code). EPA is in the process of revising the national criteria for aluminum for aquatic life.

<sup>4</sup>Value is dependant on temperature and pH

Source: <http://waterdata.usgs.gov/nwis>

The Utah Division of Environmental Quality (UDEQ) also monitors and assesses the White River on a regular basis to determine if the river is supporting beneficial uses. Water quality data have been and are currently being collected from the White River at UDEQ station 4933970, located at the crossing of Utah Highway 45, north of the project boundary. **Table 3.6-5** provides a summary of data collected at this station for the period February 1976 to June 2006.

Water quality results recorded at this station are similar to those from the downstream USGS gauging station at Asphalt Wash. The field-measured pH ranges from 6.20 to 9.10 with an average of 8.27, slightly higher than the average of 8.02 reported for the USGS station 09306700. TDS ranges from 222 mg/L to 892 mg/L with an average of 483 mg/L, and TSS concentrations range from 11.2 to 9,999 mg/L with an average of 805 mg/L. The average value is considerably lower than that reported by the USGS. The average TSS concentration exceeds the aquatic biota standard of 90 mg/L.

The UDEQ also analyzed several trace metals that were not reported by the USGS. The EPA STORET database where the UDEQ data are available reports non-detect values simply as “Not Detected”. Calculation of any central tendency (mean or median) using non-detect values requires that the instrument detection limit is known for each parameter and individual analysis. Non-detect values cannot be assumed to be zero. Therefore, for parameters with non-detect values in the database, a mean cannot be calculated accurately and is not provided here. For these parameters, the range of detected concentrations and the number of detects is provided without a calculated mean.

Aluminum was detected in five of 13 samples at concentrations up to 1,600 µg/L above the drinking water and aquatic standards. The maximum detected concentrations of cadmium, copper, iron, lead, and manganese also exceed standards. Arsenic, barium, boron, selenium, and zinc were also commonly detected. The maximum concentrations of these metals are below the applicable standards.

**Table 3.6-5. Summary of Water Quality Analysis for the White River at Utah Highway 45, UDEQ Station 4933970**

Parameters	Standards		Summary Statistics			
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	No. of Detects	Range of Detects	Mean
<b>General Water Quality Indicators</b>						
Alkalinity as CaCO <sub>3</sub> (mg/L)			155	155	111 – 293	179
Dissolved Oxygen (mg/L)		>6.5	149	149	<b>2.6</b> – 13.01	9.06
pH	6.5 to 8.5 <sup>2</sup>	6.5 to 9.0	264	264	<b>6.20</b> – <b>9.10</b>	8.27
Specific Conductance (umhos/cm)			301	301	282 – 886	710
Temperature (°C)			144	144	-0.23 – 26.9	11.0
Total Dissolved Solids (mg/L)	500 <sup>2</sup>	1,200	149	149	194 – <b>940</b>	483
Total Hardness (mg/L)			130	130	132 – 410	283
Total Suspended Solids (mg/L)		90	147	147	11.2 – <b>9,999</b>	<b>805</b>
<b>Ionic Constituents</b>						
Bicarbonate (mg/L)			155	155	135 – 357	217
Calcium (mg/L)			155	155	25.1 – 96	64.5
Chloride (mg/L)	250 <sup>2</sup>		143	143	3 – 85	19.6
Fluoride (mg/L)	4 <sup>1</sup> , 2 <sup>2</sup>		27	27	0.12 – 0.41	0.27
Magnesium (mg/L)			155	155	7.79 – 51	28.0
Ammonia as N, total (mg/L)		0.11 to 0.49 <sup>4</sup>	68	155	0.05 – <b>0.8</b>	NC
Nitrite + Nitrate, total (mg/L)	10(1 <sup>5</sup> )	4	37	43	0.05 – <b>1.5</b>	NC
Phosphorus, total (mg/L)		0.05	144	152	0.01 – <b>5.08</b>	NC
Orthophosphate (mg/L)			34	52	0.01 – 0.54	NC
Potassium (mg/L)			160	160	1 – 8	2.27
Silica (mg/L)			27	27	10 – 17	14.1
Sodium (mg/L)			155	155	8.53 – 170	55.9
Sulfate (mg/L)	250 <sup>2</sup>		155	155	47.8 – <b>370</b>	188
<b>Trace Metals</b>						
Aluminum (µg/L)	50 to 200 <sup>2</sup>	750	5	13	34 – <b>1,600</b>	NC
Arsenic (µg/L)	10 <sup>1</sup>	190	12	29	0.4 – 3	NC
Barium (µg/L)	2,000 <sup>1</sup>	1,000	16	20	38 – 150	NC
Boron (µg/L)			29	29	27 – 350	96.1
Cadmium (µg/L)	5	250	3	22	5 – <b>10</b>	NC
Chromium (µg/L)	100 <sup>1</sup>	74	1	20	5	NC
Copper (µg/L)	1300 <sup>1</sup> , 1000 <sup>2</sup>	9	4	22	3 – <b>15</b>	NC
Iron (µg/L)	300 <sup>2</sup>	1,000	16	22	5 – <b>1,500</b>	NC
Lead (µg/L)	15 <sup>1</sup>	2.5	4	22	<b>4</b> – <b>30</b>	NC
Manganese (µg/L)	50 <sup>2</sup>		13	22	27 – <b>350</b>	NC

Parameters	Standards		Summary Statistics			
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	No. of Detects	Range of Detects	Mean
Nickel (µg/L)			0	3	NA	NC
Selenium (µg/L)	50 <sup>1</sup>	5	15	27	0.2 – 2	NC
Silver (µg/L)	100 <sup>2</sup>	1.6	0	19	NA	NC
Zinc (µg/L)	5,000 <sup>2</sup>	120	12	28	5 – 33	NC

All samples are dissolved (filtered) unless otherwise noted

Bolded values exceed standards

NC = Mean not calculated due to undefined non-detect values in database

<sup>1</sup>Federal Drinking Quality Standards Primary Maximum Contaminant Level (MCL)

<sup>2</sup>Federal Drinking Quality Standards Secondary Maximum Contaminant Level (SMCL)

<sup>3</sup>Aquatic life (Utah Water Quality Standards, R317-2 Utah Administrative Code). EPA is in the process of revising the national criteria for aluminum for aquatic life.

<sup>4</sup>Value is dependant on temperature and pH

<sup>5</sup>Federal Drinking Water Quality Standard is 1 mg/L for Nitrite and 10 mg/L for Nitrate

Source: [http://www.epa.gov/storet/dw\\_home.html](http://www.epa.gov/storet/dw_home.html)

**Table 3.6-6** provides a summary of the data collected at USGS station 09306430 on Evacuation Creek. Waters in Evacuation Creek are described as sodium sulfate type waters with very high to extreme hardness (250 – 1,200 mg/L as CaCO<sub>3</sub>). TDS ranges from 2,150 – 4,710 mg/L with an average of 3,570 mg/L, well above the secondary standard of 500 mg/L. Specific conductance is correspondingly high and ranges from 1,200 to 5,800 uS/cm with an average of 4,080 uS/cm. These values are in the high salinity class as defined by the U.S. National Salinity Laboratory (1954). High salinity water is not suitable for irrigation use on soils with restricted drainage. SAR ranges from 4 to 12. High sodium water with SAR above 9 may produce harmful levels of exchangeable sodium in most soils (U.S. National Salinity Laboratory 1954).

Compared to the White River, Evacuation Creek contains much higher concentrations of most major ions, including calcium, magnesium, sodium, potassium, sulfate, and bicarbonate. All recorded concentrations of sulfate are above the secondary standard of 250 mg/L. The maximum values of fluoride, ammonia, aluminum, copper, iron, and manganese are also above the standards. TSS ranges from 3 mg/L to 178,000 mg/L during high-intensity runoff events, and exceeded the aquatic standard of 90 mg/L for 77 percent of the measurements conducted during the period of record.

**Table 3.6-6. Summary of Water Quality Analyses for Evacuation Creek, USGS Gauging Station 09306430**

Parameters	Standards		Summary Statistics		
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	Range	Mean
<b>General Water Quality Indicators</b>					
Temperature (°C)			146	0 – 33.5	14.3
Specific Conductance (uS/cm)			96	1,200 – 5,800	4,080
Dissolved Oxygen (mg/L)		Min 6.5	51	<b>4.8</b> – 14.6	8.03
pH (standard units)	6.5-9.0 <sup>2</sup>	6.5-9.0	79	<b>6.0 – 9.2</b>	7.96

Parameters	Standards		Summary Statistics		
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	Range	Mean
Total Hardness (mg/L)			66	250 – 1,200	1,038
Sodium-Adsorption Ratio			66	4 – 12	9.1
Total Dissolved Solids (mg/L)	500 <sup>2</sup>	1,200	52	<b>2,150 – 4,710</b>	<b>3,570</b>
Total Suspended Solids (mg/L)		90	57	<b>3 – 178,000</b>	<b>16,400</b>
<b>Ionic Constituents</b>					
Calcium (mg/L)			69	60 – 240	161
Magnesium (mg/L)			69	24 – 210	150
Sodium (mg/L)			69	160 – 990	674
Potassium (mg/L)			69	1.8 – 12	8.2
Chloride (mg/L)	250 <sup>2</sup>		69	6.1 – 83	45.0
Sulfate (mg/L)	250 <sup>2</sup>		69	<b>430 – 3,000</b>	<b>2,000</b>
Fluoride (mg/L)	4 <sup>1</sup> , 2 <sup>2</sup>	1.2 - 2.4 <sup>4</sup>	69	0.4 – <b>2.3</b>	0.82
Ammonia (mg/L)		0.11 – 2.49 <sup>4</sup>	57	<0.01 – <b>0.38</b>	0.05
Bicarbonate (mg/L)			50	120 – 550	449
Nitrite (mg/L)	1 <sup>1</sup>		53	<0.01 – 0.11	0.02
Nitrate (mg/L)	10 <sup>1</sup>	4	45	0.01 – 1.8	0.56
<b>Trace Metals</b>					
Aluminum (µg/L)	50 - 200 <sup>2</sup>	750 <sup>3</sup>	44	10 – <b>110</b>	29.8
Arsenic (µg/L)	10 <sup>1</sup>	150	40	<1 – 6	1.68
Barium (µg/L)	2,000 <sup>1</sup>	1,000	31	20 – 300	63.5
Boron (µg/L)			57	<20 – 8,600	1,700
Copper (µg/L)	1,300 <sup>1</sup> , 1,000 <sup>2</sup>	12 <sup>5</sup>	11	<2 – <b>600</b>	<b>83.7</b>
Iron (µg/L)	300 <sup>2</sup>	1,000	54	<10 – <b>470</b>	55.2
Manganese (µg/L)	50 <sup>2</sup>		54	<10 – <b>320</b>	<b>102</b>
Selenium (µg/L)	50 <sup>1</sup>	4.6	34	<1 – 5	1.91
Zinc (µg/L)	5,000 <sup>2</sup>	120	35	<10 – 110	25.1

All samples are dissolved (filtered) unless otherwise noted

Average values calculated using one-half the detection limit for non-detect values

Bolded values exceed standards

<sup>1</sup>Federal Drinking Quality Standards Primary Maximum Contaminant Level (MCL)

<sup>2</sup>Federal Drinking Quality Standards Secondary Maximum Contaminant Level (SMCL)

<sup>3</sup>Aquatic life (the most stringent acute or chronic standards from Utah Water Quality Standards, R317-2 Utah Administrative Code and Colorado Basic Standards for Surface Water, 5 CCR 1002-31). EPA is in the process of revising the national criteria for aluminum for aquatic life.

<sup>4</sup>Value is dependant on temperature and pH

<sup>5</sup>Standard for hardness of 100 mg/L; exact value is dependant on water hardness

Source: <http://waterdata.usgs.gov/nwis>

The UDEQ has also collected water quality data from Evacuation Creek at UDEQ station 4933870, located above the confluence with the White River, from March 1995 to June 1996, and again from July 2005 to June 2006. **Table 3.6-7** provides a summary of these data.

Water quality results recorded at this station are similar to those from the USGS gauging station 09306430. TDS ranges from 630 mg/L to 4,654 mg/L with an average of 3,570 mg/L, and TSS ranges from 0 to 76,680 mg/L with an average of 4,800 mg/L.

As discussed above, for parameters with non-detect values in the database, a mean cannot be calculated accurately and is not provided here. For these parameters, the range of detected concentrations is provided without a calculated mean.

Aluminum was detected in four of nine samples at concentrations up to 477 µg/L above the drinking water and aquatic standards. The maximum detected concentrations of ammonia, phosphorous, copper, iron, and manganese also exceed standards. Barium, boron, selenium, and zinc were also commonly detected. The maximum concentrations of these metals are below the applicable standards.

**Table 3.6-7. Summary of Water Quality Analysis for Evacuation Creek Above the Confluence with the White River, UDEQ Station 4933870**

Parameters	Standards		Summary Statistics			
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	No. of Detects	Range of Detects	Mean
<b>General Water Quality Indicators</b>						
Alkalinity as CaCO <sub>3</sub> (mg/L)			33	33	125 – 443	368
Dissolved Oxygen (mg/L)		>6.5	33	33	<b>5.92</b> – 13.06	8.61
pH	6.5 to 8.5 <sup>2</sup>	6.5 to 9.0	66	66	7.90 – 8.73	8.29
Specific Conductance (umhos/cm)			65	65	431 – 4,654	3,570
Temperature (°C)			33	33	-0.29 – 21.4	14.2
Total Dissolved Solids (mg/L)	500 <sup>2</sup>	1,200	33	33	<b>630 – 3,684</b>	<b>3,070</b>
Total Hardness (mg/L)			19	19	243 – 1197	932
Total Suspended Solids (mg/L)		90	31	31	<b>0 – 76,680</b>	<b>4,800</b>
<b>Ionic Constituents</b>						
Bicarbonate (mg/L)			19	19	152 – 490	418
Calcium (mg/L)			33	33	38 – 175	135
Chloride (mg/L)	250 <sup>2</sup>		31	31	11 – 52	39.5
Magnesium (mg/L)			33	33	21.6 – 212	156
Ammonia as N, total (mg/L)		0.11 to 0.49 <sup>4</sup>	15	32	0.05 – <b>1.08</b>	NC
Nitrite + Nitrate, total (mg/L)	10(1 <sup>5</sup> )	4	31	31	0.13 – 4.62	1.47
Phosphorus, total (mg/L)		0.05	21	33	0.01 – <b>1.83</b>	NC
Potassium (mg/L)			33	33	3.6 – 8.31	6.09
Sodium (mg/L)			33	33	134 – 765	601
Sulfate (mg/L)	250 <sup>2</sup>		33	33	<b>277 – 2,650</b>	<b>1,771</b>
<b>Trace Metals</b>						
Aluminum (µg/L)	50 to 200 <sup>2</sup>	750	4	9	30 – <b>477</b>	NC

Parameters	Standards		Summary Statistics			
	Drinking Water	Aquatic Biota <sup>3</sup>	No. of Samples	No. of Detects	Range of Detects	Mean
Arsenic (µg/L)	10 <sup>1</sup>	190	3	9	1.79 – 3.06	NC
Barium (µg/L)	2,000 <sup>1</sup>	1,000	7	9	25.1 – 180	NC
Boron (µg/L)			3	3	877 – 1310	1130
Cadmium (µg/L)	5	250	0	9	NA	NC
Chromium (µg/L)	100 <sup>1</sup>	74	1	9	12.4	NC
Copper (µg/L)	1300 <sup>1</sup> , 1000 <sup>2</sup>	9	2	9	<b>15.3 – 17</b>	NC
Iron (µg/L)	300 <sup>2</sup>	1,000	6	9	31.5 – <b>402</b>	NC
Lead (µg/L)	15 <sup>1</sup>	2.5	0	9	NA	NC
Manganese (µg/L)	50 <sup>2</sup>		8	9	10 – <b>157</b>	NC
Nickel (µg/L)			0	3	NA	NC
Selenium (µg/L)	50 <sup>1</sup>	5	9	9	2 – 4.89	2.77
Silver (µg/L)	100 <sup>2</sup>	1.6	0	9	NA	NC
Zinc (µg/L)	5,000 <sup>2</sup>	120	2	9	30.6 – 33	NC

All samples are dissolved (filtered) unless otherwise noted

Bold values exceed standards

NC = Mean not calculated due to undefined non-detect values in database

<sup>1</sup>Federal Drinking Quality Standards Primary Maximum Contaminant Level (MCL)

<sup>2</sup>Federal Drinking Quality Standards Secondary Maximum Contaminant Level (SMCL)

<sup>3</sup>Aquatic life (Utah Water Quality Standards, R317-2 Utah Administrative Code). EPA is in the process of revising the national criteria for aluminum for aquatic life.

<sup>4</sup>Value is dependant on temperature and pH

<sup>5</sup>Federal Drinking Water Quality Standard is 1 mg/L for Nitrite and 10 mg/L for Nitrate

Source: [http://www.epa.gov/storet/dw\\_home.html](http://www.epa.gov/storet/dw_home.html)

### 3.6.3 GROUNDWATER

Three main aquifers are present in the southern Uinta Basin in the vicinity of the Project Area. The principal aquifers include unconsolidated alluvial deposits along the major drainages (White River and Evacuation Creek) and two sandstone layers within the Green River Formation (Holmes and Kimball 1987; Hood and Fields 1978; Schlotthauer et al. 1981). Groundwater may also be present in the Uinta Formation as small, isolated, perched water zones in some areas. Deeper water-bearing zones are also present in many geologic units, including the Navajo Sandstone, the Entrada Formation, the Morrison Formation, and the Mesaverde Group (Frethey and Cordy 1991). These deeper zones are generally too deep to be currently considered as useable aquifers, but constitute a large water resource for the future. The alluvial aquifers are usually unconfined, whereas the consolidated aquifers are generally unconfined near outcrops and confined down dip. The primary permeability of the bedrock aquifers is generally low; however, fractures, bedding planes, and faults may produce relatively high secondary permeability (Schlotthauer et al. 1981).

The alluvial aquifers are recharged by direct precipitation, infiltration of streamflow, and leakage from consolidated-rock aquifers, and consist of silt and clay, with minor amounts of sand and gravel. The average thickness of alluvium along the White River is about 30 feet, and the hydraulic conductivity of these deposits ranges from about one to 25 feet/day. Water from the

alluvial aquifers is discharged by springs, evapotranspiration, wells, and subsurface flow into consolidated aquifers. In many of the tributary streams to the White River, evapotranspiration consumes most of the water in the stream channel. The amount of recoverable water in storage in these aquifers is estimated to be about 200,000 acre-feet (Holmes and Kimball 1987).

Water is also sometimes present in small, discontinuous perched aquifers within the Uinta Formation. In most cases, the formation yields only a couple gallons per minute (gpm) of saline water to wells and springs (Holmes and Kimball 1987; Howells et al. 1987). Locally, some wells yield fresh to slightly saline water and larger yields.

Two sandstone zones within the Green River Formation are considered to be regional aquifers. The Bird's-Nest Aquifer lies between the upper part of the Parachute Creek Member and the Mahogany Oil Shale Zone, and outcrops along the White River and Evacuation Creek within the Project Area. This aquifer is characterized by nodules of nahcolite (natural sodium bicarbonate) set in marlstone overlain by thin, brittle, shale and sandstone beds. The aquifer is generally 90 to 205 feet thick, with an average thickness of about 115 feet. The hydraulic conductivity of the aquifer is enhanced by the dissolution of the nahcolite and fracturing of the sandstones (Holmes and Kimball 1987).

The Douglas Creek Aquifer underlies much of the southern Uinta Basin, and consists of beds of sandstone and limestone of the Douglas Creek Member (Middle Member) of the Green River Formation and some intertonguing sandstone beds of the Wasatch Formation (Holmes and Kimball 1987; Howells et al. 1987). This aquifer crops out in Desolation Canyon to the southwest of the Project Area and is generally about 500 feet thick. Well yields from the Green River Formation generally range from about 0.5 to 220 gpm (Feltis 1968).

### **3.6.3.1 Groundwater Quality**

Groundwater in the Uinta Basin ranges in chemical quality from relatively good to briny. Groundwater in the unconsolidated alluvial aquifers generally reflects the overall water quality of the associated streams, rivers, or recharge sources. The highest quality groundwater occurs near the mountains at the north end of the Uinta Basin and also in valley areas. As the groundwater moves downgradient in the basin, it becomes increasingly saline. Water of higher salinity is also found in formations containing shale, gypsum, or salt.

Water from the consolidated aquifers beneath the Project Area is generally high in dissolved solids. Hardness ranges from zero to more than 24,000 mg/L, and averages about 405 mg/L, which is considered to be very hard. The Bird's-Nest Aquifer generally produces water with TDS between 3,000 and 10,000 mg/L, but some water from the zone is unusable (TDS more than 10,000 mg/L). The TDS of water in the Douglas Creek aquifer is also generally between 3,000 and 10,000 mg/L (Schlotthauer et al. 1981).

TDS concentrations in the Uinta Formation are reported to range from 3,260 mg/L to 64,300 mg/L (Schlotthauer et al. 1981). Use of groundwater from the Uinta and Green River Formations is limited to livestock watering and industrial uses because of its poor quality in terms of total dissolved solids and hardness.

## **3.6.4 FLOODPLAINS**

Currently, floodplains are protected by Executive Order 11988 which requires that all Federal agencies take action to reduce the risk of flood loss; minimize the impact of floods on human

safety, health, and welfare; and to restore and preserve the natural and beneficial values served by floodplains. The most recent data available regarding 100-year floodplains are from a 1977 U.S. Department of Housing and Urban Development (HUD) and Federal Emergency Management Agency (FEMA) survey, which inventoried public and State lands in Uintah County. Floodplains are present within the drainages of Evacuation Creek, Southam Canyon, and the lower portions of several ephemeral drainages within the Project Area, as well as along the White River. Under the VFO Approved RMP, no surface disturbance or occupancy is allowed within active floodplains (including Evacuation Creek and the White River). An exception to this management prescription may be authorized if there are no practical alternatives, impacts could be fully mitigated, or the action is designed to enhance the riparian resources.

### 3.7 VEGETATION, INCLUDING WETLANDS/RIPARIAN AREAS AND INVASIVE/NON NATIVE SPECIES

The vegetation communities identified in this section are described using data obtained from the U.S. Department of Agriculture, Natural Resources Conservation Services (USDA-NRCS) Soil Survey Geographic Database (USDA-NRCS 2006a), as well as the USDA-NRCS Field Office Technical Guides ecological site descriptions (USDA-NRCS 2006b). **Figure 3.7-1** provides a map of the vegetation communities that occur within the SCPA. **Table 3.7-1** provides a breakdown of vegetation communities occurring within the SCPA. A brief discussion of each of the vegetation communities follows.

**Table 3.7-1. Vegetation Communities within the Southam Canyon Project Area**

Vegetation Community	Estimated Acres	Percent of Total Project Area <sup>1</sup>
Wyoming Big Sagebrush	6,610	62.5%
Pinyon-Juniper	3,663	34.6%
Riparian	135	1.3%
Black Sagebrush	131	1.2%
Desert Shrub	7	0.1%
Badlands/Rock Outcrop	1	< 0.1%

<sup>1</sup> Total project Area is 10,575 acres.

#### Wyoming Big Sagebrush

The Wyoming big sagebrush vegetation community accounts for approximately 63 percent of the Project Area. At the community's optimal state, its canopy cover is composed of 35 percent shrubs, 25 percent grasses, and 5 percent forbs. Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*) is the most visually dominant species in this vegetation community. Other shrub species associated with this vegetation community include shadscale (*Atriplex confertifolia*), bud sagebrush (*Picrothamnus desertorum*), winterfat (*Krascheninnikovia lanata*), and low rabbitbrush (*Chrysothamnus viscidiflorus*). The herbaceous cover in this community includes Indian ricegrass (*Achnatherum hymenoides*), galleta (*Hilaria jamesii*), needle and thread grass (*Hesperostipa comata*), and scarlet globemallow (*Sphaeralcea coccinea*) (USDA-NRCS 2006a, USDA-NRCS 2006b).

In the SCPA, the Wyoming big sagebrush vegetation community is the most prevalent, and is found mainly in the eastern half of the Project Area. However, this community can also be found intermixed with the pinyon-juniper vegetation community.

### Pinyon-Juniper Woodlands

The second most prevalent vegetation community in the Project Area is the pinyon-juniper woodland, which accounts for approximately 35 percent of the SCPA. At the community's optimal state, the canopy cover is composed of 30 percent trees, 20 percent shrubs, 20 percent grasses, and 5 percent forbs, although trees are most visually dominant. Trees in this vegetation community include pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Shrubs include black sagebrush (*Artemisia nova*), birchleaf mountain mahogany (*Cercocarpus montanus*), and mormon tea (*Ephedra viridis*). Grasses include salina wildrye (*Leymus salinus* ssp. *salinus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), galleta, Indian ricegrass, and needle-and-thread grass. Forbs include various asters (*Asteraceae* family), mustards (*Brassicaceae* family), and buckwheats (*Polygonaceae* family) (USDA-NRCS 2006a, USDA-NRCS 2006b).

This community is mainly located in the western half of the Project Area, but is also interspersed with the vegetation sagebrush community discussed above.

### Riparian

Riparian vegetation communities occur in floodplains of large, meandering rivers in the Uinta Basin. Sandbars are also associated with large meandering rivers but because of their unstable nature, are usually devoid of vegetation. Riparian vegetation communities are composed of occasional Fremont cottonwood (*Populus fremontii*) stands, with an understory of coyote willow (*Salix exigua*). Other species associated with the riparian vegetation community include skunkbush sumac (*Rhus trilobata*), greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airoides*), silverscale saltweed (*Atriplex argentea*), and saltgrass (*Distichlis* spp.). Greasewood can also be found along Evacuation Creek (USDA-NRCS 2006a, USDA-NRCS 2006b).

In the Project Area, riparian vegetation communities are located in the White River corridor and account for approximately one percent of the Project Area.

### Black Sagebrush

The black sage brush vegetation community is located near the White River in the north-western portion of the SCPA, and accounts for approximately one percent of the Project Area. This vegetation community is similar to the Wyoming big sagebrush vegetation community in its structure and canopy cover. This vegetation community is visually dominated by black sagebrush. Other dominant species in this vegetation community include shadscale, galleta, and salina wildrye (USDA-NRCS 2006a, USDA-NRCS 2006b).

### Desert Shrub

The desert shrub vegetative community tends to be variable in its composition and species dominance. Dominant species in the Project Area primarily include valley saltbush (*Atriplex cuneata*) and shadscale, but bud sagebrush (*Picrothamnus desertorum*) and green molly (*Bassia americana*) can also occur in this vegetation community. Other plant species that occur within the desert shrub vegetation community include: Indian ricegrass, galleta, bottlebrush squirreltail (*Elymus elymoides*), scarlet globemallow, woolly pliantain (*Plantago patagonica*), and desert trumpet (*Eriogonum inflatum*) (USDA-NRCS 2006a, USDA-NRCS 2006b).

This vegetation community accounts for less than one percent of the Project Area and occurs north of the White River in the northwestern portion of the SCPA.

### Badlands/Rock Outcrop

Badlands and rock outcrops occur in all vegetation communities in the Uinta Basin. These areas are generally devoid of vegetation due to clay soils and steep slopes; however some plants may be found in small areas where water may accumulate or where the texture of alluvial material is more desirable for plant growth (USDA-NRCS 2006a, USDA-NRCS 2006b). In the SCPA, small areas of rock outcrops and badlands (less than one percent of the Project Area) occur along the White River in the northwestern portion of the Project Area.

### **3.7.1 INVASIVE, NON-NATIVE SPECIES**

Invasive weeds are defined as plants that grow out of place and are competitive, persistent, and pernicious (James et al. 1991). Noxious weeds are invasive species that are designated by a Federal, State, or county government as injurious to public health, agriculture, recreation, wildlife or property. The spread of invasive and noxious weeds is a concern in areas proposed for surface development activities.

The most common locations for weeds include existing disturbance areas such as roadsides, well pads, pipeline ROWs, adjacent washes, and areas where grazing has removed native species. Roads facilitate biological invasion, where disturbed roadside habitats are invaded by non-native species, dispersed by wind, water, vehicles, and other human activities. Roads may be the first points of entry for exotic species into a new landscape, and the road can serve as a corridor for plants moving farther into the landscape (Gelbard and Belnap 2003; Forman and Alexander 1998).

**Table 3.7-2** summarizes those weeds designated and published as noxious for Uintah County and the State of Utah. The most problematic noxious weeds in this area of Uintah County are saltcedar (*Tamarix ramosissima*) and hoary cress (*Cardaria draba*). The most common invasive species (not listed on the noxious weed list for the area) in the Project Area are Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*), and cheatgrass (*Bromus tectorum*). Although not listed below, black henbane (*Hyoscyamus niger*) and houndstongue (*Hieracium cynoglossoides*) are weed species that may also occur in the SCPA, and are of special interest to the BLM VFO.

**Table 3.7-2. Noxious Weeds of Uintah County and State of Utah**

Common Name	Scientific Name
Bermuda grass	<i>Cynodon dactylon</i>
Canada thistle	<i>Cirsium arvense</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Dyer's woad	<i>Isatis tinctoria</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hoary cress	<i>Cardaria draba</i>
Johnsongrass	<i>Sorghum halepense</i>
Leafy spurge	<i>Euphorbia esula</i>

Common Name	Scientific Name
Medusahead	<i>Taeniatherum caput-medusae</i>
Musk thistle	<i>Carduus nutans</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Perennial sorghum	<i>Sorghum halepense</i> & <i>S. almum</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Quackgrass	<i>Elymns repens</i>
Russian knapweed	<i>Centaurea repens</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Saltcedar	<i>Tamarix ramosissima</i>
Scotch thistle	<i>Onopordum acanthium</i>
Spotted knapweed	<i>Centaurea stoebe</i>
Squarrose knapweed	<i>Centaurea rigata</i>
Yellow starthistle	<i>Centaurea solstitialis</i>

### 3.7.2 WETLANDS/RIPARIAN ZONES

The BLM surveyed wetlands/riparian zones within the VFO. These areas differ from the riparian vegetation communities discussed above (**Section 3.2.7**) in that these areas are based on hydrological function as opposed to vegetation characteristics. BLM riparian management seeks to maintain, restore, improve, protect, and expand wetlands/riparian zones so they are in proper functioning condition for their productivity, ecological diversity, and sustainability. The VFO Approved RMP prohibits new surface-disturbing activities within active floodplains, wetlands, public water reserves, or 100 meters of riparian areas. An exception to this restriction could be authorized by the AO if there are no practical alternatives, impacts could be fully mitigated, or the action is designed to enhance riparian resources (BLM 2008e).

In the SCPA, wetlands/riparian zones are closely associated with the White River and Evacuation Creek. There are approximately 105 acres of wetlands/riparian zones, and approximately 4 miles of linear wetland/riparian features (those wetland/riparian features that were too small to map as a polygon) located along the White River in the northwestern portion of the SCPA. In addition, approximately 5 miles of linear wetland/riparian features follow the northern and southern sections of Evacuation Creek in the SCPA.

## 3.8 LIVESTOCK GRAZING

The SCPA contains portions of five grazing allotments: Little Emma, Hells Hole, Southam Canyon, Watson, and White River Bottoms allotments. These five allotments in the Project Area are grazed by sheep and cattle during various grazing periods. **Figure 3.8-1** provides a map of the grazing allotments that occur in the Project Area.

An animal unit month (AUM) is defined as “the amount of dry forage required by one animal unit for one month based on a forage allowance of 26 pounds per day” (BLM 2008e). Between the five allotments, there are approximately 1,005 livestock AUMs on 8,374 acres of usable land (those lands with a slope less than or equal to 40 percent) allotted for grazing within the Project Area.

All allotments have been placed in one of three management categories: Category M (Maintain Existing Resource Conditions), Category I (Improve Existing Resource Conditions), and Category C (Custodial Management). Designation of categories is dynamic and primarily based on resource potential, resource use conflicts, opportunity for positive economic return on public investments, and the present management situation (BLM 2008e). Details on each allotment, including management categories, within the SCPA are summarized in **Table 3.8-1**.

**Table 3.8-1. Grazing Allotment Information in the Southam Canyon Project Area**

Name	Type	Management Status	Use period	Total Allotment acres	Total Active AUMs	Usable <sup>1</sup> Acres w/in Project Area	AUMs <sup>2</sup> w/in Project Area
Hells Hole (#08819)	Sheep	Maintain	12/01-4/30	30,422	3,999	6,556	862
Little Emma (#15852)	Sheep	Maintain	11/27-4/30	44,782	3,624	1	0
Southam Canyon (#15843)	Sheep	Maintain	11/01-4/01	13,827	1,315	1,176	112
Watson (#08815)	Sheep	Custodial	11/15-4/30	25,425	1,258	626	31
White River Bottoms (#15850)	Cattle	Custodial	6/07-10/15	12,900	480	15	1
<b>Totals</b>						<b>8,374</b>	<b>1,005</b>

Source: BLM 2008c, Rangeland Administration System

<sup>1</sup> Usable land is defined as BLM land that has a slope less than or equal to 40 percent.

<sup>2</sup> Allotment AUMs within the Project Area were calculated using total AUMs and total acreage for each grazing allotment

## 3.9 WILDLIFE AND FISHERIES

The SCPA supports a diversity of wildlife species and habitats. Species occurrences are typically dependent on habitat availability, carrying capacities, and the degree of existing habitat disturbance. The SCPA supports approximately 10,575 acres of wildlife habitat including a large, fairly contiguous upland habitat, dissected by the incised intermittent drainages of Evacuation Creek and Southam Canyon. Past oil and gas development, consisting of six existing wells and their associated ROWs and facilities, has fragmented wildlife habitats in the area. Water resources are limited within the SCPA, and therefore the White River, which flows through the northwestern corner of the SCPA, and the wetland/riparian zones associated with Evacuation Creek, which bisects the SCPA, provide the greatest habitat value for wildlife and fisheries.

### 3.9.1 GENERAL WILDLIFE

Small mammals potentially found within the SCPA and surrounding region include the cottontail rabbit (*Sylvilagus* spp.), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilis*), and various species of rodents and bats including the Townsend's big-eared bat (*Corynorhinus townsendii*) and fringed myotis (*Myotis thysanodes*). Bird species that may be present include numerous migratory birds (see **Section 3.9.3**) and raptors (see **Section 3.9.4**). Herptiles potentially found in the region include the wandering garter snake (*Thamnophis elegans vagrans*), Great Basin gopher snake (*Pituophis catenifer deserticola*), milksnake (*Lampropeltis*

*triangulum*), Great Basin spadefoot toad (*Scaphiopus intermontana*), western whiptail (*Cnemidophorus tigris*), sagebrush lizard (*Sceloporus graciosus*), and shorthorned lizard (*Phrynosoma douglassii*).

Although all of these species are important members of wildland ecosystems and communities, most are common and have widespread distributions within the region. Consequently, the relationships of most of these species to the proposed development are not discussed in the same depth as those species that are threatened, endangered, candidate, sensitive, of special economic interest, or are otherwise of high interest or unique value (special status species are discussed in **Section 3.11**).

### 3.9.2 BIG GAME

Four resident big game species are known to occur in the SCPA: mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*), and bison (*Bos bison*). The UDWR has identified various types of seasonal ranges (e.g., winter, yearlong, and fawning) within the SCPA (**Figures 3.9-1** through **3.9-4**). UDWR ranges are ranked according to their relative biological value and are defined below. Under the VFO ROD and Approved RMP, the BLM has committed to managing big game ranges as defined by the UDWR (BLM 2008e).

*Crucial:* Habitat on which the local population of a wildlife species depends for survival because there are no alternative ranges or habitats available. Crucial value habitat is essential to the life history requirements of a wildlife species. Degradation or unavailability of crucial value habitat will lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.

*Substantial:* Habitat that is used by a wildlife species, but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.

#### 3.9.2.1 Mule Deer

Mule deer occur throughout the western mountains, forests, deserts, and brushlands. Typical habitats include short-grass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests, and forested and shrubby riparian areas. The species is common State-wide in Utah, where it can be found in many types of habitat, ranging from open deserts to high mountains to urban areas. Mule deer often migrate from high mountainous areas in the summer to lower elevations in the winter to avoid deep snow (UNHP-UDWR 2008).

Although mule deer primarily occupy the SCPA during the winter, the species also occupies the portion of the White River corridor in the northwestern portion of the SCPA on a year-round basis. The UDWR has identified a small area (approximately 612 acres) in the northwestern portion of the SCPA as crucial value, year-long fawning habitat (**Figure 3.9-1**). The majority of the SCPA has been identified as crucial value winter habitat (approximately 1,752 acres) and substantial value winter habitat (approximately 7,501 acres) (**Figure 3.9-1**). Seasonal timing restrictions in the Vernal ROD and Approved RMP would apply to portions of mule deer habitat in the SCPA. Specifically, no exploration, drilling, or other development activities would be allowed from May 15 to June 30 in crucial deer fawning habitat. Maintenance of producing wells would be allowed. Additionally, no activities that would result in adverse impacts to deer would

be allowed in crucial deer winter habitat from December 1 through April 30, and no more than 10 percent of such habitat would be subject to surface disturbance and remain un-reclaimed at any given time (BLM 2008e). Mule deer that occupy the SCPA are part of the Book Cliffs mule deer herd unit (Herd Unit #10), which currently falls approximately 35 percent below the UDWR-population objective for this herd (UDWR 2007 – B. Williams, personal correspondence, November 2007).

### **3.9.2.2 Elk**

Elk are common in most mountainous regions of Utah, where they can be found in meadows and forests during the summer, and in foothills and valley grasslands during the winter. The seasonal changes in elevation allow elk to avoid deep snow and find food year-round. Like other members of the deer family, this species relies on a combination of browse, grasses, and forbs, depending on their availability throughout the year. Elk may be active day and night, but most activity occurs at dusk and dawn (UNHP-UDWR 2008).

Elk occupy the southwestern portion of the SCPA during the winter. The UDWR has identified approximately 3,715 acres of substantial value, winter habitat in pinyon-juniper woodlands in the SCPA (**Figure 3.9-2**). Elk that occupy the SCPA are part of the Bitter Creek subunit of the Book Cliffs elk herd unit (Herd Unit #10), which currently falls approximately 53 percent below the UDWR-population objective for this subunit (UDWR 2007 – B. Williams, personal correspondence, November 2007).

### **3.9.2.3 Rocky Mountain Bighorn Sheep**

The Rocky Mountain bighorn sheep is native to rugged mountainous areas of western North America. In Utah, a great effort has gone into re-establishing Rocky Mountain bighorn sheep, and the species can now be found in a number of mountain ranges. Rocky Mountain bighorn sheep prefer steep rocky slopes, and may migrate from higher elevations to lower valleys in the winter (Fitzgerald et al 1994; UNHP-UDWR 2008).

Rocky Mountain bighorn sheep occupy the SCPA on a year-round basis. The UDWR has identified approximately 2,315 acres of crucial value, year-long bighorn sheep habitat along the Evacuation Creek and White River corridors in the SCPA (**Figure 3.9-3**). No management objectives exist for this Rocky Mountain bighorn sheep population due to the high number of domestic sheep and their grazing allotments within the area (UDWR 2007 – B. Williams, personal correspondence, November 2007).

### **3.9.2.4 American Bison**

Bison once roamed from Canada to northern Mexico. Due to over-hunting and habitat alteration, the species was close to extinction by the early 1900s. Since then, protective measures have improved bison populations such that bison can now be found in several areas of Utah, including the Henry Mountains and Antelope Island. They are hunted on a limited basis in the State. Bison prefer plains, grassland, and open woodland habitats. Bison today make shorter migrations than their pre-1900 predecessors (UNHP-UDWR 2008).

The UDWR has identified almost the entire SCPA (approximately 10,498 or 99 percent of the SCPA) as crucial value, year-long habitat for bison (**Figure 3.9-4**). Bison that occupy the SCPA are part of the Book Cliffs bison herd unit, which has a current population objective of 450 individuals (UDWR 2007 – D. Mangus, personal correspondence, November 2007). Bison were

reintroduced to the Book Cliffs through a joint agreement between the UDWR and the Ute Tribe Fish and Game in August 2008. The initial reintroduction released 14 bison from the annual Hill Creek bison roundup to the Book Cliffs. Another 30 bison have been scheduled for release later in 2008 (UDWR 2008a).

### 3.9.3 MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703 et seq.), as amended, was implemented for the protection of migratory birds. The MBTA makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, or barter any migratory bird, including the feathers or other parts, nests, eggs, or migratory bird products. In addition to the MBTA, Executive Order 13186 sets forth the responsibilities of Federal agencies to further implement the provisions of the MBTA by integrating bird conservation principles and practices into agency activities and by ensuring that Federal actions evaluate the effects of actions and agency plans on migratory birds.

The following sections address migratory birds that may inhabit the SCPA, including those species classified as Priority Species by Utah Partners-in-Flight (PIF). Priority Species are denoted by an asterisk (\*). Utah PIF is a cooperative partnership among Federal, State, and local government agencies as well as public organizations and individuals organized to emphasize the conservation of birds not covered by existing conservation initiatives. Migratory bird species that may utilize the SCPA are listed below based on preferred habitats (i.e., nesting and foraging habitats) and vegetative communities present in the area. Those migratory bird species, including special status raptors that are Federally-listed under the Endangered Species Act (ESA) of 1973, as amended, candidates for Federal listing under the ESA, or listed as State sensitive are addressed in **Section 3.10**. Non-special status raptor species are addressed in **Section 3.9.4**.

*Sagebrush* – The following migratory bird species may be associated with sagebrush communities (Wyoming big sagebrush and black sagebrush), which collectively constitute the largest vegetation community within the SCPA: Brewer’s sparrow\* (*Spizella breweri*), mountain bluebird (*Sialia currucoides*), sage sparrow\* (*Amphispiza belli*), horned lark (*Eremophila alpestris*), sage thrasher (*Oreoscoptes montanus*), and vesper sparrow (*Pooecetes gramineus*). These birds may also utilize the desert shrub vegetation community (Parrish et al. 2002).

*Pinyon-Juniper* – The following migratory bird species may be associated with pinyon-juniper habitat, which is the second largest vegetation community within the SCPA: ash-throated flycatcher (*Myiarchus cinerascens*), black-chinned hummingbird (*Archilochus alexandri*), black-throated gray warbler\* (*Dendroica nigrescens*), blue-gray gnatcatcher (*Polioptila caerulea*), Cassin’s kingbird (*Tyrannus vociferans*), common nighthawk (*Chordeiles minor*), common poorwill (*Phalaenoptilus nuttallii*), gray flycatcher, gray vireo\* (*Vireo vicinior*), loggerhead shrike, Scott’s oriole (*Icterus parisorum*), Virginia’s warbler\* (*Vermivora virginiae*), and western bluebird (*Sialia mexicana*) (Parrish et al. 2002).

*Riparian Areas* – The following migratory bird species may be associated with riparian areas along the White River within the SCPA: American goldfinch (*Carduelis tristis*), bank swallow (*Hirundo rustica*), belted kingfisher (*Ceryle alcyon*), black-billed magpie (*Pica pica*), black-capped chickadee (*Parus atricapillus*), broad-tailed hummingbird\* (*Selasphorus platycercus*), Bullock’s oriole (*Icterus bullockii*), downy woodpecker (*Picoides pubescens*), Lewis’ woodpecker (*Melanerpes lewis*), northern flicker (*Colaptes auratus*), western kingbird (*Tyrannus verticalis*), western wood-pewee (*Contopus sordidulus*), yellow warbler (*Dendroica petechia*), and Wilson’s phalarope (*Phalaropus tricolor*) (Parrish et al. 2002).

### 3.9.4 RAPTORS

Some of the more common and visible birds within the SCPA are the raptors, or birds of prey. The SCPA provides diverse breeding and foraging habitats for raptors including lowland riparian areas, desert shrub communities, pinyon-juniper woodlands, and lower elevation shrublands. **Table 3.9-1** identifies those raptor species with the potential to occur in the SCPA, and a description of their typical nesting habitats.

**Table 3.9-1. Raptor Species with the Potential to Occur in the SCPA**

Common Name	Scientific Name	Nesting Habitats
American Kestrel	<i>Falco sparverius</i>	Holes in tree cavities, cliff crevices
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Large trees near rivers, lakes, marshes, or other wetland areas
Cooper's Hawk	<i>Accipiter cooperii</i>	Woodland and riparian zones
Ferruginous Hawk	<i>Buteo regalis</i>	Trees and shrubs, cliffs, utility structures, and rock outcrops
Golden Eagle	<i>Aquila chrysaetos</i>	Cliff ledges and rock outcrops
Great-horned Owl	<i>Bubo virginianus</i>	Cliff ledges or nests of other species
Long-eared Owl	<i>Asio otus</i>	Coniferous and deciduous forests, and shrublands
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Steep-walled canyons with mixed conifer forests
Northern Harrier	<i>Circus cyaneus</i>	Ground within thick vegetation
Peregrine Falcon	<i>Falco peregrinus</i>	Cliff ledges
Prairie Falcon	<i>Falco mexicanus</i>	Cliff ledges
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Cliff ledges, rock outcrops, aspen, pinyon-juniper woodlands
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Coniferous forests
Short-eared Owl	<i>Asio flammeus</i>	Arid grassland and shrublands
Swainson's Hawk	<i>Buteo swainsoni</i>	Cottonwoods, spruce, or serviceberry

Review of BLM records identified several raptor nests in or within ½-mile of the SCPA. The following nest sites have been documented: two golden eagle (*Aquila chrysaetos*) nests, three red-tailed hawk (*Buteo jamaicensis*) nests, two prairie falcon (*Falco mexicanus*) nests, one great-horned owl (*Bubo virginianus*) nest, and one unknown nest. No bald eagle (*Haliaeetus leucocephalus*) roost sites had been identified along the portion of the White River that flows within or near the SCPA.

In 2006, a baseline aerial raptor nest inventory was conducted for all habitats occurring inside the SCPA (B&A 2006). Potential raptor nesting habitat within the area consists primarily of pinyon-juniper woodlands and cliffs/rock outcrops. Eight raptor nests, including one active golden eagle nest, one inactive accipiter nest, and six other inactive nests, were found at the time of the survey; these nests occurred within the vicinity of, but west of, the SCPA. All but one of the observed raptor nests were built on cliff faces. In addition to these nesting sites, other raptors may have established or could establish territories, nests, and/or roosting sites within or near the SCPA. Nest sites could occur on rock outcrops, on taller shrubs, or in trees.

All raptor species and their nests are protected from take or disturbance under the MBTA; however, because Mexican spotted owls, bald eagles, and golden eagles are considered to be special status raptor species, they are discussed in further detail in **Section 3.10**.

### 3.9.5 UPLAND GAME BIRDS

Two resident upland game bird species are known to occur in the SCPA: greater sage-grouse (*Centrocercus urophasianus*) and chukar (*Alectoris chukar*). As the sage-grouse is considered to be a special status species, detailed discussion of the grouse follows in **Section 3.10**.

#### 3.9.5.1 Chukar

Intensive efforts began in Utah in 1951 to establish the chukar, a species native to the Middle East and southern Asia. By 1968, about 186,000 chukars had been released at 191 different sites. This wide distribution, largely on public lands, provides the potential for increased hunter participation and harvest (UNHP-UDWR 2008).

The chukar prefers steep, rocky, semi-arid slopes, riparian brush, and open desert (Ehrlich et al. 1988; UNHP-UDWR 2008). Low shrubs and rocky outcrops provide loafing or escape cover. The species seems to prefer rabbitbrush, sagebrush, saltbrush, and cheatgrass vegetative associations below the juniper tree belt, where nests may be built on the ground, usually concealed by rocks, low-growing shrubs, or clumps of grass. Water sources may be used extensively in late summer, when their diet consists of grass seeds, weed seeds, and insects. In winter, new growth cheatgrass is an extremely important principal food item (UNHP-UDWR 2008).

The UDWR has identified approximately 5,705 acres of substantial value, year-long chukar habitat located primarily in sagebrush vegetation along the White River and Evacuation Creek corridors (**Figure 3.9-5**).

### 3.9.6 FISHERIES

All drainages in the SCPA are considered part of the Upper Colorado River Basin. Fishery habitat in the SCPA occurs in the White River, which flows through the northwestern corner of the SCPA. **Table 3.9-2** presents those fish species that could occur in or downstream from the Project Area. Two intermittent streams (Evacuation Creek and Southam Canyon) also occur in the SCPA. However, these streams only flow at certain times of the year and therefore, generally do not hold enough water to support fish populations.

**Table 3.9-2. Fish Species Potentially Present in or Downstream of the SCPA**

Common Name	Scientific Name	Status
Bluehead Sucker	<i>Catostomus discobolus</i>	UDWR Conservation Agreement Species
Bonytail	<i>Gila elegans</i>	Federally endangered
Carp	<i>Cyprinus carpio</i>	Common
Channel Catfish	<i>Ictalurus punctatus</i>	Common
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Federally endangered
Flathead Minnow	<i>Pimephales promelas</i>	Common
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	UDWR Conservation Agreement Species
Humpback Chub	<i>Gila cypha</i>	Federally endangered
Northern Pike	<i>Esox lucius</i>	Common
Razorback Sucker	<i>Xyrauchen texanus</i>	Federally endangered
Red Shiner	<i>Cyprinella lutrensis</i>	Common
Roundtail Chub	<i>Gila robusta</i>	UDWR Conservation Agreement Species

Federally-listed endangered species and UDWR-designated sensitive fish species are addressed further in **Section 3.10**.

### **3.10 SPECIAL STATUS WILDLIFE AND FISHERY SPECIES**

This section discusses wildlife and fishery species that have a special-status designation, which includes:

- Species Federally-listed as threatened or endangered, proposed for Federal listing as threatened or endangered, or considered to be a candidate for Federal listing as threatened or endangered under the ESA;
- Species listed as sensitive by the UDWR, including both wildlife species of concern and species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing; and
- Species protected under certain specified regulations.

In accordance with Section 7(a)(2) of the ESA, the USFWS must ensure that any Federal action to be authorized, funded, or implemented does not jeopardize the continued existence of a listed species, or destroy or adversely modify the listed species' critical habitat. It is the BLM's current policy that candidate species and State sensitive species are also managed to prevent a future Federal listing as threatened or endangered.

Special status species that have the potential to occur within the SCPA or be affected by development activities within the SCPA are discussed below. Refer to the "Summary of Potential for and/or Occurrence of Special Status Wildlife Species" (**Appendix D**) for further analysis of all special status species and their potential to occur in the SCPA.

#### **3.10.1 MEXICAN SPOTTED OWL**

The Mexican spotted owl (MSO) is Federally-listed as a threatened species. At the northern end of their range, which includes the State of Utah, the MSO is a year-round resident of narrow, shady cool canyons between 4,400 - 6,800 feet in elevation. Most of the owl's activities during the breeding season are believed to occur within the canyons. Owls roost in riparian vegetation of canyon bottoms, on ledges, or cavities in the slickrock canyon. Habitats suitable for MSO nesting appear to be more restricted than those required for foraging or roosting. Areas with high canopy closure and at least a few old-growth trees are usually selected for nesting (USFWS 1995). Canyon habitats used for nesting and roosting are typically characterized by the cooler conditions found in steep, narrow canyons, often containing crevices, ledges, and/or caves. These canyons frequently contain small clumps or stringers of ponderosa pine, Douglas-fir, white fir, and pinyon/juniper. Deciduous riparian and upland tree species may also be present. One common characteristic among the canyon sites is the presence of steep to vertical rock walls in all or part of the canyon. Rock-walled canyons preferred by the owls are generally found at elevations below 7,000 feet to as low as 3,750 feet (Ganey and Balda 1989).

There is no designated critical habitat for the MSO on lands administered by the VFO<sup>2</sup>. The Vernal planning area has been identified as containing suitable MSO habitat according to the

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<sup>2</sup> USFWS-designated MSO critical habitat (CP-15) closest to the SCPA is located in Desolation Canyon in Carbon and Emery Counties, Utah.

USFWS 1997 and 2000 models by Willey and Spotskey. The majority of the modeled MSO habitats in the VFO area were further evaluated by computer models or ground-truthed between 2003 and 2005. According to these analyses, portions of the SCPA were considered potential “poor” MSO habitat, and “fair” habitat was identified approximately 0.47 miles northeast of the SCPA (SWCA 2005). At the direction of the BLM, areas of “poor” habitat do not require surveys for the presence of MSO prior to surface-disturbing activities. However, all areas of “fair” or better habitat identified in the *2005 Assessment of Potential MSO Nesting Habitat on BLM-administered Lands in Northeastern Utah* (SWCA 2005) must be surveyed for the presence of MSO prior to any disturbance within ½-mile of these areas. In the summer of 2007 and 2008, MSO surveys were conducted according to USFWS 2003 Mexican Spotted Owl Survey Protocol to evaluate the potential MSO “fair” habitat adjacent to the SCPA. These surveys resulted in some incidental great-horned owl responses, but no MSO response. Due to the lack of MSO response, it was inferred that MSO were absent in the surveyed area at the time the survey was conducted (B&A 2007; B&A 2008).

### **3.10.2 YELLOW-BILLED CUCKOO**

The yellow-billed cuckoo (*Coccyzus americanus*) is a candidate for listing under the ESA. This species is a neotropical migratory species that breeds in the U.S. and Canada, and winters in South America (USFWS 2001). The cuckoo is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nest sites have been correlated with large patches (greater than 10 hectares) of gallery cottonwood-willow stands, dense understories, high local humidity, low local temperatures, and in proximity to slow or standing water.

In Utah, this neotropical migrant nests in riparian areas and has been documented in cottonwood habitat along the Green River (Howe and Hanberg 2000). In this survey, a total of 16 yellow-billed cuckoos were detected at four different sites along the Green River from Hydes Bottom to the Stirrup. Breeding was not confirmed during this survey; however, it is possible that breeding occurred as indicated by the presence of birds and territories during late season survey efforts (Howe and Hanberg 2000).

Although no yellow-billed cuckoo nests have been identified within the SCPA, potential nesting habitat may occur in riparian vegetation associated with the portion of the White River that flows through the SCPA.

### **3.10.3 BALD EAGLE**

Effective August 8, 2007, the USFWS delisted the bald eagle (*Haliaeetus leucocephalus*) in the lower 48 States from the Federal list of endangered and threatened wildlife (72 FR 37346). However, the bald eagle is still protected under the Bald and Golden Eagle Protection Act (BGEPA) and the MBTA. In addition, the USFWS, in compliance with Section 4(g)(1) of the ESA, will monitor the status of the bald eagle over a 20-year period with sampling events held once every 5 years (USFWS 2007). The result of the post-delisting monitoring plan will be to determine if the population of bald eagles in the lower 48 States warrants expanded monitoring, additional research, and/or resumption of Federal protection under the ESA (USFWS 2007).

Although bald eagles have shown recovery across their range, the number of nesting pairs in Utah is low; to date there are only nine known bald eagle breeding pairs in the State of Utah (72 FR 37346). Although no bald eagle nesting sites exist within or near the SCPA, known winter roost sites are located along the Green River, west of the SCPA. These winter roost sites do not occur within ½-mile of the SCPA. Wintering bald eagles concentrate at established roosting sites for

the purpose of feeding and sheltering in close proximity to sufficient food sources. Winter roosting usually occurs from early November through late March, and bald eagles may periodically utilize the SCPA as foraging habitat during this time period.

#### **3.10.4 GOLDEN EAGLE**

The golden eagle (*Aquila chrysaetos*) is protected under the MBTA and BGEPA, based upon the similarity of the juvenile bald eagle's physical appearance to that of the adult golden eagle. Populations in the northern parts of their breeding range migrate south for the winter. However, golden eagles in Utah are considered to be year-round residents. Golden eagles are quite common in Uintah County and the VFO. Throughout the summer, golden eagles are found in mountainous areas, canyons, shrublands, and grasslands. During the winter, they inhabit shrubsteppe vegetation, as well as wetlands, river systems, and estuaries. Golden eagle nests are constructed on cliffs or in large trees. In Utah, eggs are laid from late February to early March (UNHP-UDWR 2008).

Review of BLM records identified two golden eagles nests within the SCPA boundary. Additionally, potential nesting and foraging habitat is found throughout the SCPA; therefore, additional breeding golden eagles could or may have established territories/nests in the SCPA.

#### **3.10.5 GREATER SAGE-GROUSE**

The greater sage-grouse (*Centrocercus urophasianus*) is a UDWR wildlife species of concern because widespread losses of sagebrush habitat have caused a decline in population size and have limited species distribution within the State. Large fragments of sage-grouse habitat have been lost throughout Utah due to a variety of developments including intensive domestic livestock grazing, indiscriminate pesticide spraying, cropland conversion, wildfires, and the invasion of exotic species (e.g., smooth brome, crested wheatgrass) (UDWR 2002; UNHP-UDWR 2008). Today, sage-grouse are found in 26 of Utah's counties (including Uintah County) and are thought to only occupy 50 percent of their historic habitat (UDWR 2002). In Utah, sage-grouse inhabit sagebrush habitat of the Colorado Plateau and Great Basin geographic regions from 6,000-9,000 feet above mean sea level (UDWR 2002). In Uintah County, Utah, the largest populations of sage-grouse are on Diamond and Blue Mountains, with smaller populations scattered throughout the County (UDWR 2002).

Sage-grouse are a sagebrush-obligate species that rely almost exclusively on contiguous sagebrush ecosystems for leks, nesting sites, feeding sites, rearing sites, protection and wintering grounds. Based largely on the presence of contiguous sagebrush vegetation, the UDWR has identified the following habitats for sage-grouse in the SCPA: approximately 4,804 acres of crucial value brooding areas and approximately 4,804 acres of crucial value winter habitat (see Figure 3.10-1). These two habitats overlap one another in the eastern portion of the SCPA, east of the Evacuation Creek corridor. No leks or nesting habitat have been identified within the SCPA. However, UDWR identified one possible lek (the Watson lek) less than one mile from the southeastern corner of the SCPA. Males and females have been observed in this area, but no strutting has been observed. As such, it is unclear if these sage-grouse are tied to another population or are just a small, isolated group. The UDWR continues to monitor this area each spring; however, no counts have been made. The Watson lek was last monitored in spring 2008, at which time, the UDWR found droppings in the area, but no sage-grouse (UDWR 2008b).

### **3.10.6 ENDANGERED COLORADO RIVER FISHES**

#### **3.10.6.1 Bonytail**

The bonytail (*Gila elegans*) is a Federally-endangered fish species. Historically, the bonytail was a common species in the main river channels of the Colorado River systems; however, today the bonytail exists in very low numbers in its natural habitat. There are currently no self-sustaining populations of bonytail in the wild, and very few individuals have been caught throughout the Upper Colorado River Basin in Utah. A few individuals have been caught in the Green River in Hideout Canyon and Gray Canyon, and at the confluence of the Colorado River and the Green River. Releases of hatchery-reared bonytail into the Upper Basin have resulted in low survival, with no evidence of reproduction or recruitment. The bonytail is adapted to mainstem rivers where it has been observed in pools and eddies. Flooded bottomland habitats are important growth and conditioning areas for bonytail, particularly as nursery habitats for young (USFWS 2002a).

In Utah, a total of 139 river miles and their associated 100-year floodplains have been designated by the USFWS as critical habitat for the bonytail in portions of the Green River and Colorado River. Critical habitat for the bonytail is not present in the SCPA. The closest USFWS-designated critical habitat for the bonytail is located in the Green River, upstream from its confluence with the White River (approximately 33 miles from the SCPA) (USFWS 2008).

#### **3.10.6.2 Colorado Pikeminnow**

The Colorado pikeminnow (*Ptychocheilus lucius*), formerly known as the Colorado squawfish, is a Federally-endangered fish species. The Colorado pikeminnow is endemic to the Colorado River Basin where it has adapted to rivers with seasonally variable flow, high silt loads, and turbulence. Historically in Utah, the Colorado pikeminnow was found in the Colorado, Green, Duchesne, San Juan, White, and Dolores Rivers and probably numerous smaller streams. Today, the species is most abundant in the Green River below the confluence with the Yampa River; the White River from Taylor Draw Dam near Rangely, Colorado, downstream to the confluence with the Green River; and the mainstem of the Colorado River from Palisade, Colorado, to Lake Powell. The Yampa River and Gray Canyon of the lower Green River hold the two principal spawning sites of this species (USFWS 2002b).

A total of 726 river miles in Utah have been designated by the USFWS as critical habitat for the Colorado pikeminnow. This critical habitat occurs in portions of the Green, Colorado, White, and San Juan Rivers and their respective 100-year floodplains, including the portion of the White River (approximately 1.6 river miles) that flows through the SCPA (USFWS 2008).

#### **3.10.6.3 Humpback Chub**

The humpback chub (*Gila cypha*) is a Federally-endangered fish species. In Utah, specimens of humpback chub have been reported from the upper Green River, Desolation Canyon on the Green River, the lower Yampa River, the White River, and the Colorado River above and below Glen Canyon Dam. Populations of adult humpback chub are found in boulder-strewn river canyons where they utilize a variety of habitats including pools, riffles, eddies, rocky runs, and travertine (i.e., a form of limestone) dams. The highest known concentrations of humpback chub are found in the Westwater Canyon and Grand Canyon reaches of the Colorado River. Humpback chub in the Desolation/Gray Canyons of the Green River is the third most abundant population of this species (USFWS 2002c).

In Utah, a total of 139 river miles and their associated 100-year floodplains have been designated by the USFWS as critical habitat for the humpback chub in portions of the Green River and Colorado River. Critical habitat for the humpback chub is not present in the Project Area. The closest USFWS-designated critical habitat for the humpback chub is located in the Green River, upstream from its confluence with the White River (approximately 33 miles from the SCPA) (USFWS 2008).

#### **3.10.6.4 Razorback Sucker**

The razorback sucker (*Xyrauchen texanus*) is a Federally-endangered fish species. In the Upper Colorado River Basin in Utah, the razorback sucker is currently found in the Green River, upper Colorado River, and San Juan River sub-basins. The fish are mostly aged adults with little or no recruitment, except in the middle Green River, where small numbers of juveniles and young adults indicate low recruitment levels. The largest population of razorback sucker in the Upper Colorado River Basin exists in low-gradient, flat-water reaches of the middle Green River between the Duchesne River and Yampa River (USFWS 2002d).

Adult razorback suckers occupy a variety of habitat types including impounded and riverine areas, eddies, backwaters, gravel pits, flooded bottoms, flooded mouths of tributary streams, slow runs, sandy riffles, and others. Razorback suckers typically move into flooded areas in early spring and begin spawning migrations to specific locations as they become reproductively active. Spawning occurs over rocky runs and gravel bars (USFWS 2002d).

In Utah, a total of 688 river miles and their associated 100-year floodplains have been designated by the USFWS as critical habitat for the razorback sucker in portions of the Green, Colorado, Duchesne, White, and San Juan Rivers. Critical habitat for the razorback sucker is not present in the Project Area. The closest USFWS-designated critical habitat for the razorback sucker is located in the White River approximately 13 miles downstream of the SCPA (USFWS 2008).

### **3.10.7 STATE SENSITIVE FISHES**

#### **3.10.7.1 Bluehead Sucker**

The bluehead sucker (*Catostomus discobolus*) is a Utah State sensitive species found in the Upper Colorado River Basin. Bluehead suckers occur in small to large streams, rivers, and tributaries in the Upper and Lower Colorado River Basin, including the Green River. Large adult bluehead may inhabit stream environments as deep as 2 to 3 meters, although they most commonly feed in riffles and swift runs. Spawning occurs in spring and early summer at lower elevations and mid-to late summer in colder waters at higher elevations. Spawning occurs on gravel beds in shallow water (Sigler and Sigler 1996).

Populations of the bluehead sucker currently occur in the mainstem of the Green River from the Colorado River confluence upstream to Lodore, Colorado, and in the White River from the Green River confluence upstream to Meeker, Colorado. In the Upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico), bluehead suckers currently occupy about 45 percent of their historical habitat. Recent declines of the species have occurred in the White River below Taylor Draw Dam, and in the upper Green River. Known distribution of this species includes portions of the Green River downstream of the SCPA (UNHP-UDWR 2008).

### 3.10.7.2 Flannelmouth Sucker

The flannelmouth sucker (*Catostomus latipinnis*) is listed as a Utah State sensitive species found in the Upper Colorado River Basin. Flannelmouth suckers typically inhabit deep water habitats of large rivers, but are also found in small streams and occasionally in lakes. Flannelmouth suckers spawn during March and April in the southern portions of Utah and from May to June in northern Utah at higher elevations (Sigler and Sigler 1996).

Flannelmouth sucker populations can be found in the Green River from the Colorado River confluence upstream to the Flaming Gorge Reservoir, and the White River from Kenny Reservoir in Colorado to the Green River. Recent investigations of historical accounts and museum specimens indicate that flannelmouth suckers occupy approximately 50 percent of their historic range in the Upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico). Populations have declined since the 1960s due to impoundment of the Green River in Wyoming and Utah (Flaming Gorge Reservoir), as well as the impoundment of the Colorado River in Glen Canyon, Utah (Lake Powell). Known distribution of this species includes portions of the Green River downstream of the SCPA (UNHP-UDWR 2008).

### 3.10.7.3 Roundtail Chub

The roundtail chub (*Gila robusta*) is listed as a Utah State sensitive species and is found in the Upper Colorado River Basin. This species is a large member of the minnow family and is found most often in major rivers and smaller tributary streams. The roundtail chub has been described as varying from sedentary to mobile, depending on life stage and habitat conditions (Sigler and Sigler 1996).

Roundtail chub populations occur in the Green River from the Colorado River confluence upstream to Echo Park and in the White River from the Green River confluence upstream to near Meeker, Colorado. In the Upper Colorado River Basin (New Mexico, Utah, Colorado and Wyoming), the species has been extirpated from about 45 percent of its historical range, including the Price River and portions of the San Juan, Gunnison, and Green Rivers. Data on smaller tributary systems are largely unavailable, and population abundance estimates are available only for short, isolated river reaches. Known distribution of this species includes portions of the Green River downstream of the SCPA (UNHP-UDWR 2008).

## 3.11 RECREATION

The Project Area is located primarily on public lands administered by the BLM (83 percent of the 10,575 acre Project Area). The remaining 17 percent is comprised of private, State, and Tribal lands scattered throughout the area. Within the Project Area, visitors encounter extensive open areas where they can participate in dispersed activities in an unrestricted setting. However, the network of roads, along with existing oil and gas facilities and associated development in the area, reduce the primitive character of the Project Area for visitors seeking solitude and relatively pristine landscapes. Primary access to the Project Area is via State Highway 45 as well as Dragon Road and Southam Canyon Road, both Class 1-B gravel roads. These roads provide access to and within the Project Area for recreational users.

Big game hunting in the Project Area takes place in the fall and winter. The SCPA is part of the Limited Entry hunting area for elk and deer. The Project Area is primarily located within the Book Cliffs Bitter Creek wildlife management unit. A small portion of the Project Area is also

located in the South Slope Bonanza management unit. In the spring, antler collection is a popular activity by foot, horseback, and off highway vehicles (OHV).

All of the BLM lands within the the Project Area are designated as “limited” to OHV use to protect important wildlife habitat and recreation values. Areas designated as “limited” restrict OHV use to designated trails and travel routes or to certain seasons (BLM 2008e). There are no developed recreational facilities or established OHV trail systems within the immediate Project Area. Therefore, much of the camping and OHV travel that occurs in or near the Project Area is related to big game hunting.

*River Recreation:* The majority of recreational use in the project vicinity is associated with the White River which bisects the northwestern corner of the Project Area. The river is used extensively for canoeing, floating, fishing, hunting, wildlife and waterfowl viewing, and exploration of historical sites. The White River is a major source for commercial and private boating draws an estimated 2,000 people per year to this section of the White River. The most popular segment, a portion of which is within the project area, begins at the Bonanza Bridge and ends at the Enron take-out (BLM 2008d, Appendix C). In accordance with the VFO Approved RMP, there would be no new surface disturbing activities allowed within the line of sight from the centerline, up to ½ mile along both sides of the White River from where the river enters T10S, R24E to where the river leaves Section 18, T10S, R23E. This restriction includes lands within the upper portion of the Project Area. Valid leases which predate the RMP (2008e) would be excepted.

### **3.12 VISUAL RESOURCES**

Public lands managed by the BLM within the Project Area have been classified according to BLM’s Visual Resource Management (VRM) system, an analytical process used to inventory, manage, and set management objectives for visual resources on public lands. The area classification can be used to determine the visual impact of proposed activities and to measure the amount of disturbance an area can tolerate before the proposed activity exceeds the VRM.

The majority of the Project Area (5,957 acres) occurs within a VRM Class III area. In accordance with Class III objectives, the landscape should partially retain the existing character and changes to the landscape are moderate. The northern portion of the Project Area along the White River (646 acres) is classified as a VRM Class II area. VRM Class II objectives include retaining the existing character of the landscape and allowing for management activities that do not attract the attention of a casual viewer. The remaining 2,209 acres of BLM lands in the Project Area are classified as a VRM Class IV, which allows for changes in the landscape’s original composition and character to dominate the viewshed (BLM 2008d, Appendix I).

The SCPA falls within an active oil and gas unit. As such, a number of well pads, ancillary facilities, access roads, and surface pipelines have modified the natural character of Project Area on both Federal and State lands. Six wells have been developed within the SCPA, three within VRM III areas and the other three within VRM IV areas.

Given the viewer sensitivity of recreationists on the White River, GIS viewshed analyses have been completed to determine the extent of lands which can be seen by the casual observer on the river (**Figure 3.12-1**).

### 3.13 LAND USE AUTHORIZATION

As discussed in **Section 1.2**, the Project Area consists predominantly of lands managed by the BLM (8,813 acres). The remainder of land is managed by the State of Utah (162 acres), and private land owners (1,600 acres).

Federal lands within the Project Area are managed for multiple uses under the VFO Approved RMP and ROD (BLM 2008e). Existing and/or authorized land uses on Federal lands within the Project Area include oil and gas development, oil shale development, water development, and grazing. In addition lands within the Project Area provide habitat for a number of wildlife species and are used for recreational activities.

#### 3.13.1 RIGHTS-OF-WAY

Prior to using or constructing a road, pipeline, or ancillary facility located on BLM-administered lands outside of the lease or unit on which the proposed project is being conducted, oil and gas operators are required to submit a ROW application. ROW applications must also be submitted prior to constructing water management and transportation facilities, electrical generation and transmission facilities, communications systems, and all other transportation systems.

An LR2000 database search was conducted in July of 2008 to identify all pending or authorized ROWs within the Project Area. These ROWs are discussed in **Table 3.13-1**.

**Table 3.13-1. Authorized and Pending Rights-of-Way within the Project Area**

Applicant or ROW Holder	Type	Status	Township and Range	Section(s)	Acreage
Utah Division of Water Resources	Water Facility	Authorized	10S:24E 10S:25E	11,12,14,15,22 18	2,377
Mid-American Pipeline	O&G pipeline	Authorized	10S:24E 10S:25E	12,13 18	1.25
Uintah County	Road	Authorized	10S:24E 10S:25E	12,13 18	38.7
Uintah County	Road	Authorized	10S:25E	30,31	25.6
Uintah County	Road	Pending	10S:25E	31	0.1
Uintah County	Road	Pending	10S:24E	12,13,14,23,24,26,27,34,35	0.1
XTO	O&G Pipeline	Authorized	10S:24E	27	17.1
Mid-American Pipeline	O&G Pipeline	Authorized	10S:24E 10S:25E	12,13 18	1,181.8
Enduring Resources	Road	Authorized	10S:25E	19	4.6
Enduring Resources	O&G Pipeline	Authorized	10S:25E	19	0.88
Enduring Resources	O&G Pipeline	Authorized	10S:25E	18	2.17
Enduring Resources	O&G Pipeline	Authorized	10S:24E	13	0.38
OSEC	Water Facility	Authorized	10S:24E	15,22	26.9
OSEC	Road	Authorized	10S:24E	14,15,22,23	17.8
ETC Canyon	O&G Pipeline	Authorized	10S:24E	12	17.0

Applicant or ROW Holder	Type	Status	Township and Range	Section(s)	Acreage
Pipeline			10S:25E	18,19	
Moon Lake Electric	Power Transmission Line	Authorized	10S:24E 10S:25E	12 18,19	55.0

As demonstrated by **Table 3.6-1**, there are a number of pending and authorized ROWs and ROW holders within the Project Area. The majority of the ROWs that have been applied for and issued are for road use or pipeline construction.

In addition to ROWs for roads and pipelines, the Project Area contains two ROWs for water facilities. ROW UTU-030745 was issued to the Utah Division of Water Resources for the construction of the White River Dam, which was planned to be constructed as part of the Central Utah Project. The ROW for the White River Dam and reservoir covers approximately 321 acres of the 10,574 acre Project Area (3 percent). An environmental impact statement was completed for the potential White River Dam Project by the BLM Vernal Field Office in 1980; however, the dam was never constructed. Although the State Of Utah has never relinquished the ROW for this water facility, neither the State Of Utah's Water Plan (Utah Division of Water Resources 2001) or the Uintah Basin's Water Plan (Utah Division of Water Resources 1999) give any indication that the White River Dam site will be developed in the reasonably foreseeable future.

The second water management facility is associated within the OSEC's oil shale RD&D area within the Project Area. More information on the RD&D project is provided in the section below as well as in **Section 3.2.2**-(Mineral and Energy Resources).

### 3.13.2 MINERAL LEASES

In addition to conventional oil and gas extraction, there are other mineral extraction activities that take place within the Project Area. An LR2000 database search was conducted to identify all pending or authorized non-oil and gas mineral leases as well as any mining claims within the Project Area. A list of all non-oil and gas mineral leases and the lessees can be found in **Table 3.13-2**.

**Table 3.13-2. Non-Oil and Gas Mineral Leases within the Project Area**

Applicant or ROW Holder	Type	Status	Township and Range	Section(s)	Acreage
OSEC	Oil Shale RD&D	Authorized	10S:24E	22,27	160.0
BAARD Energy	Oil Shale RD&D	Pending	10S:24E	22,27	160.0
Frederick Larson	Placer	Pending	10S:25E	30,31	10,176