

**2015 Comprehensive Management Plan**



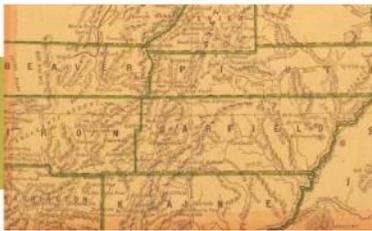
**Moab  
Sovereign Exchange  
Lands**





# Table of Contents

<b>INTRODUCTION &amp; BACKGROUND</b>	5	Union Pacific Railroad	26
History of Land Acquisition	5	Access	26
Management Directives for Sovereign Lands	5	Recreation	26
Public Trust Doctrine	6	Sovereign Trail System	26
Legal Authority	7	Dispersed Camping	27
Purpose of the Comprehensive Management Plan	7	Adjacent Land Ownership	27
		Paleontological Resources	29
<b>PRAIRIE DOG HAVEN UNIT</b>	10	Paleontological Resources of the Dalton Wells Unit	29
<b>DESCRIPTION</b>		The Dalton Wells Quarry	32
Introduction	10	Dinosaur tracks	34
Historic Land Use	10	Vegetation	35
Current Land Use	10	Soils	35
Mineral Extraction	12	Wildlife	36
Grazing	13	Terrestrial/Avian Wildlife	36
Access	13	Sensitive Species/T&E	36
Adjacent Land Ownership	14		
Vegetation	14	<b>DALTON WELLS UNIT</b>	
Soils	14	<b>MANAGEMENT OBJECTIVES</b>	38
Wildlife	14	Paleontological Resources	38
Terrestrial Wildlife/Avian Wildlife	14	Preservation	38
Sensitive Species/T&E	15	Research	38
Paleontological Resources	17	Public Access and Safety	38
		Camping regulations	38
<b>PRAIRIE DOG UNIT MANAGEMENT</b>		Sanitation	38
<b>GOALS AND OBJECTIVES</b>	18	Target shooting	38
Mineral Extraction	18	Recreation Management of Existing Trails	39
Manage Invasive Species	18	Multiple-Use Sovereign Trail	39
Grazing	19	Public Trust Education and Outreach	39
Recreation Management	19	Management of Invasive Species	39
Wildlife Management	19	Adjacent Landowner Partnerships	39
Adjacent Landowner Partnerships	19		
		<b>APPENDIX</b>	41
<b>DALTON WELLS UNIT</b>	20	Appendix A - Citations	41
Historic Land Use	20	Appendix B – Public Comment Summary	46
Current Land Use	24		
Dinosaur Quarry	24		
Industrial Minerals and Metals	24		
Oil, Gas and Mineral Resources	25		



# Table of Contents

## Maps

Figure 1 • Map of Sovereign Exchange Lands Geographical Location	pg 8
Figure 2 • Map of Moab Sovereign Exchange Lands	pg 9
Figure 3 • Map of Prairie Dog Haven	pg 11
Figure 4 • Map of Dalton Wells	pg 21
Figure 5 • Map CCC Camp	pg 23
Figure 6 • Map of Sovereign Trail System	pg 28

## Tables

Table 1 • Legal Description – Prairie Dog Haven Unit	pg 10
Table 2 • Current Leases on Prairie Dog Unit	pg 12
Table 3 • Utah DNR, Division of Wildlife Resources Utah Sensitive Species List	pg 16
Table 4 • Legal Description – Dalton Wells Unit	pg 22
Table 5 • Current Leases on Dalton Wells Unit	pg 24
Table 6 • Utah DNR, Division of Wildlife Resources Utah Sensitive Species List	pg 37

# **INTRODUCTION & BACKGROUND**

---

## **HISTORY OF LAND ACQUISITION**

In 1965, the Utah Division of State Lands and Forestry exchanged both school trust lands and sovereign lands within the newly-designated Canyonlands National Park for Bureau of Land Management (BLM) lands north of Moab. These lands were managed by the Division of State Lands and Forestry until July 1994 when State Lands and Forestry divided into what are now known as the School and Institutional Trust Lands Administration (SITLA) and the Division of Forestry, Fire and State Lands (DFFSL). At that time, certain parcels in the vicinity of Crescent Junction and Courthouse Ridge were selected from the Canyonlands exchange for their paleontological and wildlife habitat values to be managed as sovereign lands (hereafter referred to as Moab Sovereign Exchange Lands”), while the remaining lands were designated as SITLA-administered lands.

*(See Figure 1 and Figure 2: Maps of Moab Sovereign Exchange Lands)*

The Moab Sovereign Exchange Lands are different from most sovereign lands managed by DFFSL. UTAH CODE § 65A-1-1 defines sovereign lands as “those lands lying below the ordinary high watermark of navigable bodies of water at the date of statehood and owned by the state by virtue of its sovereignty”. Since the exchange, DFFSL rules have been revised to expand this definition to include land received in exchange for sovereign lands. As a result, the exchange lands to be managed under this comprehensive management plan are considered sovereign lands and will be managed in accordance with the Public Trust Doctrine and multiple-use, sustained-yield principals despite the fact that they are not shoreline, riverbed or lakebed lands.

*(See Figure 1 and Figure 2: Maps of Moab Sovereign Exchange Lands)*

## **MANAGEMENT DIRECTIVES FOR SOVEREIGN LANDS**

In Utah, sovereign lands are defined by rule as “those lands lying below the ordinary high water mark of navigable bodies of water at the date of statehood and owned by the state by virtue of its sovereignty or land received in exchange for sovereign land”. The Moab Sovereign Exchange Lands fall under this definition and were selected for their public trust values. Public trust values are typically considered uses such as lake and stream navigation and recreational uses such as hunting, fishing and trapping. Public trust values can also include conservation and preservation. The establishment of Canyonlands National Park ensured protection of these public trust values on sovereign lands of the Colorado River while providing for an exchange of sovereign land to the National Park Service, taken for acreage that is not near a navigable body of water. While public trust values are typically associated with only navigable bodies of water, these values will be considered in management decisions regarding the Moab Sovereign Exchange Lands due to the fact that the exchange lands are considered sovereign. The Moab Sovereign Exchange Lands were selected for their wildlife, scenic, recreational and paleontological values (Division of State Lands and Forestry, Record of Decision 94-0602- EXCH 48, 2-3).

## **PUBLIC TRUST DOCTRINE**

Under Roman law and perhaps earlier, the air, sea and running waters were common to all citizens and the separate property of none. All rivers and ports were public and the right of fishing was common to all. Any person was at liberty to use the seashore to the highest tide, as long as they did not interfere with the use of the sea or beach by others. The influence of Roman civil law carries forward through English common law to today's Public Trust doctrine, which recognizes the special public interest in rivers, lakes, tidelands and waters. Thus, sovereign lands are held in trust by the state for the benefit of the public.

The Public Trust doctrine is flexible and accommodates changing demands for Public Trust resources. DFFSL is the management authority for sovereign lands in Utah. As such, they may exchange, sell, or lease sovereign lands, but only in the quantities and for the purposes that serve the public interest and do not interfere with the public trust (UTAH CODE § 65A-10-1). DFFSL administers state lands under comprehensive land management programs using multiple-use sustained yield principles (UTAH CODE § 65A-2-1). There is no particular hierarchy of uses. Uses at Moab Sovereign Exchange Lands include motorized and non-motorized recreation; grazing; wildlife protection; research and protection of paleontological resources; camping; availability of potash and other minerals, chemicals and petrochemicals to aid the state's economy; and public access along county roads for recreation and hunting.

Implementation of multiple-use and other legislative polices for Moab Sovereign Exchange Lands are subject to consistency with Public Trust obligations and must avoid substantial impairment of the Public Trust. As trustee, DFFSL must strive for an appropriate balance among compatible and competing uses. Given the state's duty to manage sovereign lands for the public, sale of sovereign lands is generally precluded by the constitutionally imposed duty of the state to manage sovereign lands for the public. Exceptions to the prohibition could be made if the disposition itself further enhances the public interest. The Utah Legislature has chosen to protect the public interest in hunting, trapping and fishing when sovereign land is sold or leased by requiring that "the lease, contract of sale, or deed shall contain a provision that provisions be made preserving appropriate public access and use" (UTAH CODE § 23-21-4).

Similarly, under some circumstances, DFFSL may authorize through lease provisions, a lessee or grantee to restrict public access on affected sovereign land to fully enjoy the rights granted under a lease, permit, or sale. Examples include restrictions during mining operations, construction of improvements, harbor operations, military operations and access to personal property.

## **LEGAL AUTHORITY**

DDFSL is the executive authority for the management of sovereign lands in Utah (UTAH CODE § 65A-1-4), including the Moab Sovereign Exchange Lands. Title 65A of the Utah Code, entitled State Lands, establishes the Division and the DFFSL Advisory Council and sets forth the powers and responsibilities of the DFFSL and council.

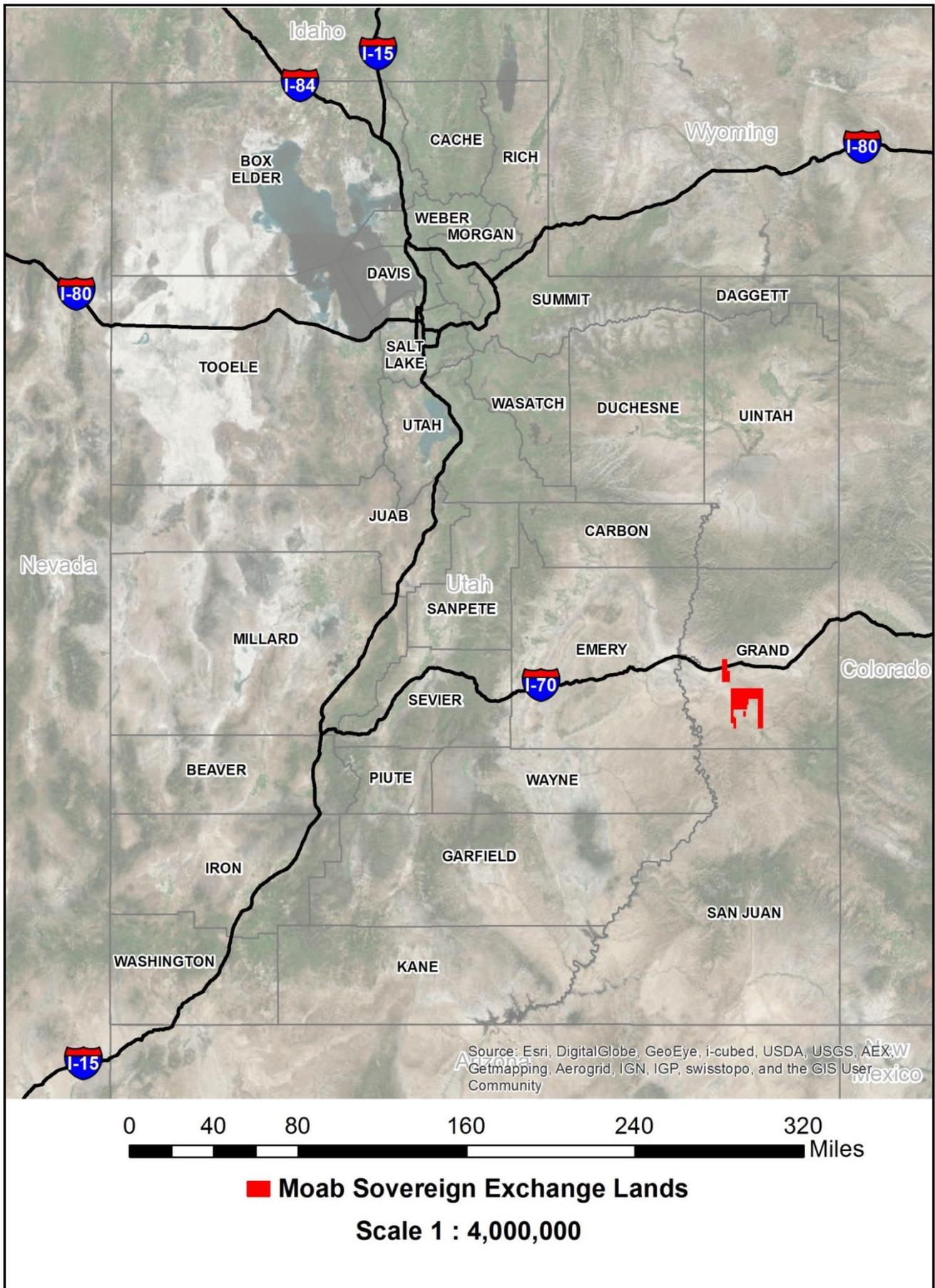
UTAH CODE § 65A-2-1 states that “[the Division of Forestry, Fire and State Lands] shall administer state lands under comprehensive land management programs using multiple-use, sustained-yield principles.” Briefly stated, the overarching management objectives of DFFSL are to protect and sustain the trust resources and to provide for reasonable beneficial uses of those resources, consistent with their long-term protection and conservation. This means that DFFSL will manage the Moab Sovereign Exchange Lands and their resources under multiple-use, sustained-yield principles (UTAH CODE § 65A-2-1) by implementing legislative policies and accommodating public and private uses to the extent that those policies and uses do not substantially impair Public Trust resources and the sustainability of the natural resources are maintained. Any beneficial use of Public Trust resources is subsidiary to long-term conservation of resources.

## **PURPOSE OF THE COMPREHENSIVE MANAGEMENT PLAN**

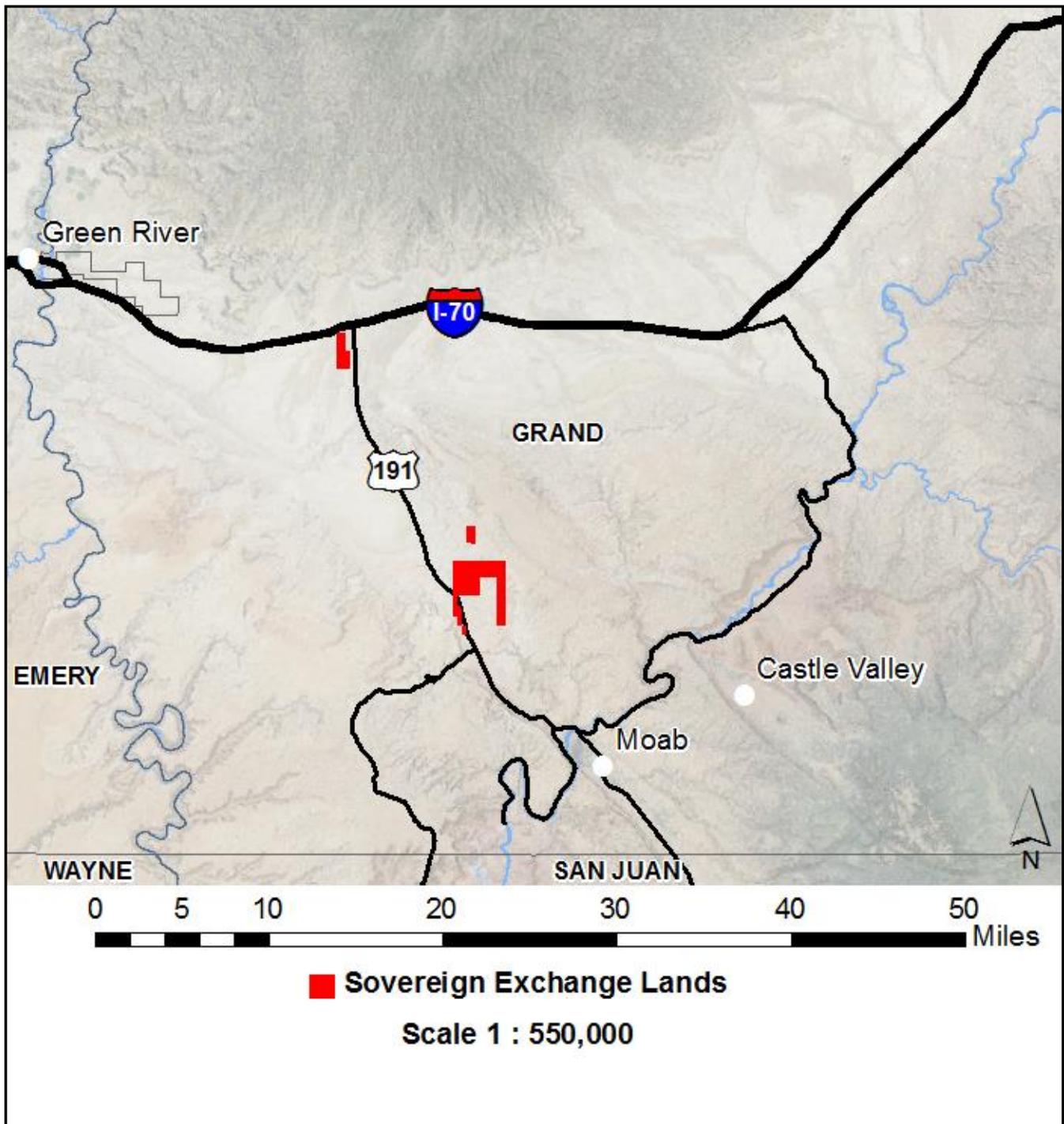
The purpose of this plan is to provide guidance to DFFSL in the management of the Moab Sovereign Exchange Lands and define the long-term management goals and objectives of these sovereign lands. The following are the general goals that the development and implementation of this comprehensive management plan (CMP) hope to achieve:

1. Identify and define the Division management objectives for the Moab Exchange Lands.
2. Assess the current, known conditions of the ecological, cultural, historical, paleontological, recreation, wildlife and mineral resources within each parcel and determine needs for further assessment and study.
3. Describe the existing uses within each parcel, any existing or potential conflicts between these uses and identify appropriate future uses that are consistent with the management objectives, Public Trust values and multiple use/sustained-yield principles.
4. Identify partnership opportunities with federal, state and nonprofit partners.

**FIGURE 1: MAP OF SOVEREIGN EXCHANGE LANDS GEOGRAPHICAL**



**FIGURE 2: MAP OF MOAB SOVEREIGN EXCHANGE LANDS**



# PRAIRIE DOG HAVEN UNIT DESCRIPTION

---

## INTRODUCTION

The Prairie Dog Haven (PDH) Unit is a parcel consisting of 829 acres located near Crescent Junction, which is where Highway 191 intersects Interstate 70. Figure 2 depicts the boundaries of the unit in relation to Highway 191 and Interstate 70 (*See Figure 2, page 8, Map of Prairie Dog Haven*). The legal description for the PDH Unit is included in Table 1 below.

**TABLE 1: LEGAL DESCRIPTION – PRAIRIE DOG HAVEN UNIT**

Prairie Dog Haven Unit: Township 22 South, Range 19 East, SLB&M	
Section 4: Lots 3-4, S2NW4, SW4	349 acres
Section 9: W2E2, W2	480 acres
TOTAL	829 acres

## HISTORIC LAND USE

From 1905-1944, a small community called Valley City existed approximately three miles south of the PDH Unit. The economic structure of the community was centered on farming and grazing. Floods, drought, vandalism and development have nearly wiped out the remains of this small community. The only visible remains include a root cellar and a few fence posts that are located about 5 miles south of the PDH Unit. Based on the unit's proximity to Valley City, it is likely that residents of Valley City utilized PDH for agricultural activities including grazing and limited crop production.

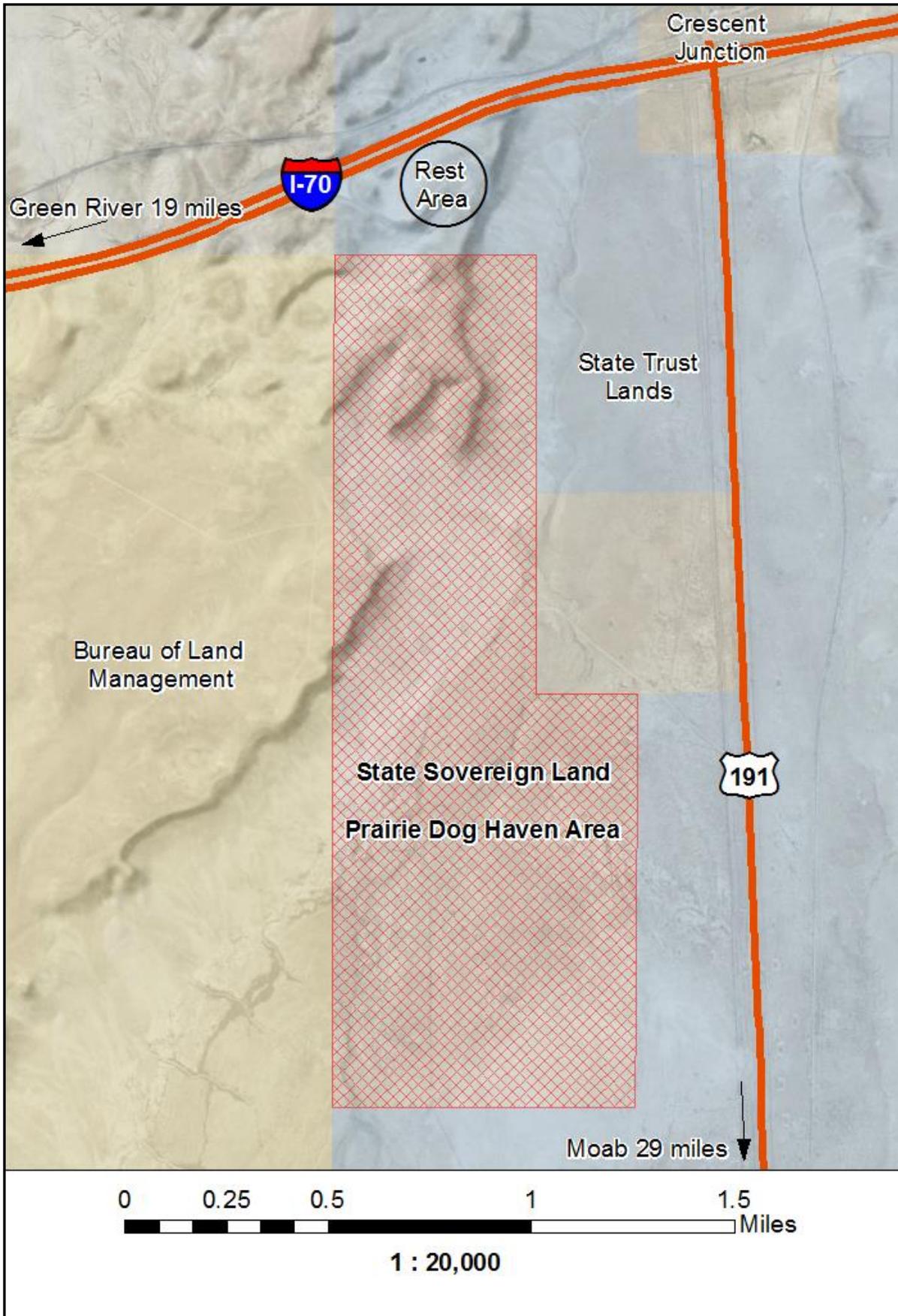
It could have even been used for residential dwellings; however, no evidence of this has been discovered within the parcel to date.

Since the decline of Valley City, land within the PDH Unit has been primarily used for grazing of cattle and sheep. Beginning in the 1950s and continuing through the 1960s and 1970s, several oil and gas exploration wells were drilled within the unit boundaries. The remnants of some of the old well heads can still be observed. The State of Utah, Division of State Lands and Forestry, took title to the PDH Unit in 1965. In 1995, DFSSL (newly separated from SITLA) took title to the PDH Unit to be managed as sovereign lands.

## CURRENT LAND USE

Since DFSSL took ownership of the PDH Unit, the primary surface uses have included livestock grazing and oil, gas and hydrocarbon exploration and development. Table 2 provides a summary of the currently valid leases within the PDH Unit.

**FIGURE 3: MAP OF PRAIRIE DOG HAVEN**



**TABLE 2: CURRENT LEASES ON PRAIRIE DOG UNIT**

Lease Number	Acres	Type of Lease	Lessee	Effective Date
500-00002	828.9	Grazing	Gurney and Gurney LLC	05/01/1997
200-00009	348.9	Oil, Gas & Hydrocarbon	Tidewater Oil and Gas Company LLC: 3.75%; Rocksourc Energy Corporation: 2.75%; Thomas Collins: 1%; Alpha Exploration Group LLC 50%; Rocksourc Energy Corporation 37%; Thomas Collins 13%	12/31/2001
200-00011	480	Oil, Gas & Hydrocarbon	Tidewater Oil and Gas Company LLC: 3.75%; Rocksourc Energy Corporation: 2.75%; Thomas Collins: 1%; Alpha Exploration Group LLC 50%; Rocksourc Energy Corporation 37%; Thomas Collins 13%	05/01/2003

**MINERAL EXTRACTION**

To date, the primary mineral interests at PDH Unit have included potash and oil, gas and hydrocarbon deposits. There have been no documented exploration activities for other potential mineral resources such as coal, oil shale, or geothermal resources to date. The presence of mineral resources other than potash or oil, gas and hydrocarbons within PDH is currently poorly defined.

**POTASH RESOURCES**

The PDH Unit falls within the potash zone of the Paradox Basin. A potash well was drilled on or very near the PDH Unit and potash that falls within BLM’s economic potash criteria was discovered in the well.

There has been increasing interest in the potash resources within the general area around PDH and at least one operator has secured leases from adjoining property owners such as SITLA and the BLM for the development of wells, pipelines, rail lines, and other infrastructure required to extract, process and transport potash materials. Based on this, it is very likely that potash resources from within PDH will also be extracted and processed for resale. This activity would require the operator to obtain a mineral lease and royalty agreement from DFFSL prior to extraction activities (Utah Code 65A-6-4).

## **OIL, GAS & HYDROCARBON RESOURCES**

The PDH Unit is located within an 84,877.78 acre mineral leasing unit called the Crescent Unit (CU). The development and operation of a mineral leasing unit is authorized under the Mineral Leasing Act of February 25, 1920, 41 Stat. 437, as amended 30 U. S. C. Sec. 181 et seq., which authorizes Federal lessees and their representative to unite with each other in collectively adopting and operating under a unit plan of development of operation of any oil and gas pool, field, or like area, for the purpose of more properly conserving the natural resources whenever determined and certified by the Secretary of the Interior to be necessary or advisable in the public interest. CU has been effective since May 12, 2011, with approval by the BLM, SITLA, DFFSL and the successor operator, Tidewater Oil & Gas Company.

In most instances, it is desirable for the DFFSL to enter into unit agreements, particularly in the case of the PDH Unit, which is situated in the center of the overall Crescent Unit. By entering into the unit agreements, the DFFSL ensures that the beneficiaries, or citizens of Utah, receive financial compensation for the extraction of mineral resources beneath sovereign lands. In all likelihood, the mineral resources would be drained from beneath sovereign lands whether the DFFSL enters into the unit agreement or not as a result of extraction outside of sovereign land surface boundary. By entering into the agreements and regulating surface occupancy, the DFFSL ensures fair compensation for the beneficiaries and limits potential impacts from mineral extraction activities.

On March 28, 2011, DFFSL designated the PDH Unit a Multiple Mineral Development (MMD) Area pursuant to Subsection R652-20-2500. This allows DFFSL the flexibility to require a lessee to furnish a bond or evidence of financial responsibility to assure that the state and other existing mineral lessees within the MMD are indemnified and held harmless from unreasonable and all unnecessary damage to mineral deposits or improvements caused by the conduct of the lessee. The MMD designation is suitable for PDH Unit due to the multiple existing and proposed uses, which include but are not limited to grazing, oil, gas and hydrocarbon exploration and extraction, and potash extraction.

## **GRAZING**

There is one grazing permit on the PDH Unit. The grazing permit was issued with an effective date of May 1, 1997 and was originally issued to Scott Anderson for a term of 15 years. The permit was reassigned from Scott Anderson to Gurney & Gurney, LLC on February 6, 2002. Renewal of the grazing permit is allowed under the terms of the permit if the lessee notifies the DFFSL of its intent to renew prior to the expiration date. The current permit holder renewed their 5-year permit on May 1, 2012. The permit will expire on April 30, 2017. As indicated in Table 2, the grazing permit covers the entire area of the PDH Unit. The calculated animal unit month (AUM) for this permit is 33.47 AUMs.

## **ACCESS**

Primary vehicle access to the PDH Unit is along a county maintained road with an access point off of Highway 191 approximately 1.6 miles south of the Crescent Junction exit off Interstate-70. There is a cattle guard on this access road on the eastern boundary of the PDH Unit. Walking access from the north originates from the Crescent Junction rest area. A small hiker-made trail runs south from the parking lot of the rest area to the northern boundary of the PDH Unit.

## **ADJACENT LAND OWNERSHIP**

In contrast to other sovereign lands within the state, land ownership boundaries and management patterns at PDH Unit are straightforward. The 829-acre parcel is surrounded by lands administered by the School & Institutional Trust Lands Administration, Bureau of Land Management and Utah Department of Transportation (UDOT). Most surrounding parcels administered by SITLA and the BLM are currently being leased for grazing and mineral extraction activities (primarily oil, gas, hydrocarbon and potash extraction). Two major highways are also located adjacent to the PDH Unit, with Interstate 70 and the Crescent Junction rest area located directly north of PDH and Utah Highway 191 located just east of PDH within SITLA and private property. This is illustrated in Figure 3.

## **VEGETATION**

From the USGS soil survey, the potential native upland vegetation on PDH Unit includes a mix of mat saltbush, galleta, black grama, sage, cactus, shadscale, greasewood, winterfat, halogeton, inkweed, Indian ricegrass, Gardners saltbush, bluestem wheatgrass and bottlebrush squirreltail. Numerous non-native plant species are present on PDH Unit, including Russian thistle and cheatgrass. There are no records of occurrence for any threatened, endangered or sensitive plant species within the PDH Unit.

## **SOILS**

According to the U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) soil survey, the soils in the Prairie Dog Haven Unit are generally composed of silty clay loam, fine sandy loam and silt loam and include the Mesa-Chipeta (fsl), Chipeta-Badland Complex (scl), Chipeta Complex (scl) and Toddler-Ravola-Glenton Family (sl) (USDA NRCS 1989). All soils are well drained. Runoff characteristics range from negligible to very high, with slow to moderately rapid permeability. Some soils are subject to rare or occasional very brief or brief flooding following high intensity summer thunderstorms or above average snow melt events. These soils are suitable for use as native rangeland for grazing, irrigated cropland, or orchards. If irrigated, the soils could support small grains, corn, sugar beets, alfalfa and pasture grain or hay crops.

## **WILDLIFE**

### **TERRESTRIAL WILDLIFE/AVIAN WILDLIFE**

According to wildlife studies conducted in the vicinity of Crescent Junction and Interstate 70, the general area in which PDH is located is considered a “salt desert and greasewood habitat.” Species generally present in this habitat include antelope, white-tailed prairie dog, coyotes, gray fox and kit fox as well as numerous raptor species such as golden eagles and ferruginous hawks. The white-tailed prairie dog can be found on the PDH Unit and is currently listed as a Utah species of concern. The Gunnison’s and white-tailed prairie dog are present in Grand County but have declined in distribution and number as a result of disease, drought, habitat disturbance and habitat conversion (Lupis et. al, 2007). In 2006, a Utah Gunnison’s Prairie Dog and White-Tailed Prairie Dog Conservation Plan was developed for the species in order to preclude the need for listing as threatened or endangered under the Endangered Species Act.

Surrounding PDH Unit there are populations of Bighorn Sheep in the Bookcliffs Mountains to the north, Arches National Park to the east and south in the Potash region. There has been no evidence of Bighorn sheep within the boundaries of the PDH Unit. However, Bighorn sheep are very

sensitive to human disturbance and if they are to coexist with activities such as recreation, livestock grazing, oil and gas exploration and other land uses, they require large areas of undisturbed habitat. The Potash herd is native and because of the high interest in the species, impacts to this herd resulting from human activities should be considered significant.

Within PDH Unit, there is ample evidence of black-tailed prairie dog colonies and activity, mostly in the form of mounds adjacent to or around burrow entrances. The black-tailed prairie dog is not currently considered a sensitive or endangered species. Pronghorn are also routinely observed within the boundaries of the PDH Unit. Pronghorn use the area for rest and grazing of available vegetation. Pronghorn are also not currently considered a threatened or endangered species.

### **SENSITIVE SPECIES / THREATENED AND ENDANGERED**

Within the PDH Unit, the Utah Division of Wildlife Resources (UDWR) has recent records of occurrence for ferruginous hawk and white-tailed prairie dog, both a State designated species of concern. Ferruginous hawks are particularly susceptible to disturbance. The US Fish and Wildlife Service recommends keeping activities at least one mile away from nest sites. This is particularly important during the breeding season from March 1st through August 1st. It is recommended to locate nests as accurately as possible on a map and to delineate a “no disturbance” buffer of one half a mile. In Utah, white-tailed prairie dogs are protected under both State Code and administrative rule from unlawful possession, transportation, destruction and harm. Any surface disturbance or other activities that might impact burrows or otherwise cause harm to a white-tailed prairie dog may be considered unlawful.

In addition, within a 2-mile radius of PDH, there are historic records of occurrence for black-footed ferret and recent records of burrowing owl and kit fox. Black-footed ferret is considered the rarest mammal in North America and is also on the State Sensitive Species List.

**TABLE 3: UTAH DNR, DIVISION OF WILDLIFE RESOURCES. UTAH SENSITIVE SPECIES LIST. MARCH 29, 2011**

Common	Scientific Name	State Status	Presence: Historic or Current	Notes
<b>Ferruginous Hawk</b>	BUTEO REGALIS	SPC- Species of Concern	Current	This raptor nests at the edge of juniper habitats and open, desert and grassland habitats in western, northeastern and southeastern Utah. The species is highly sensitive to human disturbance and is also threatened by habitat loss from oil and gas development, agricultural practices and urban encroachment. The ferruginous hawk, a Neotropical migrant, has declined across much of its range and has been extirpated from some of its former breeding grounds in Utah.
<b>White-Tailed Prairie Dog</b>	CYNOMYS LEUCURUS	SPC- Species of Concern	Current	The presence of this species within the PDH Unit. Has been documented by in the past by the Division of Wildlife Resources. It is protected under Utah Code and administrative rule.
<b>Black Footed Ferret</b>	MUSTELA NIGRIPES	S-ESA- Federally Endangered Species	Historic	Historic occurrence within a 2-mile radius of the PDH Unit.
<b>Burrowing Owl</b>	ATHENE CUNICULARIA	SPC- Species of Concern	Current	Declining populations; the burrowing owl is adversely impacted by agricultural and residential development though it may be able to adapt to minor disturbances. The owl, a Neotropical migrant, nests in desert valleys and grasslands and is often found in association with prairie dog colonies. The owl's population appears to have declined across its range; its distribution has been localized in many areas of Utah.
<b>Kit Fox</b>	VULPES MAC ROTIS	SPC- Species of Concern	Current	Historic occurrence within a 2-mile radius of the PDH Unit.

## **PALEONTOLOGICAL RESOURCES**

To date, there have been no paleontological inventories of PDH Unit and the potential for the discovery of significant localities is low. Surface deposits in this area consist mainly of quaternary alluvium, although there may be some exposures of the Mancos Shale that may yield invertebrate fossil localities.

# **PRAIRIE DOG HAVEN UNIT MANAGEMENT GOALS AND OBJECTIVES**

---

## **1.1 MINERAL EXTRACTION**

According to recent land and mineral surveys, Grand County holds a large amount of Potash. Potash is typically processed using surface evaporation ponds; in most instances this requires extensive surface disturbance. The preferred method of potash extraction for DFFSL would be one that causes the least amount of surface disturbance to the Prairie Dog Haven Unit. Such methods could include potash extraction using directional drilling which can reduce the total number of wellheads and well pads required or can be conducted from adjacent property.

Subsection R652-90-700 allows DFFSL to designate a primary intended land use for a planning unit. The PDH Unit was exchanged to DFFSL for its wildlife value, namely the presence of multiple species of prairie dogs, including the potential presence of sensitive, threatened or endangered species (T&E). As such, DFFSL has designated the primary intended land use for the PDH Unit as prairie dog habitat. With potential sensitive/T&E wildlife species within the PDH Unit and the fact that its primary intended land use is prairie dog habitat, requests for surface occupancy for mineral extraction activities will be handled on a case-by-case basis. In any case, each applicant will be required to conduct a biological survey using a State of Utah approved wildlife biologist. The result of the survey will be reviewed by DFFSL sovereign lands staff, Division of Wildlife Resources biologists and the U.S. Fish and Wildlife Service (if threatened or endangered species are discovered). The decision to allow or deny surface occupancy will be, in part, based on the analysis of the findings of the biological surveys.

## **1.2 MANAGE INVASIVE SPECIES**

When not properly managed, grazing or other actions that create surface disturbance can cause significant damage to an ecological system by promoting the spread and survival of invasive weeds. Overgrazing can reduce native plant cover, disturb soils, weaken native communities and allow exotic weeds to invade. In addition, animals that are moved from pasture to pasture can spread invasive plant seeds. Surface occupancy for oil, gas and hydrocarbon extraction can also contribute to an increase in invasive and non-native species. DFFSL will work closely with all lessees to provide resources and management directions for encouraging native species regeneration.

### **1.3 GRAZING**

The Prairie Dog Haven Unit has no supported spring developments and all water has to be currently brought in from off-site sources. According to Colorado State University Stocking Rate Calculator, (<http://region8water.colostate.edu/PDFs/range4.pdf>), the sustainable amount of cattle for the 829 acre PDH Unit was calculated and is listed below. However, the current ecological conditions may not have adequate vegetation for the favorable or normal conditions as seen in the list below. DFFSL aims to conduct a grazing assessment with a partnering agency to determine the responsible number of cattle on Prairie Dog Haven Unit.

- In a favorable year, a total of 524 AUMs per year or 43 AUMS per month is supported if grazed for a 12 month period.
- In a normal year, a total of 345 AUMs per year or 28 AUMS per month is supported if grazed for 12 months.
- In an unfavorable year, only 238 AUMs per year or 19 AUMS per month are supported if grazed for 12 months.

### **1.4 RECREATION MANAGEMENT**

From a recreation standpoint, there is little to no current recreation use at PDH. However, there are opportunities for increased recreational activity since the PDH Unit currently serves as the single connection from Highway 191 for vehicles and off highway enthusiasts to recreation opportunities on adjacent BLM land to the west. Also, the area could be a place for Crescent Junction rest area visitors to hike to the breathtaking vista along the bench on PDH. There is already a single track trail on the bench that runs south from the rest area. This trail stops at a barbwire fence located on sovereign lands. A small hiker/mountain biking cattle guard could be installed through the gate to provide access to the rest of the PDH. Target shooting is another recreational activity that is allowed on sovereign lands and could occur at the PDH Unit. With that in mind, it is essential that target shooting is performed in a safe manner away from livestock, vehicles and people.

### **1.5 WILDLIFE MANAGEMENT**

The PDH Unit was primarily acquired through the Canyonlands Lands Exchange for its wildlife characteristics. Since all sovereign land is managed through the multiple use-sustained yield mandate, DFSSL strives to monitor and manage the balance between wildlife and habitat management with known extraction and grazing activities. DFFSL will work with grazing and mineral lessees to ensure adequate wildlife habitat is preserved and protected. Sovereign lands within Utah are also required by statute to be open for hunting, fishing and trapping. Safety issues associated with hunting and trapping will be addressed when issues become apparent.

### **1.6 ADJACENT LANDOWNER PARTNERSHIPS**

Since PDH Unit is a landlocked parcel, it is imperative that the DFFSL works collaboratively with adjacent property owners such as UDOT, SITLA and BLM to streamline management strategies and ensure that objectives are accomplished.

## **DALTON WELLS UNIT DESCRIPTION**

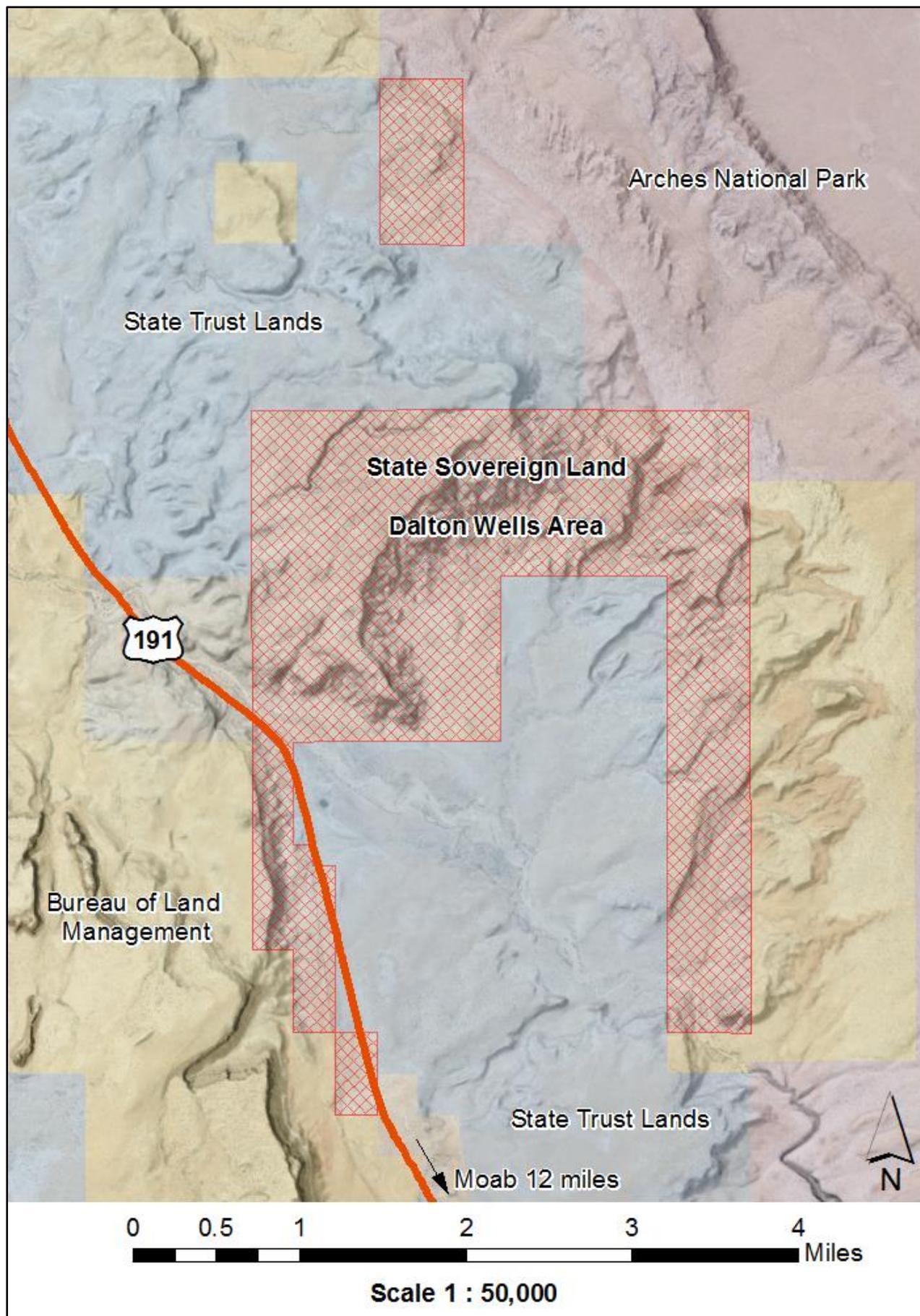
The Dalton Wells Unit (DWU) is located 17 miles north of Moab along Highway 191 and contains 4,350 acres. Table 4 provides a legal description of the DWU. (*See Figure 4, page 18, Map of Dalton wells*) This parcel has a horseshoe shape with a detached northern half section parcel. Two Grand County maintained roads, portions of Highway 191 and railroad tracks run through this parcel of sovereign lands. DWU also holds an extremely valuable quarry that contains prehistoric fossils known to be nowhere else in North America. This area has potential to become nationally recognized with National Natural Landmark status. In addition to its important paleontological value, the DWU also possesses aesthetic values as well, particularly along the eastern border with views of many areas within Arches National Park.

### **HISTORIC LAND USE**

During the Great Depression, Civilian Conservation Corps (CCC) was created around the United States to help stimulate the economy and provide jobs to young men. From 1935-1942, the Dalton Wells CCC, also called Camp DG-32, was in service holding 200 men (*See Figure 5, page 20, Map of CCC Camp*). The camp focused on a multitude of projects, including range improvements, creating livestock trails down sandstone cliffs, spring developments, wells and stock ponds, rodent eradication, fences for corrals and pastures and developing a reservoir. From January 11, 1943 to April 27, 1943, shortly after the closing of the camp, the area was used as a Japanese American World War II Internment Camp called Moab Relocation Center. Both of these uses occurred within an area of the DWU immediately adjacent to Utah Highway 191. At this date, the only remnants of this historical use are a few concrete slabs that served as foundations for the buildings, a collapsed windmill and several large planted cottonwood trees. This area was added to the National Register of Historical Places in 1994 for Grand County. An interpretive sign is located off Highway 191 at the turn off for Dalton Wells Road.

The above uses only impacted a small area of the DWU. Most other areas of the unit experienced little historical use. Historical uses in other areas of the DWU include mineral prospecting, dispersed recreation (including camping and off-highway vehicle use) and small quarries used by researchers studying the unit's paleontological resources.

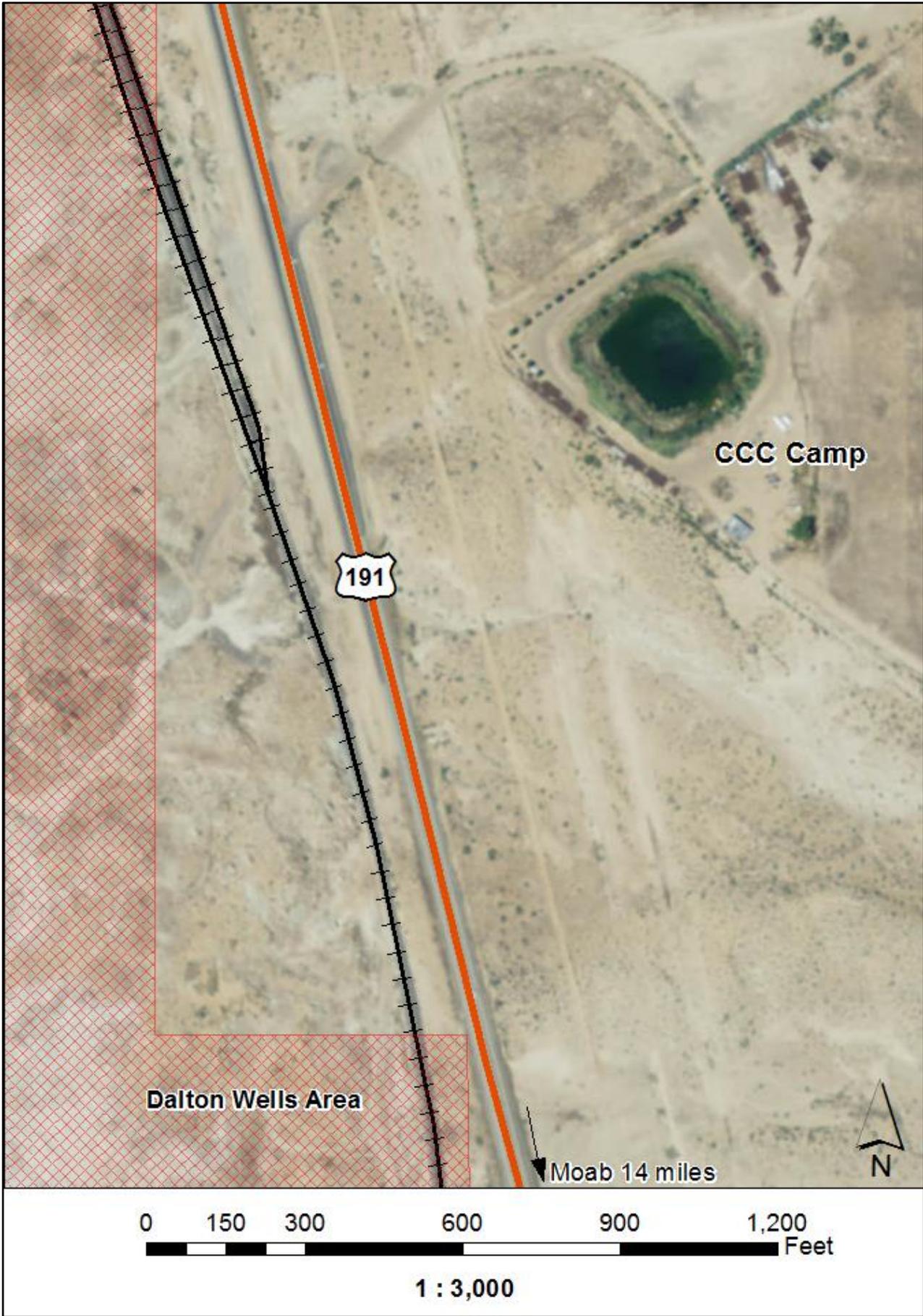
**FIGURE 4: MAP OF DALTON WELLS**



**TABLE 4: LEGAL DESCRIPTION – DALTON WELLS UNIT**

<b>Dalton Wells Unit: Township 23 South, Range 20 East SLBM</b>	
Section 34: E2	320 acres
<b>Dalton Wells Unit: Township 24 South, Range 20 East SLBM</b>	
Section 10: All	640 acres
Section 11: All	640 acres
Section 12: All	640 acres
Section 13: E2	320 acres
Section 14: W2	320 acres
Section 15: All	640 acres
Section 22: W2W2, SE4SW4, SW4NE4SW4	210 acres
Section 24: E2	320 acres
Section 25: NE4, N2SE4	240 acres
Section 27: N2NW4, SE4NW4, NE4SW4, SW4SE4	200 acres
Section 34: NW4NE4	40 acres
<b>TOTAL</b>	<b>4,350 acres</b>

FIGURE 5: MAP OF CCC CAMP



**TABLE 5: CURRENT LEASES ON DALTON WELLS UNIT**

<b>Legal Description number</b>	<b>Lease</b>	<b>Type of Lease</b>	<b>Lessee</b>	<b>Beginning Date</b>
All sovereign sections	50000003	Grazing	Gerald Young Canyonlands Cattle	1997
T24S R20E, Sec 27	ROW 1601	Right of way	Citizens Telecom	1980
T24SR20E, Sec 15 & 22	400-00001	Easement	Citizens Telecom	1995
T24SR20E, Sec 15,22 & 27	400-00065	Easement	Mid-America Pipeline	1998
T24SR20E, Sec 15, 22 & 27	400-00172	Easement	Delta Petroleum Corporation	1995
All sovereign sections	41000172	Right of Entry	Canyonlands Ballooning	2008
All sovereign sections	41000038	Right of Entry	Elite Motorcycle Tours	2003
All sovereign sections	41000196	Right of Entry	Red Rock 4 Wheelers	2011
All sovereign sections	41000151	Right of Entry	Trek Travel, LLC.	2006

**CURRENT LAND USE****DINOSAUR QUARRY**

The Dalton Wells dinosaur quarry is an active paleontological quarry in partnership with the Utah Geological Survey (UGS), Brigham Young University (BYU) and the University of Utah. The quarry contains dinosaur fossils of extreme significance and has potential to become a more protected area through the National Natural Landmark designation system. Such designations do not impact DFFSL's multiple-use, sustained yield management strategy and could be a more effective measure to protect the area from ongoing pilfering. See Paleontological Resources, page 25, for more information.

**INDUSTRIAL MINERALS AND METALS**

The DWU is thought to contain deposits of potash, halite and magnesium salts; gypsum; cement rock; sand and gravel. There is also speculative potential for clay, building stone and zeolites.

The potash, halite and magnesium salts are relatively deep ranging from 7,519 feet to 10,996 feet below the ground surface. At these depths, solution mining through drill holes is the only economical mining alternative. According to the publication *Industrial Rocks and Minerals on Sovereign Lands Near Arches National Park* prepared by Barry Tripp, there are likely thick layers of these salts beneath the DWU but based on the geology of the area, there is reason to believe that the salt beds, particularly the potash beds, became folded and mixed with undesirable materials, such as shale, making both solution and underground mining difficult. According to the publication, there are likely large quantities of halite and carnallite, a magnesium-containing salt, present beneath the DWU but little is known about the thickness, grade, economic value or minability of these salt deposits (Tripp 1998).

Gypsum exists in thick layers beneath the DWU; however, it has little economic value due to its depth below the ground surface and the fact that the gypsum occurs in an anhydrite form, which is not a form appropriate for most gypsum uses. Cement rock, sand and gravel also occur within the unit but the quality of these resources is thought to be poor and of little value for industrial use.

There is speculative potential for other industrial minerals such as building stone (i.e., flagstone), zeolites, tektites and clay (bentonite clay, expanding shale and heavy clay). Of these, clays probably have the highest potential for extraction and industrial use. Bentonite clay is being mined in similar geological formations at other sites within 100 miles of the DWU.

Previous studies of the presence of metallic minerals within the DWU by Robert Gloyn (1998), Utah Geological Survey, summarized in the publication *Metals Review, Courthouse Quarry Area* have revealed only minor occurrences of copper and manganese within the unit. It is thought that these occurrences are not viable for extraction and are of little economic value. In addition, the study concluded that while there may exist economical mineral deposits of uranium (based on existing geological conditions and the proximity of known deposits near the unit) exploration for the uranium would be expensive and risky because of the high level of uncertainty about the location of the deposit and the likely depth of the deposit. Vanadium deposits would also likely be small and not economical to extract (Gloyn et al., 1998).

## **OIL, GAS AND MINERAL RESOURCES**

The Utah Geological Survey identifies the Paradox Basin, in which DWU lies, as the second most prolific oil producing basin in the state. Oil and gas were discovered in the early 1960s in this general area. There has been some renewal in exploration in the vicinity of DWU in recent years, including exploration of geologic structures formed by Paradox salt. The Utah Geologic Survey suggests that the Leadville limestones and McCracken sandstones may have some potential oil and gas deposits as well. In 1964, a dry hole was drilled on the DWU; additional drilling took place on sovereign lands within the DWU in 1978 and on adjacent SITLA lands in 1984. These wells showed some gas-cut water but no further drilling took place.

Exploratory oil and gas well and seismic data are greatly limited in the general area due to topography and access restrictions associated with Arches National Park. However, oil and gas leases on the DWU reached the end of their primary terms in 1996-97 without drilling or production. No interest has been expressed in the area for oil, gas and hydrocarbons since the expiration of these leases. The DWU may attract future interest again if oil and gas prices rise to a point where extraction is profitable.

The DWU is directly adjacent to and just north of the Seven Mile Known Potash Leasing Area (KPLA). For an area to be a KPLA it must have a known potash resource, so it is reasonable to assume that there may be some potash resource within the DWU. There have been no known potash exploration or extraction activities on the DWU. There are no existing or pending potash leases for DWU.

## **UNION PACIFIC RAILROAD**

In 1963, a modern potash plant built off Highway 279 resulted in the construction of a railroad spur line from the Denver and Rio Grande Western Railroad at Crescent Junction to the Texas Gulf Sulphur Company mill outside Moab. This line parallels Highway 191 and passes through the southwest corner of the DWU. The line currently carries potash one day a week from the Intrepid Potash Plant. The line is shared with the Uranium Mill Tailings Remedial Action (UMTRA) Project tailings pile site, carrying uranium tailings from the superfund site. The tailings are sent by rail to Crescent Junction as much as twice per day and up to seven days a week.

## **ACCESS**

As mentioned previously, there are two Class B county roads that traverse the DWU; Willow Springs Road and Dalton Wells Road. The Willow Springs Road holds historical value as it was the first entrance into Arches National Park in the 1960s. Grand County Roads Department grades and maintains these roads. DFFSL manages roads for public access and does not make a profit off the use of these roads.

## **RECREATION**

Recreational opportunities that currently exist on the DWU consist of camping and trail-based recreation, including off-highway vehicle (OHV) riding (four-wheeling, all-terrain vehicle (ATV) riding and motorcycling) and non-motorized use (mountain biking, horseback riding and hiking). Primary access to the trails is off of the two county roads that traverse the DWU: Dalton Wells Road and Willow Springs Road.

## **SOVEREIGN TRAIL SYSTEM**

The Sovereign Trail System, created in 2001 by Ride With Respect (RWR), a Moab based 501(c)(3) non-profit organization, is a multi-use recreational trail system located on the eastern and northern parts of the DWU. The Sovereign Trail contains over 23 miles of single track and 4 miles of ATV trail (Appendix B). The trail system features two routes, the Sovereign Single track and the Sovereign ATV Loop and is located on both State Sovereign and adjacent SITLA land. To date, RWR has placed signage on 30 miles of existing roads on DFFSL and SITLA areas to indicate the location of the trail. (*See Figure 6, page 24, Map of Sovereign Trail System*)

The Sovereign Trail System represents the only network of motorized single track and ATV trails within twenty miles of Moab. The Sovereign ATV Loop accommodates ATVs and full-size vehicles by utilizing alternate roads where the primary route is narrow. Trails are delineated by technical difficulty, providing easy to very hard trail sections for users of all abilities. RWR performs a yearly user count, noting that thousands of people each year use the trail. RWR has contributed several thousand hours of volunteer work to maintain the Sovereign Trail and works

closely with the southeast sovereign land coordinator in managing the trail system. While the majority of the construction, maintenance and education work is done through RWR, over \$5,000 for signage material was received from the State of Utah, Division of Parks & Recreation, SITLA and DFFSL. Over the last decade, RWR made improvements to minimize maintenance and prepare for increased visitation. Problematic trail segments were armored or rerouted to improve safety, sustainability and user satisfaction. Providing diverse opportunities, setting proper expectations and fostering trail ethics has yielded compliance and even stewardship among visitors.

## **DISPERSED CAMPING**

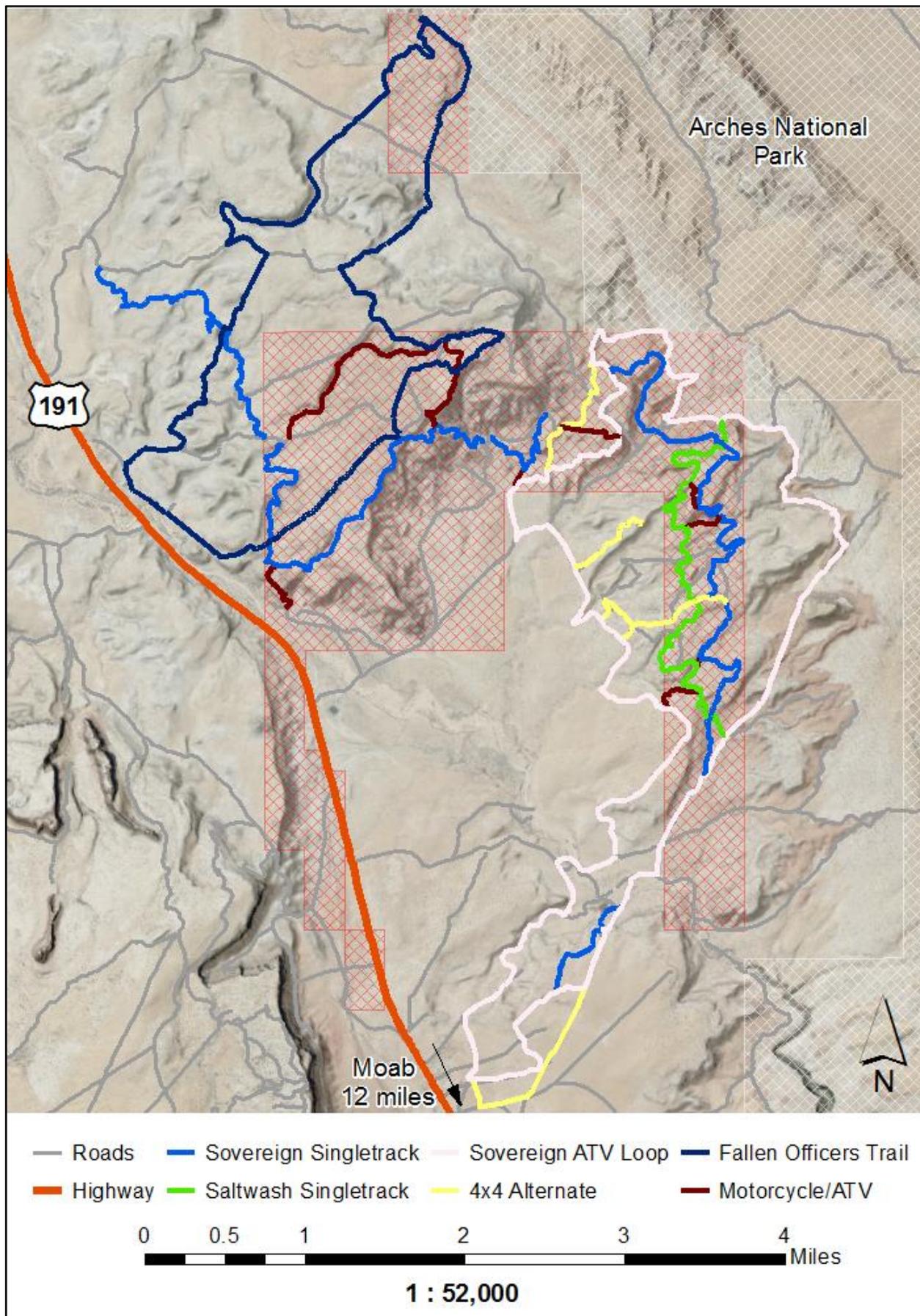
The DWU is one the last places for free dispersed camping within 15 miles of Moab. There are approximately twenty established campsites along DWU, concentrated mostly at the base of the dinosaur quarry and in the northeast corner of the unit. These areas have stone fire rings and established roads wide enough for a vehicle. Within the past few years, a significant increase in visitation and use by recreational campers has been observed at the DWU. While these campsites previously appeared to be at a manageable state, it is now apparent that the increase of user activity poses a risk of resource degradation due to the lack of camping regulations for sanitary toilet facilities and increasing campsite expansion.

The DWU is currently the only camping area within the state that DFFSL manages. As such, DFFSL recognizes the need to create and implement a set of rules and regulations to protect and conserve these natural resources from degradation and intends to execute this action through a phased approach to limit user conflict. These phases will likely include minor infrastructure (i.e. kiosk, regulatory signage, site designation markers, etc.) installations at DWU. Posted at the currently established campsites, the information intends to achieve user awareness and compliance regarding acceptable camping practices. The installation of vault toilet facilities is also necessary to address sanitary concerns in the area. The DFFSL is interested in having another entity (i.e. BLM, Grand County, Division of State Parks and Recreation or possibly a concessionaire) lease this property from DFFSL to more effectively manage the increasing user demands while preserving integrity of the natural resources.

## **ADJACENT LAND OWNERSHIP**

The DWU is surrounded by several landowners, including SITLA, the BLM, private landowners and Arches National Park, which is administered by the National Park Service (NPS). SITLA administers almost all of the property bordering Dalton Wells to the south as well as much of the northern border of the unit. SITLA land within Section 22, Township 24 South, Range 20 East is currently being used as an irrigated alfalfa field. The SITLA land along Willow Springs Road and along Dalton Wells Road is being heavily used for dispersed camping. There are also active grazing and natural gas leases on adjacent SITLA land. There is private land along Utah Highway 191 bordering Dalton Wells along the western boundary that could eventually be developed for commercial or residential uses. The BLM manages land bordering Dalton Wells on the western boundary south of Utah Highway 191 as well as most of the eastern boundary. Under the guidance of the 2008 Moab Resource Management Plan, the BLM manages adjacent lands as recreation focus areas (Klondike Bluffs and Bar M Mountain Biking Areas). The NPS administers Arches National Park, which borders Dalton Wells along the northeast corner of the horseshoe-shaped portion and along the western boundary of the northern parcel. The NPS manages Arches National Park to preserve cultural and natural resources and maintain unimpaired resources values for enjoyment by current and future generations.

**FIGURE 6: SOVEREIGN TRAIL SYSTEM**



## **PALEONTOLOGICAL RESOURCES**

*The majority of following section "PALEONTOLOGICAL RESOURCES" has been written by the Utah State Paleontologist, James Kirkland, of the Utah Geologic Survey.*

### **PALEONTOLOGICAL RESOURCES OF THE DALTON WELLS UNIT**

To the southwest of Utah Highway 191, the Moab fault cuts through the Cedar Mountain outcrop belt juxtaposing the Triassic-Jurassic Wingate Sandstone (Lucas and others, 2006; Kirkland and Milner, 2006; Lucas and Tanner, 2007) and underlying Upper Triassic Chinle Formation against the Cedar Mountain Formation just to the southwest of the Courthouse Quarry Area. This fault has been a conduit for fluids that have altered the adjoining strata (Chan and others, 2000; Garden and others, 2001) to the particularly vibrant colors observed in the Morrison and Cedar Mountain Formations along the east-west escarpment north of Dalton Wells.

Fossiliferous rocks extend from the Middle Jurassic Entrada Formation up section to the base Upper Cretaceous Dakota Formation (Doelling, 2001, 2003) and several sites have been found in the Courthouse Quarry area.

### **ENTRADA FORMATION (MIDDLE JURASSIC)**

The Entrada Formation is best known for hosting the arches at Arches National Park. It represents a vast desert like the Sahara Desert of North Africa. Although often noted as unfossiliferous, it does preserve burrows and some dinosaur tracks in this area (Ekdale and Picard, 1985; Swanson et al., 2005). One Locality has been recorded within the Courthouse Wash Quarry unit, which is GR508t. GR508t is listed as mammal burrows in the UGS Paleontological Locality Database by site discoverer George Odier.

### **MOAB TONGUE OF THE CURTIS FORMATION (MIDDLE JURASSIC)**

The contact between the Moab Tongue of the Curtis Formation and the overlying Summerville Formation represents the beach surface as a shallow seaway expanded into Utah from the north. The surface is the horizon of the Moab Megatracksite which may be the largest dinosaur track surface in the world with estimates of as many as a million tracks per square kilometer surrounding all of Arches National Park (Lockley et al., 1991; Lockley and Hunt, 1995). A footprint from near Courthouse Spring west of ARCH was described by McKnight (1940) and area tracks were examined by track specialist Roland T. Bird in 1944, but the tracks were largely forgotten for many years (Lockley, 1991). The megatracksite horizon is interpreted as a coastal plain (Lockley, 1991). Horizontal burrows from 3 to 7 cm (1 to 3 in.) in diameter are known from the upper Moab Tongue as well (Swanson et al., 2005). The UGS Paleontological Locality Database does not have any specific sites recorded on the surface of Courthouse Quarry Area.

### **SUMMERVILLE FORMATION (MIDDLE JURASSIC)**

The Summerville Formation records the presence of the margin of a shallow hyper-salty sea in eastern Utah at the end of the middle Jurassic. It is only a couple of tens of meters thick in this area and while it has not been surveyed in this area it is known for pterosaur and dinosaur tracks elsewhere in eastern Utah (Lockley and Mickelson, 1997; Mickelson et al., 2004). These animals were recorded walking along the shoreline during low levels of this shallow sea.

### **MORRISON FORMATION, TIDWELL MEMBER (UPPER JURASSIC)**

Tidwell Member of the Morrison Formation represents the super tidal deposits as the Middle Jurassic sea retreated from Utah. It has not been surveyed in this area, but just a few miles to the south on State School and Institutional Trust lands, Utah's only known pterosaur (flying reptile) *Utahdactylus kateae* was discovered (Czerkas and Mickelson, 2002).

### **MORRISON FORMATION, SALT WASH MEMBER (UPPER JURASSIC)**

Salt Wash Member of the Morrison Formation represents a semiarid savannah like that of modern East Africa marked by numerous rivers flowing across this region to the northeast. It has not been surveyed in this area, but the UGS has recorded numerous fossil sites including those with dinosaur bones in the Arches area. The BLM has developed an interpretational site at the Valley City Track site (Lockley and Hunt, 1995) on the northwest side of Arches National Park. Additionally, Dinosaur tracks have been recorded on the underside of a sandstone ledge about two miles northeast of Dalton Wells (*Gr211t*) and petrified wood was noted on the extreme southwest corner of the Courthouse Quarry Area on the west side of the railroad track (*Gr554p*).

### **MORRISON FORMATION, BRUSH BASIN MEMBER (UPPER JURASSIC)**

The Brushy Basin Member of the Morrison Formation represents a semiarid savannah like that of modern East Africa, however with the advent of massive volcanic activity far to the southwest, the rivers became choked with fine sediment and ash leading to the development of levee controlled rivers on a vast muddy floodplain. The development of ancient soils periodically on this floodplain gives the Morrison its colorful variegated appearance. Utah is rightfully famous for its Morrison dinosaur fossils with the Carnegie Quarry at Dinosaur National Monument and the Cleveland Lloyd Quarry being known worldwide (ex. Smith, 1997; Chure, 1997; Turner and Peterson, 2004). Dinosaur bones and other significant fossils can generally be found in any outcrop in the region except where they have all been illegally collected. Just to the north of the Courthouse Quarry Area the UGS investigated a major illegal excavation where it was clear hundreds of pounds of dinosaurs were stolen from SITLA lands. The perpetrators worked in the snow in December and January to avoid detection. The Brushy Basin Member has not been surveyed for fossil resources in the Courthouse Quarry Area.

A site preserving fossil dinosaur eggshell (*Gr194v*), is located on the west side of US 191 within the west boundary of the Courthouse Quarry Area. Unfortunately this site has been obliterated by someone digging in and looking for the source of the eggshell.

### **CEDAR MOUNTAIN FORMATION, YELLOW CAT MEMBER (LOWER CRETACEOUS)**

The Yellow Cat Member consists of drab variegated mudstone, limestone and paleosols, with some sandstone lenses. The type section is west of where the Yellow Cat Road crosses the bench held up by the overlying Poison Strip Sandstone Member of the Cedar Mountain Formation northeast of Arches National Park (Kirkland and others, 1997). It is recognized in the area between the Green and Colorado Rivers, where it is thought to reflect the last effects of salt diapirism in the region around Arches National Park. There is an approximately 25-million-year hiatus in sediment accumulation between the Late Jurassic and middle Early Cretaceous (Kirkland and others, 1997, 1999; Kirkland and Madsen, 2007). The Yellow Cat Member is conformably

overlain by the Poison Strip Sandstone and pinches out under it to the east and west. It reflects a complex of fluvial and lacustrine environments deposited under semiarid conditions.

The Yellow Cat section is relatively thin in this area (figures 32, 33) and, as on the entire west side of Arches National Park (figure 11), there is no massive pedogenic carbonate in the Yellow Cat Member. The base of the Yellow Cat Member is placed at the first concentration of chert pebbles, which is at the base the bone beds.

Significant fossils, known nowhere else in North America, are abundant in the Yellow Cat Member (Fig. 3) in the entire area surrounding Arches National Monument (Kirkland and others, 1997,1999; Kirkland, 2005a, 2005b; Kirkland and Madsen, 2007) and no other locality is more important than the Dalton Wells Quarry Gr001v (Eberth and others, 2006; Britt and others, 2009). In fact, with Dinosaur National Monument and the Cleveland-Lloyd Quarry; Dalton Wells is one of only three Utah Dinosaur Sites with entries in the Encyclopedia of Dinosaurs (Britt and Stadtman, 1997; Currie and Padian, 1997). This world class, scientific resource is discussed in more detail in its own section. Additionally just to the west of the Courthouse Wash Area dinosaur bones were found while excavating for a pipeline and dinosaur egg shell is weathering out of the rocks on the west side of the railroad corridor (Hirsh and others, 1996).

#### **CEDAR MOUNTAIN FORMATION, POISON STRIP SANDSTONE MEMBER (LOWER CRETACOUS)**

The Poison Strip Sandstone is a complex of well-cemented sandstones that indicate deposition in beaches and low-sinuosity anastomosing and meandering river systems (Kirkland and others, 1997; Kirkland and Madsen, 2007). The type section is north of the Ringtail Mine northeast of Arches National Park. In the Arches National Park area, Stikes (2006) found the Poison Strip Sandstone to represent an amalgam of river channels up to fifteen meters thick due to decreased subsidence rates dominated by low to moderate-sinuosity channels with lateral bars and distal braided channels. Young (1960) referred to these resistant sandstones as the middle Cedar Mountain Sandstone and noted that they form the most continuous marker bed in the Cedar Mountain Formation. These resistant sandstones holdup an extensive cliff of lower Cedar Mountain and upper Morrison Formation extending across much of east-central Utah from the eastern San Rafael Swell to western Colorado.

Trace fossils are abundant and diverse in the Poison Strip Sandstone. Petrified logs and cycads are also common in these beds (Dayvault and Hatch 2005). Dinosaurs are less commonly preserved and include a large nodosaurid originally referred to as cf. *Hoplitosaurus* (Bodily, 1969; Carpenter and others, 1999) found a few miles north of the Courthouse Quarry Area. Overall, the fossils in the Poison Strip Sandstone suggest persistence of the Yellow Cat fauna.

#### **CEDAR MOUNTAIN FORMATION, RUBY RANCH MEMBER (LOWER CRETACOUS)**

The Ruby Ranch Member is present everywhere the Cedar Mountain Formation is recognized and thickens to the northwest, perhaps indicating the earliest development of a foreland basin caused by initial Cretaceous thrust faulting in central Utah (Kirkland and others, 1997, 1998; Kirkland and others). The Ruby Ranch Member's appearance is much like the Yellow Cat Member, except that carbonate nodules are much more common and cover the ground to such an extent that it is difficult to find fossil bone fragments. These carbonate nodules were formed in ancient soils and

ephemeral ponds formed under semiarid conditions. Ribbon sandstones representing low-sinuosity rivers are common in this member (Harris, 1980; Kirkland and others, 1997, 1999). Where the Dakota Formation directly overlies the Ruby Ranch Member east of the San Rafael Swell, several meters at the top of the member may be leached to a pale green color, such that the top of the member may appear superficially to represent the Mussentuchit Member of the Cedar Mountain Formation to the west (Kirkland and Madsen, 2007). However, the abundance of carbonate nodules in this interval provides evidence that this is not the case.

Although present, fossils, including dinosaur skeletal remains, are not well known from the Ruby Ranch Member. However, it has recently been noted that a large lake system was developed along the western side of Arches National Monument that is becoming a focus of research for scientist from a number of different institutions. The UGS has noted fossil plants, fish and invertebrate fossils that are highly rare in the interval elsewhere. Significant dinosaur track sites have been noted near the margins of this lake; notably within Arches National Park near its eastern margin (Lockley and others, 2004) and the BLM has set aside a major, newly discovered dinosaur track site near the Mill Canyon Dinosaur Trail (Cowan and others, 2010) a few miles northwest of Courthouse Quarry Area near its western margin. The Courthouse Quarry Area lies near the southern margin of this large lake system.

#### **DAKOTA FORMATION (LOWER TO BASAL UPPER CRETACEOUS)**

The conglomerate at the base of the Dakota Formation is present capping parts of the mesa on the northwest of the Courthouse Quarry Area. The pebble conglomerates formed at the bottom of northeast flower river channels developed on a short erosional interval at the end of the Early Cretaceous. Dinosaur bones are known from these beds (Carpenter, 2006, UGS observations) in the Arches National Park area, but they are not common. These rocks correlate to the fossiliferous Mussetuchit Member of the Cedar Mountain Formation in the western San Rafael Swell and not to the overlying Dakota Formation in that area (Hunt and others, 2011).

#### **THE DALTON WELLS QUARRY**

The Dalton Wells Quarry is visible on the point at the west end of the escarpment, which is held up by the Poison Strip Sandstone capping the less resistant beds of the Yellow Cat Member of the Cedar Mountain Formation and the Brushy Basin Member of the Morrison Formation to the northeast across Courthouse Wash. The abundance of dinosaur fossils at Dalton Wells have been known to residents of Moab for many years, so much so, that local businesses would hand out maps with the area circled as a place to collect dinosaur bones. Thus, the site has been a major focal point of ongoing pilfering of significant and scientifically unique fossil remains.

The Dalton Wells Dinosaur Quarry is highly significant in the history of paleontological research on the Cedar Mountain Formation (Britt and Stadtman, 1997; Eberth and others, 2006) because: (1) it may be the first paleontological site discovered in the Cedar Mountain Formation and is certainly the first site discovered in the Yellow Cat Member, (2) it may be the largest known single paleontological site in the Lower Cretaceous of North America and is certainly the largest known in the Yellow Cat Member and (3) with nine dinosaur taxa recognized it preserves the most diverse single dinosaur fauna yet known from any single paleontological site in the Lower Cretaceous of North America. The first fossil to be described from the site was a fragment of the

upper jaw of an iguanodont described as *Iguanodon ottingeri* in honor of Lin Ottinger in Moab, Utah (Galton and Jensen, 1979). The quarry has been worked since the 1970s by Brigham Young University and to date more than 4,200 dinosaur bones have been recovered with many tens of thousands more awaiting excavation. An area of only 215 square meters has been excavated and it is estimated that the entire bone bed extends over 4,000 square meters (Eberth and others, 2006; Britt and others, 2009).

The Dalton Wells faunal list discovered to date include Chelonia (turtles), Neochoristodera (crocodile-like lizard relatives), Archosauria (present day crocodylians and birds), Pterosauria (flying reptiles), Crocodylia (Crocodylian) and many suborders of Dinosauria (dinosaurs). The dinosaur fauna is sauropod-dominated (MNI [minimum number of individuals] =41): a new, as yet unnamed basalmacronarian (MNI=15), Cedarosaurus (Tidwell and Carpenter) (MNI=3), a new, as yet unnamed camarasaurid (MNI=2) and a large number (MNI=21) of generically unassigned sauropod elements. Other dinosaurs include the theropods Utahraptor (MNI=9), Nedcolbertia (MNI=2), a possible ornithomimid (MNI=2), plus iguanodontids (MNI=4) and the ankylosaurid, Gastonia (MNI=9). The assemblage also includes eight elements from four non-dinosaurian reptiles. The presence of Utahraptor, Nedcolbertia, Cedarosaurus, and Gastonia at the Dalton Wells Dinosaur Quarry support its inclusion in the upper Yellow Cat Member as used elsewhere (Kirkland and Madsen, 2007).

In an attempt to receive local economic benefit of this unique resource, in 1995, Grand County applied to the Utah Department of Economic Development's Local Economic Development Initiative to develop a master plan for a Dalton Wells-Utahraptor Dinosaur Park. Being awarded the grant, Grand County hired a consultant, Landscape Architects Inc., who developed a feasibility study for a more than \$15,000,000 Utahraptor Dinosaur Learning Center. This plan was presented to the Utah Legislature in 1996 by the consultant, but due to a lack of a compromise position, the proposal was tabled and was never formally presented again.

In 1994, because of the great scientific significance of this site, then Utah State Paleontologist Dave Gillette was tasked SITLA to determine which lands in the area of Dalton Wells would best be transferred to DFFSL to better insure the protection of these important fossil resources for the benefit of the citizens of Utah. In 1999 the Courthouse Wash Area was turned over to DFFSL by SITLA. Initially, the DFFSL's Courthouse Wash Area was known as the Utahraptor Lair.

During the fall of 2003, in an attempt to expose the high wall of the quarry for visiting scientists collaborating on a study of the geology of the quarry, a track hoe was used to excavate a 60 m trench through the bone bed damaging an untold number of bones; certainly several hundreds of specimens. This far exceeded the stipulation that only hand tools be used unless prior permission was granted (UGS Paleontological Excavation Permit 01-325). The damage was accidentally discovered when another team of visiting scientist visited the site in January of 2004. Numerous intact bones were found littering the slope and extending out of the collapsing walls of the trench. An administrative review of the incident was held on Feb. 26, 2004 with representatives of the DFFSL, UGS and BYU.

Eberth and others (2006) interpreted the site to represent a two meter-thick succession of four stacked bone beds deposited in a back-bulge setting by sub-aerial debris flows (cohesive

mudflows) triggered by intense rainfall or seismic events, which transported the bones over a relatively short distance. They interpreted the carbonate cementation of the poorly sorted host matrix to represent a calcrete formed through diagenesis and not paleosol development. The Utah Geological Survey concurs that there is no genetic relation between the calcretes north of Arches National Park and the bone beds at Dalton Wells. A maximum age of 124 million years (basal Aptian stage [Gradstein and others, 2004]) has been derived from the laser ablation Uranium/Lead dates of detrital zircon grains from associated sandstone (Barton and others 2006; Greenhaugh and others, 2006). Additionally, Britt and others (2009) in their taphonomic study of the site have noted that the bones are largely disarticulated and display a remarkable amount of damage due to the activities of insects during the Early Cretaceous.

Utah's Cedar Mountain dinosaurs are contributing critical information about an important period of time in the history of terrestrial life in the Northern Hemisphere. Globally, this was a time of changing climatic conditions and exceptionally high atmospheric carbon dioxide levels causing "super-greenhousing" (a world with no polar ice caps and a sluggish, poorly oxygenated ocean), major restructuring of biogeographic migration corridors and a complete restructuring of plant communities with the origin and rapid rise to dominance of flowering plants. The Utah Geological Survey, Dinosaur National Monument and researchers from a host of different institutions continue to discover and integrate new data from the Cedar Mountain Formation into an increasingly robust history of Utah during the Early Cretaceous. Furthermore, these data are documenting the relationship of Utah's geological history with the rest of the world. Continued new dinosaur discoveries only serve to show that Utah has the most complete Cretaceous dinosaur record in the world (Kirkland and Madsen, 2007) and that there is still a great deal to learn from this extraordinary record.

## **DINOSAUR TRACKS**

Paleontological resources are the most remarkable and unique resource at Courthouse Quarry/Dalton Wells. At the time of selection of sovereign land parcels in 1993, Martha Hayden, representing UGS, wrote:

The most significant known sites include dinosaur remains from the Upper Jurassic Morrison formation and the Lower Cretaceous Cedar Mountain formation and dinosaur track sites at the Entrada Sandstone/Summerville formation contact. The Dinosaur Well Quarry in the SE1/4 of Section 15, T24S, R20E has yielded new and important dinosaur taxa from the Lower Cretaceous Cedar Mountain Formation. This site was partially excavated in the 1970s by Brigham Young University, but much more of it remains in place. Because of the scientific importance of this site, as well as its proximity to the highway and the town of Moab, Dalton Well Quarry and other sites in the area are vulnerable to vandalism by commercial and amateur collectors and need protection to preserve their scientific value. Separating these lands from the school trust estate and managing them under public trust responsibility should make it easier to protect Dalton Wells from unauthorized collecting and also allow the flexibility of choosing other options such as designating a paleontological landmark under Utah Code 76-6-901.

This exposure in Section 15 continues north into section 10, through Section 11 and then northward into Section 2 [SITLA lands] and the west half of Section 14. (Kenny Wintch, Division of State Lands and Forestry, April 4, 1994 correspondence) The west half of Section 22 may have

Morrison Formation petrified wood. Dinosaur tracks from the middle Jurassic are present in Section 34, T23SR20E and Sections 12, 13, 24 and 25, T24SR20E. The Dalton Well quarry in particular has been the subject of several scientific articles. The UGS website describes it as follows:

Early Cretaceous dinosaur fossils are found in Utah in the Cedar Mountain Formation, which dates to about 125-98 million years ago. This rock unit overlies the Morrison Formation, but represents more time and contains several entirely different faunas or groups of dinosaurs. These represent a time when North America was connected to Europe before flowering plants, a period when rising sea levels led to the isolations of North America from the rest of the world and finally a time when the first land connections with Asia were established and flowering plants had come into their own (Utah Geological Survey web page Dinosaurs and Fossils, “Utah in the Age of Dinosaurs”).

Dinosaurs of this period include the Acrocanthosaurus, Eolambia, Gastonia, Iguanodon, Nedcolbertia, Cedarsaurus and Utahraptor. Plaster models exist for some of the dinosaur bones taken from Dalton Well Quarry. In addition, there is information on these discoveries on several websites, including those operated by UGS, the Museum of Western Colorado and the Earth Museum at Brigham Young University.

Along Highway 191 and the railroad right-of-way, dinosaur eggshell fragments and fossil cones have been found, according to Jim Kirkland, State Paleontologist. These sites need further investigation.

The Merrimac Butte Geological Quad (2000) has recently been published by the Utah Geological Survey and could be the reference map for paleontological sites already known or discovered in a paleo survey of the area.

## **VEGETATION**

From the USDA NRCS soil survey, the potential native upland vegetation on DWU included a mix of Indian ricegrass, galleta grass, sand dropseed, snakeweed, Mormon-tea, saltbush, shadscale, blue grama, alkali sacaton, threeawn, fourwing saltbush, juniper, algerita, cliffrose, Gardner saltbush, bud sagebrush, bottlebrush squirreltail, western wheatgrass and widely spaced pinyon pine (USDA NRCS 1989). Cottonwood trees are also present within the ephemeral drainages as are Single-leaf Ash throughout the DWU. Numerous non-native plant species are present on DWU, including Russian thistle, tamarisk and cheatgrass. There are no records of occurrence for any threatened, endangered or sensitive plant species within the DWU.

## **SOILS**

According to the USGS soil survey, the soils in the DWU are generally composed of silt loam, fine sand, fine sandy loam, loamy fine sand and extremely bouldery silt loam. The soil types include the Rock Outcrop (sl), Sheppard Fine Sand (fs), Rock Outcrop-Moenkopie Association (fsl), Nakai-Redlands Complex (lfs), Hanksville family, Badland complex (ebsl), Toddler-Ravola-Glenton Family(sl), Nakai Fine Sandy Loam (fsl) and Muff Family-Badlands. All soils are well drained or somewhat excessively drained. Runoff characteristics range from negligible to rapid depending upon slope and surface compaction, with very slow to rapid permeability.

Some soils are subject to rare or occasional, very brief or brief flooding following high intensity summer thunderstorms or above average snowmelt events. These soils are used for livestock grazing, rangeland and wildlife habitat.

## **WILDLIFE**

### **TERRESTRIAL/AVIAN WILDLIFE**

Similar to Prairie Dog Unit, the DWU contains important habitat for desert bighorn sheep. The bighorn sheep using the DWU belong to the Potash herd, one of two native herds of bighorn sheep in the entire state. Because this is a native herd as well as a high interest species, impacts to this herd resulting from human activities should be considered significant. Critical habitat includes rocky, inaccessible habitat associated with cliffs and talus slopes. Management of these areas under public trust responsibilities could provide the needed protection from development and accommodate the high public interest in this species. Other desert fauna including lizards, ravens, turkey vultures, jackrabbits, snakes, pack rats and mice are also present on DWU.

### **SENSITIVE SPECIES/THREATENED AND ENDANGERED**

The Utah Department of Wildlife Resources does not have records of occurrence for any threatened, endangered or sensitive species within the DWU. However, within a 2-mile radius there are recent records of occurrence for big free-tailed bat, ferruginous hawk, fringed myotis and white-tailed prairie dog.

**TABLE 6: UTAH DNR, DIVISION OF WILDLIFE RESOURCES. UTAH SENSITIVE SPECIES LIST. MARCH 29, 2011**

<b>Common Name</b>	<b>Scientific Name</b>	<b>State Status</b>	<b>Presence: Historic or Current</b>	<b>Notes</b>
<b>Big Free-Tailed Bat</b>	NYCTINOMOPS MACROTIS	SS-Sensitive Species (Transient)	Current	Reported in a wide variety of habitats and elevations, including desert shrub or riparian habitat. Associated with sage, creosote bush, rabbit brush, willow and salt cedar.
<b>Ferruginous Hawk</b>	BUTEO REGALIS	SPC-Species Of Concern	Current	This raptor nests at the edge of juniper habitats and open, desert and grassland habitats in western, northeastern and southeastern Utah. The species is highly sensitive to human disturbance and is also threatened by habitat loss from oil and gas development, agricultural practices and urban encroachment. The ferruginous hawk, a neotropical migrant, has declined across much of its range and has been extirpated from some of its former breeding grounds in Utah.
<b>Fringed Myotis</b>	MYOTIS THYSANODES	SPC-Species Of Concern	Current	Inhabits caves, mines, crevices and buildings in pine-oak, pinyon-juniper and desert shrub between elevations 1,217m to 2,438m
<b>White-Tailed Prairie Dog</b>	CYNOMYS LEUCURUS	SPC-Species Of Concern	Current	This small mammal breeds from April 1 - June 15. Protecting prairie dogs during their spring breeding season helps ensure the prairie dogs are able to give birth to and raise their young

# **DALTON WELLS UNIT MANAGEMENT OBJECTIVES**

---

## **2.1 PALEONTOLOGICAL RESOURCES**

### **PRESERVATION**

In order to preserve the paleontological resources for the public trust, UGS issues all paleontology research permits for Utah State Lands and their subdivisions. This ensures that all paleontology research and excavating activity done on the DWU will be for the public benefit in knowledge and curation at institutions such as universities, museums, and or government agencies.

### **RESEARCH**

DFFSL seeks to partner with universities and other professional researchers to ensure they have adequate access to the resources. These partners can help DFFSL identify future exploration opportunities on this land.

## **2.2 PUBLIC ACCESS AND SAFETY**

### **CAMPING REGULATIONS**

The DWU is one of the last parcels of public land that has free dispersed camping within 15 miles of Moab. In the last few years, this area has become increasingly popular due to the fact that the BLM has implemented an agency plan to restrict camping to campgrounds or designated sites in heavily used areas. The neighboring land is administered by SITLA, which also provides free dispersed camping sites to the public. Currently, FFSL has few camping rules and regulations and none that are posted for public awareness, but intends to develop a more thorough and concise public list in conjunction with SITLA in order to cooperatively manage the current and future camping issues at both Willow Springs and Dalton Wells.

### **SANITATION**

The DWU holds an extensive single track trail system that attracts thousands of visitors and local residents each year. There are no restroom facilities or refuse stations on sovereign land or adjacent SITLA land. This poses a potential health hazard and impacts the aesthetics of the area over time.

### **TARGET SHOOTING**

Target shooting is a legal activity on sovereign lands and adjacent SITLA and BLM lands. Although legal, it poses a direct threat to the recreationists on the Sovereign single track trail system. Although FFSL cannot restrict target shooting, for the safety of the public, a well-executed educational component should be provided in key areas like trailheads, day use areas, parking lots and campgrounds.

## **2.3 RECREATION MANAGEMENT OF EXISTING TRAILS**

### **MULTIPLE-USE SOVEREIGN TRAIL**

DFFSL would like to continue the partnership with RWR, as they are dedicated to multiple uses of the Sovereign Trail System. Their mission follows the multiple-use, sustained-yield management principles by providing numerous recreational opportunities on state sovereign lands including motorized access (ATV and non-motorized), hiking and mountain biking.

### **PUBLIC TRUST EDUCATION AND OUTREACH**

In general, it is a lack of awareness that underlies much of the resource damage and user-conflict occurring on public land. Along with building and maintaining trails, RWR seeks to educate trail users about the responsible way to utilize public lands. Their message is to ride with respect for oneself, for others and for nature, itself. The majority of their curriculum is specific to desert riding, since national education campaigns often neglect this setting. RWR provides rider training courses and implements their education on outdoor signage. For instance, on the Sovereign Trail System, RWR has placed large signs at six entrance roads and kiosks at four staging areas. Topics include an explanation of trail-designations, preserving trail width, etiquette for encountering other trail users and avoiding cryptobiotic soil. DFFSL encourages and appreciates the educational efforts about resource damage and degradation and would like to continue to work in partnership with RWR by supporting educational days and trail clean up events

## **2.4 MANAGEMENT OF INVASIVE SPECIES**

Tamarisk (*tamarix* sp.), a woody invasive and county noxious weed is present on Dalton Wells Unit in the upper Courthouse Wash drainage. Since 2009 the southeast area fire wardens removed 17 acres of tamarisk using the cut, pile and burn method. The biological control agent called tamarisk leaf beetle (*Diorabdha elongata*) exists in Grand County to diminish the health of tamarisk trees through annual defoliation. After removal, the tamarisk trees were not treated with any herbicide and instead DFFSL is monitoring tamarisk leaf beetle activity on the re-sprouts. DFFSL works closely with the Grand County Weed Supervisor to help identify and control noxious weeds on sovereign lands. The Utah Noxious Weed Act (Subsection R68-9) dictates weed control on sovereign lands, where all state listed weeds are put into categories based on the threat of spread and the priority of removal.

## **2.5 ADJACENT LANDOWNER PARTNERSHIPS**

DFFSL seeks to maintain partnerships with adjacent landowners including federal (BLM and NPS), state and nonprofit partners. DFFSL and SITLA are working together to streamline rules and regulations for the DWU because boundaries contain both dispersed camping and motorized and non-motorized trails. DFFSL and NPS share boundaries on the northeast corner where recreation trails exist. TrailMix, a non-motorized trails committee of Grand County has created necessary signage along these borders to protect National Park resources and keep unauthorized OHV and bicycle use out of the Arches National Park. DFFSL would like to continue this partnership with TrailMix and with the NPS to ensure that recreational users of the Sovereign Trail do not cause damage in adjoining national parklands from OHV and bicycle use. DFFSL will utilize these partners to help ensure that signage is provided to show the park boundaries

and indicate that OHV

use is illegal within those park boundaries. DFFSL, Trail Mix and the NPS will also work to find other solutions (such as physical barriers) that will prevent unauthorized OHV and bicycle use within the park. Should additional uses on DWU adversely impact NPS resources, DFFSL will coordinate with NPS to mitigate impacts to adjacent NPS land.

DFFSL would also like to maintain close coordination and communication with RWR, a local 501(c)(3) non-profit organization, who maintains the Sovereign Trail and provides educational materials as well as hundreds of volunteer hours each year to the maintenance of the trail.

## Appendix A – Moab Exchange Lands CMP Citations

- Bodily, N.M., 1969, An armored dinosaur from the Lower Cretaceous of Utah: Brigham Young University Geology Studies, v. 16, p. 35-60.
- Britt, B.B., Scheetz, R.D., Brinkman, D.B., and Eberth, D.A., 2006, A Barremian neochoristodere from the Cedar Mountain Formation, Utah, U.S.A.: *Journal of Vertebrate Paleontology*, v. 26, p. 1005-1008.
- Britt, B.B., and Stadtman, K.L., 1997, Dalton Wells Quarry, *in* Currie, P.J. and Padian, K., editors, *Encyclopedia of Dinosaurs* San Diego, Academic Press, p. 165-166.
- Britt, B.B., Stadtman, K.L., and R.D. Scheetz, R.D., 1997, The Early Cretaceous Dalton Wells dinosaur fauna and the earliest North American titanosaurid sauropod [abs.]: *Journal of Vertebrate Paleontology*, v. 16, supplement to no. 3, p. 24A.
- Britt, B.B., Eberth, D.A., Scheetz, R., Greenhalgh, B.W., and Stadtman, K.L., 2009, Taphonomy of debris-flow hosted dinosaur bonebeds at Dalton Wells, Utah (Lower Cretaceous, Cedar Mountain Formation, USA): *Paleogeography, Paleoclimatology, Paleoecology*, v. 280, p. 1-22.
- Bureau of Land Management (BLM), 2008. Moab Record of Decision and Resource Management Plan. Bureau of Land Management. Moab District, Moab, Utah.
- Burton, D., Greenhalgh, B.W., Britt, B.B., Kowallis, B.J., Elliott, W.S. Jr., and Barrick, R., 2006, New radiometric ages from the Cedar Mountain Formation, Utah and the Cloverly Formation, Wyoming: Implications for contained dinosaur faunas [abs.]: *Geological Society of America Abstracts with Programs*, v. 38, no. 7, p. 52.
- Carpenter, K. 2006, Assessing dinosaur faunal turnover in the Cedar Mountain Formation (Lower Cretaceous) of eastern Utah, USA. *Mesozoic Terrestrial Ecosystems 2006*, p. 21-25.
- Carpenter, K., and Kirkland, J.I, 1998, Review of Lower and middle Cretaceous ankylosaurs from North America, *in* Lucas, S.G., Kirkland, J.I., and Estep, J.W., editors, *Lower to Middle Cretaceous Non-marine Cretaceous Faunas: New Mexico Museum of Natural History and Science Bulletin 14*, p. 249-270.
- Carpenter, K., Kirkland, J. I., Burge, D., and Bird, J., 1999, Ankylosaurs (Dinosauria: Ornithischia) of the Cedar Mountain Formation, Utah, and their stratigraphic distribution, *in* Gillette, D., editor, *Vertebrate Paleontology in Utah*, Utah Geological Survey, Miscellaneous Publication 99-1, p. 243-251.
- Chan, M.A., Parry, W.T., and Bowman, J.R., 2000, Diagenetic hematite and manganese oxides and fault-related fluid flow in Jurassic sandstones, southeastern Utah: *American Association of Petroleum Geologists Bulletin*, v. 84, p. 1281-1310.
- Cowan, J., Lockley, M., and Gierlinski, G., 2010, First Dromaeosaur trackways from North America: New evidence from a large Site in the Cedar Mountain Formation (Early Cretaceous) of eastern Utah. *Journal of Vertebrate Paleontology, Abstracts* v. 30, p. 75A.

- Currie, P.J. and Padian, K., editors 1997, *Encyclopedia of Dinosaurs San Diego*, Academic Press, 869 p.
- Czerkas, S.A. and Mickelson, D.A., 2002, The first occurrence of skeletal pterosaur remains in Utah. In Czerkas, S.J., editor, *Feathered Dinosaurs and the origin of flight*, The Dinosaur Museum Journal, Volume 1, Blanding, Utah, p. 3-13.
- Dayvault, R.D., and Hatch, H.S., 2005, Cycads from the Upper Jurassic and Lower Cretaceous rocks of southeastern Utah: *Rocks and Minerals*, v. 80, no. 6, p. 412-432.
- Doelling, H.H., 2001, Geological map of the Moab and eastern part of the San Rafael Desert 30' x 60' quadrangles, Grand County, Utah and Mesa County, Colorado: Utah Geological Survey Map 180, scale 1:100,000.
- Doelling, H.H., 2003, Geology of Arches National Park, in Sprinkel, D.A., Chidsey, T.C., Jr., and Anderson, P.B., editors, *Geology of Utah's Parks and Monuments*: Utah Geological Association Publication 28, p. 11-36.
- Eberth, D.A., Britt, B.B., Scheetz, R., Stadtman, K.L., and Brinkman, D.B., 2006, Dalton Wells—Geology and significance of debris-flow-hosted dinosaur bonebeds in the Cedar Mountain Formation (Lower Cretaceous) of eastern Utah, USA: *Paleogeography, Paleoclimatology, Paleoecology*, v. 236, p. 217-245.
- Ekdale, A. A. and M. D. Picard. 1985. Trace fossils in a Jurassic eolianite, Entrada Sandstone, Utah, U.S.A. Pages 3-12 in Curran, H. A., editor. *Biogenic structures: their use in interpreting depositional environments*. Society of Economic Paleontologists and Mineralogists, Tulsa, OK. Special Publication 35:3-12.
- Galton P.M. and Jensen, J.A., 1979. Remains of ornithopod dinosaurs from the Lower Cretaceous of North America, *Brigham Young University Geological Studies* 25-1-10.
- Garden, I.R., Guscott, S.C., Burley, S.D., Foxford, K.A., Walsh, J.J., and Marshall, J., 2001, An exhumed palaeo-hydrocarbon migration fairway in a faulted carrier system, Entrada Sandstone of SE Utah, USA: *Geofluids*, v. 1, 195-213.
- Gloyn, Robert W., 1998. Presence of metallic minerals within the Dalton Wells Unit. *Metals Review*, Courthouse Quarry Area. Utah Geological Survey.
- Gradstein, F.M., Ogg, J.G., and Smith, A.G., 2004, *A geologic time scale 2004*: Cambridge University Press, 589 p.
- Greenhalgh, B.W., Britt, B.B., and Kowallis, B.J., 2006, New U-Pb age control for the lower Cedar Mountain Formation and an evaluation of the Morrison Formation/Cedar Mountain Formation Boundary, Utah [abs.]: *Geological Society of America Abstracts with Programs*, v. 38, no. 6, p. 7.
- Harris, D.R., 1980, Exhumed paleochannels in the Lower Cretaceous Cedar Mountain Formation near Green River, Utah: *Brigham Young University Geology Studies*, v. 27, p. 51-66.
- Hirsch, K. F., Bray, E. S., Hasiotis, S. T. , Demko, T. M., Currie, B., Ekart, D., and the Morrison Research Group. 1996. Dinosaur eggshell from the uppermost part of the Upper Jurassic Morrison Formation, southeastern Utah. *Geological Society of America National Meeting*,

- Hunt, G.J., Lawton, T.F., and Kirkland, J.I., 2011, Detrital zircon U-Pb geochronological provenance of Lower Cretaceous strata, foreland basin, Utah, in Sprinkel, D.A., Yonkee, W.A., and Chidsey, T.C., Jr., editors, Sevier thrust belt: northern and central Utah and adjacent areas: Utah Geological Association Publication 40, p. 193-211.
- Kirkland, J.I., 1998a, A polacanthid ankylosaur from the Early Cretaceous of eastern Utah, *in* Lucas, S.G., Kirkland, J.I., and Estep, J.W., editors, Lower to Middle Cretaceous Non-marine Cretaceous Faunas: New Mexico Museum of Natural History and Science Bulletin 14, p. 271-281
- Kirkland, J.I., 2005a, Utah's newly recognized dinosaur record from the Early Cretaceous Cedar Mountain Formation: Utah Geological Survey, Survey Notes, v. 33, no. 1, p. 1-5.
- Kirkland, J.I., 2005b, Dinosaurs from the Lower Cretaceous Cedar Mountain Formation: Canyon Legacy, Moab, Utah, Dan O'Laurie Museum, v. 55, p. 28-36.
- Kirkland, J.I. and Madsen, S.K. 2007. The Lower Cretaceous Cedar Mountain Formation, eastern Utah: The view up an always interesting learning curve, in Lund W.R. (ed.) Field Guide to Geological excursions in southern Utah, Geological Society of America Rocky Mountain Section 2007 Annual Meeting, Grand Junction Geological Society, Utah Geological Association Publication 35:1-108 CD-ROM.
- Kirkland, J.I., Britt, B.B., Burge, D.L., Carpenter, K., Cifelli, R., DeCourten, F., and Eaton, J., Hasiotis, S., and Lawton, T., 1997, Lower to middle Cretaceous dinosaur faunas of the central Colorado Plateau: A key to understanding 35 million years of tectonics, sedimentology, evolution, and biogeography: Brigham Young University Geology Studies, v. 42, Part II, p. 69-103.
- Kirkland, J.I., Britt, B.B., Whittle, C.H., Madsen, S.K., and Burge, D.L., 1998, A small coelurosaurian theropod from the Yellow Cat Member of the Cedar Mountain Formation (Lower Cretaceous, Barremian) of eastern Utah, *in* Lucas, S.G., Kirkland, J.I., and Estep, J.W., editors, Lower to Middle Cretaceous Non-marine Cretaceous Faunas: New Mexico Museum of Natural History and Science Bulletin 14, p. 239-248.
- Kirkland, J.I., Burge, D., and Gaston, R., 1993, A large dromaeosaurid (Theropoda) from the Lower Cretaceous of Eastern Utah: *Hunteria*, v. 2, no. 10, 16 p.
- Kirkland, J.I., Cifelli, R., Britt, B.B., Burge, D.L., DeCourten, F., Eaton, J., and Parrish, J.M., 1999, Distribution of Vertebrate faunas in the Cedar Mountain Formation, east-central Utah, *in* Gillette, D., editor, Vertebrate Paleontology in Utah: Utah Geological Survey, Miscellaneous Publication 99-1, p. 201-217.
- Kirkland, J.I., Scheetz, R.D., and Foster, J.R., 2005, Jurassic and Lower Cretaceous dinosaur quarries of western Colorado and eastern Utah, *in* Rishard, G., compiler, 2005 Rocky Mountain Section of the Geological Society of America Field Trip Guidebook: Grand Junction Geological Society, Field Trip 402, 26 p. CD-ROM.
- Lockley, M. G. 1991. The Moab megatracksite: a preliminary description and discussion of millions of Middle Jurassic tracks in eastern Utah. Pages 59-65 *in* Averett, W. R., editor. Guidebook

for dinosaur quarries and tracksite tour, western Colorado and eastern Utah. Grand Junction Geological Society, Grand Junction, CO.

- Lockley, M. G. and A. P. Hunt. 1995. Dinosaur tracks and other fossil footprints of the western United States. Columbia University Press, New York, 338 p.
- Lockley, M. G. and D. L. Mickelson. 1997. Dinosaur and pterosaur tracks in the Summerville and Bluff (Jurassic) beds of eastern Utah and northeastern Arizona. Pages 132-138 in Anderson, O. J., B. Kues, and S.
- G. Lucas, editors. Mesozoic geology and paleontology of the Four Corners Region. New Mexico Geological Society, Socorro, NM. Field Conference Guidebook 48.
- Lockley, M. G., White, D., Kirkland, J. and Santucci, V., 2004, Dinosaur Tracks from the Cedar Mountain Formation (Lower Cretaceous), Arches National Park, Utah: *Ichnos*, v. 11, p. 285-293.
- Lupis, S. G., K.D. Bunnell, T. A Black, and T. A. Messmer. 2007. Utah Gunnison's prairie dog and white-tailed prairie dog conservation plan: Draft #5. Utah Division of Wildlife Resources, Salt Lake City, Utah.
- McKnight, E. T. 1940. Geology of area between Green and Colorado Rivers, Grand and San Juan counties, Utah. U.S. Geological Survey, Reston, VA. Bulletin 908.
- Mickelson, D. L., M. Lockley, J. Bishop, and J. I. Kirkland. 2004. A new pterosaur tracksite from the Jurassic Summerville Formation, near Ferron, Utah. *Ichnos* 11(1):1-18.
- Natural Resources Conservation Service (NRCS), 1989. "Soil Survey of Grand County, Utah, Central Part," Soil Conservation Service, U.S. Department of Agriculture. Washington, D.C., 1962.
- Ruediger, William C., 2007. An Assessment of Wildlife Habitat Linkages on Interstate 70, Utah,
- Scheetz, R.D., Britt, B.B., Burge, D.L., Stadtman, K.L., Madsen Jr., J.H., 2001. New iguanodontid-grade ornithopod taxa from the Cedar Mountain Formation (Early Cretaceous) of Utah. *Journal of Vertebrate Paleontology*, Abstracts 22 (3), 97A.
- Smith, J.B. 1997. Cleveland-Llyod Dinosaur Quarry. in Currie, P.J. and Padian, K., editors, *Encyclopedia of Dinosaurs*, San Diego, Academic Press, p. 126-1128.
- Stikes, M.W., 2006, Fluvial facies and architecture of the Poison Strip Sandstone, Lower Cretaceous Cedar Mountain Formation, Grand County, Utah: Utah Geological Survey, Miscellaneous Publication 06-2, 84 p., CD-ROM.
- Swanson, B. A., V. L. Santucci, S. K. Madsen, A. S. Elder, and J. P. Kenworthy. 2005, Arches National Park Paleontological Survey. National Park Service, Geologic Resources Division, Denver, CO. Technical Report NPS/NRGRD/GRDTR—05/01.
- Tidwell, V.C., Carpenter, K., and Brooks, W., 1999, New sauropod from the Lower Cretaceous of Utah, USA: *Oryctos*, v. 2, p. 21-37.

Tripp, Barry, 1988. Industrial Rocks and Minerals on Sovereign Lands Near Arches National Park. Industrial Minerals Review, Courthouse Quarry Area.

Turner, C. and Peterson, F. 2004, Reconstruction of the Upper Jurassic Morrison Formation extinct ecosystem – a synthesis: Sedimentary Geology, v. 167, p.309-355.

## **Appendix B – Public Comment Summary**

### **Scoping Public Comment Summary**

In 2011, DFFSL began a CMP development process for two parcels of State land north of Moab, Utah. These parcels are known as the Moab Sovereign Exchange Lands and include the Courthouse Wash/Dalton Wells and Prairie Dog Haven parcels, encompassing 4,500 and 830 acres respectively. As part of this planning process, DFFSL hosted a public meeting to provide an opportunity for public participation and initiate the scoping process to gather initial feedback. The public meeting took place on Thursday June 23, 2011 from 6:00pm – 8:00pm at the Grand County Council Chambers located at 125 E. Center St, Moab, UT 84532 and opened the public comment period which ran until July 21, 2011. DFFSL staff also presented the initiation of the Moab CMP planning process to the Grand County Council on May 3, 2011. From this open comment period, public comments were collected and the summarized comments are as follows:

- The Moab exchange lands should continue to be managed under multiple use sustain yield practices and remain open for all recreation types, both motorized and non-motorized.
- Hunting should continue to be permitted on Sovereign Lands.
- There should be no closing of the existing roads or trails.
- Dalton Wells Dinosaur Quarry should be preserved for public viewing benefit and surrounding structures should be installed for informational/interpretational reasons.
- Camping areas should be developed to meet the needs of increasing user demand while maintaining ecological and environmental integrity.
- Neighboring agencies and interested stakeholders should be kept informed and worked closely with throughout this process to ensure cohesive management practices.
- Grazing and mineral exploration should not be restricted in these areas.

Upon completion of the Draft Final CMP a second public meeting and comment period were held to gather comments on the draft document. Notice of the Draft Final CMP was submitted to RDCC on October 29, 2014. A public meeting was held at the Grand Center in Moab, UT on Thursday, November 13, 2014. The meeting provided an opportunity for public comment regarding the issues to be addressed in the plan. Public notice of the meeting and the 45-day comment period (November 3 – December 18, 2014) was provided via mail to adjacent landowners and interested parties. Pursuant to R652-90-500, notice was also provided in the Moab Times from October 30<sup>th</sup> through November 13<sup>th</sup> and in the Sun Times from October 29<sup>th</sup> through November 12<sup>th</sup>. DFFSL received eight comment letters during the draft final comment period. Each letter was acknowledged and addressed, as appropriate, by DFFSL.

The eight commenters are listed below. The number next to their organization/name corresponds to letter number in the proceeding comment table.

1. National Park Service - Kate Cannon
2. Sue Sternberg
3. Public Lands Policy Coordination - Kathleen Clarke
4. Lee Shenton
5. Barbra Fincham
6. Ride with Respect - Cliff Koontz
7. Pinnacle Potash – Dalh Black

Pursuant to 65-A-2-4, DFFSL will respond to each of the eight commentors via a mailing announcing the release of the Final CMP the Record of Decision. The comments from each of the comment letters was extracted and placed into Table B-1 in order to provide rationale for acceptance or non-acceptance of each comment. For purposes of the CMP, “acceptance” of a comment means that the comment was used to prompt changes in the CMP or was used to provide informative data or knowledge pertaining to the CMP planning area. Substantive comments that shape the outcome of the CMP are considered “accepted.” Non-acceptance of a comment means that the comment did not change the CMP content. A comment is considered “not accepted” if it does not contain substantive information specific to the project, if the comment is a “vote” in favor or against a management decision or if the comment is merely expressing support or dissatisfaction with the proposed actions. Rationale for the acceptance or non-acceptance of comments is provided in Table B-1.

**Table B-1: Moab Sovereign Exchange Lands CMP Response to Comments**

<b>Letter #</b>	<b>Comment #</b>	<b>Resource</b>	<b>Comment</b>	<b>Rationale for Acceptance or Non-acceptance</b>
1	1	Management	Description of adjacent land ownership, p 27. Because of the close proximity of the DWU to Arches National Park, we suggest that National Park Service (NPS) management objectives be described in greater detail in this section. Specifically, NPS management objectives for Arches National Park are to preserve cultural and natural resources and values unimpaired for enjoyment by current and future generations. Resource values that have potential to be impacted to adjacent land-use activities addressed in the CMP include naturally dark night skies, natural soundscapes, clean air and scenic views and sensitive wildlife species such as desert bighorn sheep. Soil, vegetation, and possible other resources also have the potential to be adversely impacted if motorized or non-motorized uses on the Sovereign Trail System expand across the unfenced administrative boundary into the park.	Accepted - This section has been expanded in the Final CMP to further detail NPS management objectives for Arches National Park. DFFSL will coordinate with NPS regarding to potential resource resources impacts and user conflicts.
1	2	Technical	Description of vegetation and soils, p. 35. In these two sections, DFFSL refers to "the USGS soil survey." The soil survey that covers the DWU ("Soil Survey of Grand County, Utah, Central Part") was prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS) rather than by the U.S. Geological Survey (USGS). If this is the survey to which DFFSL refers, it may be	Accepted - This reference has been changed in the Final CMP.

			appropriate to include the full citation in the document. (Note that this comment also is relevant to the CMP section on Prairie Dog Haven.)	
1	3	Management	DWU management objectives, adjacent landowner partnerships, p.39. We ask that DFFSL consider stating explicitly that one management objective for the DWU is to ensure protection of resources and values associated with Arches National Park. Certainly we appreciate and endorse the current language indicating that DFFSL will seek to maintain its partnerships with NPS and other adjacent land owners, but we also suggest that this section could be revised to reflect a stronger commitment to the protection of NPS resources and values. For example, the draft CMP indicates that the Grand County TrailMix "...has created necessary signage along these borders to protect National Park resources and keep unauthorized OHV use out of Arches National Park." By itself, such signage may not be sufficient for the protection of park resources and values. In addition to the OHV prohibition, we note that bicycle use also is prohibited except on park roads, and that some activities in the DWU could adversely impact park resources and values even if users do not physically cross park boundaries. Examples include high levels of noise, artificial light, and dust generated by motorized activities in the DWU. We ask that DFFSL consider whether these issues and concerns may warrant greater specificity in management objectives and management prescriptions for the DWU.	Acceptance - DFFSL is interested in working closely with NPS to ensure that uses on DFFSL lands do not adversely impact NPS resources. Additional language has been added to the final CMP to reflect our interest in mitigating adverse impacts.
2	1	Paleo	Regarding the "Comprehensive Management Plan proposed by Utah's Division of Forestry, Fire and State Lands (FFSL) for the area containing the historic Dalton Wells Quarry." I would like to urge you to do whatever you can to preserve the paleontological and archeological gifts this area brings us. I am a Moab resident and live close by and want to see this area protected as best as possible.	Acceptance - The Moab Exchange Lands were acquired by DFFSL because of the paleontological values, among others, and the lands will be managed to protect those values.

3	1	Technical	UDWR provides newer data on the pronghorn and white-tailed prairie dog occurrences. The zipped shapefiles for habitat are attached. A revised (April 2014) habitat layer for pronghorn is available on the AGRC's SGID under the filename: SGID10.BIOSCIENCE.Habitat_Pronghorn. Also, white-tailed prairie dog occurrences are available by contacting Sarah Lindsey, UDWR Information Manager: sarahlindsey@utah.gov (801) 538-4759.	Acceptance - The updated shapefiles have been accepted by DFFSL and incorporated into the project resource database.
4	1	Process	DFFSL management of all resources is both appropriate and necessary.	Acceptance - The Moab Exchange Lands were acquired by DFFSL because of their wildlife, scenic, recreational and paleontological values. The lands will be managed to protect those values as well as the public trust.
4	2	Management	Management of waste from disbursed camping will become more problematic with time and needs to be addressed promptly.	Acceptance - DFFSL is aware of this management issue and is considering management strategies to address dispersed camping in the future.
4	3	Land Use	Mineral extraction activities should be managed to allow sustainable uses while protecting the paleontology and recreational resources. With wise management, all of these resources can coexist.	Acceptance - As part of DFFSL's multiple-use mandate, mineral extraction is not prohibited as evidenced by existing leases on the PDH Unit.
4	4	Paleo	The State of Utah was wise to select the Dalton Wells Unit, recognizing the scientific value of the paleontology resources there. Utah Friends of Paleontology strongly supports the efforts of DFFSL to preserve these resources in a sustainable manner.	Non-acceptance - Thank you for your comment.

4	5	Land Use	...industrial development in the DWU should be kept as far away from Arches NP as possible.	Acceptance - DFFSL acknowledges the potential conflict in land uses between the NPS and DFFSL lands and would coordinate with NPS accordingly should interest in industrial development arise.
4	6	Management	I appreciate the balanced approach of the DFFSL staff. The economic benefits come from several sources and should be managed accordingly.	Non-acceptance - Thank you for your comment.
5	1	Paleo	I'm in favor of Dalton Wells dinosaur quarry being protected for future research and later, perhaps, tourism use. Scientists cannot dig a site after it has been stripped and get as much information from it. People are coming into the area for 2 National Parks (are they using the same headquarters?) and 1 Utah State Park (Dead Horse Point). Two hotel chains have built hotels in Moab recently. Seems like a potential client base. Also a source of trouble if no control. Ask the National Parks do more eyes (visitors) discourage vandalism?	Non-acceptance - Thank you for your comment.
5	2	Recreation	Moab has many days during its busy season when all or nearly all its non-commercial campsites are taken. Some would camp at Dalton Wells. There are now "no camping" signs there Ba State Park camp campground with pit toilets would be nice.	Acceptance - DFFSL is aware of this management issue and is considering management strategies to address dispersed camping in the future.
6	1	Recreation	Ride with Respect has hundreds of members, and our work on Sovereign Trail is enjoyed by thousands of bicyclists, motorcyclists, and four-wheeled enthusiasts. Rather than encouraging all of them to comment, we will simply point out that access to Sovereign Trail and conservation of the surrounding area is greatly valued.	Acceptance - The Moab Exchange Lands were acquired by DFFSL because of the recreational values, among others, and the lands will be

			The final draft of your CMP lays a solid foundation for responsible recreation of sovereign lands. We support your plans, and look forward to start implementing them next year.	managed to protect those values.
7	1	Minerals	In addition to the PDH lands, PPI holds potash leases on the adjoining state (SITLA-administered) lands. PPI's production method for the extraction of the potash resource entails an in-situ solution mining process, with no evaporative ponds, resulting in relatively limited surface disturbance. Therefore, PPI is confident its operations can be conducted within the PDH in an environmentally sensitive manner and in accordance with DFFSL's wildlife management objectives, and that any potential impacts to sensitive, threatened or endangered wildlife species ("STE Species") can be successfully mitigated.	Acceptance - Thank you for your comment. DFFSL acknowledges limited surface disturbance practices of potash extraction.
7	2	Minerals	PPI expresses concern that the DCMP overstates the value of the PDH for STE Species habitat, while downplaying the value of the PDH for responsible mineral resource development. As noted in the DCMP, there exists "ample evidence" of species not considered to be threatened or endangered inhabiting the PDH. However, the evidence suggests that the distribution of STE Species habitat within the PDH is limited due in part to the topography and vegetative conditions within the PDH. While PPI acknowledges that some STE Species habitat may exist within the PDH, it firmly believes that the impacts on such habitat can be successfully mitigated.	Acceptance - DFFSL simply reported the habitat types and occurrences of wildlife provided by the Utah Division of Wildlife Resources in and around the PDH Unit. DFFSL acknowledges proposed limited surface disturbance practices of potash extraction.
7	3	Minerals	The PDH and adjoining lands contained large reserves of valuable, economically extractable mineral resources, including potash. Given the limited evidence of STE Species within the PDH, PPI is concerned that the DCMP's proposed regulatory requirements outlined in the DCMP, if incorrectly implemented, will only result in increasing mineral development costs and delaying the potential economic benefits from mineral development within the PDH, while achieving little or no corresponding benefit to the wildlife in and around the	Acceptance - With limited STE species on the PDH, it is unclear how "proposed regulatory requirements" would delay or increased cost of mineral development. Leasees are required to comply

			PDH. With this in mind, PPI requests DFFSL modify the language of the DCMP to more accurately reflect the demonstrated presence and nature of both the wildlife and mineral resource within the PDH.	with State and Federal regulations for STE species.
7	4	Management	<p>Absent from the DCMP is any discussion of the possibility and appropriateness of a transfer of the PDH lands to SITLA. Abundant mineral resource exists within the PDH, as well as within the large tracts of SITLA-administered lands adjoining the PDH. Considering SITLA's extensive experience in administering Utah's mineral resources, along with the location of the PDH next to the large SITLA-administered tracts, PPI believes that there are clear advantages to transferring the PDH lands to SITLA. For instance, unifying the administration of the PDH with the adjoining SITLA tracts would result in more efficient and consistent administration of the State lands within the Crescent Junction area. To facilitate further discussion on this matter, PPI suggests that some discussion of the advantages and disadvantages of such a transfer should appear in the DCMP.</p>	<p>Acceptance - The Moab Exchange Lands were received in exchange for portions of the Green and Colorado Rivers, sovereign lands, to be held in the public trust. DFFSL's mandate to manage for the public trust is different than SITLA's mandate to manage for the exclusive benefit of state institutions or beneficiaries. Allowing SITLA to manage the parcel could potentially be incongruous with the Public Trust Doctrine.</p>
7	5	Management	<p>PPI requests DFFSL revisit its management objectives for the PDH, aligning those objectives more closely with the specific details of the nature and scope of the STE Species and mineral resources within the PDH.</p>	<p>Acceptance - Based on the current resource values of STE Species and mineral resources, DFFSL is confident that our management objectives in the CMP meet the needs of the resources.</p>

8	1	Paleo	Due to the amount of camping below the quarry, and due to the poaching of vertebrate material that I've heard about, I think this may be one of the trickiest places to deal with. Although I've only heard about people digging holes there, I have seen the site in the off season when bone was exposed all over the slope (loose) and in the ground in trenches. This may require more careful winter burial for the site, which is more up to the permitting agency (UGS), but it underscores the vulnerability of the site at the hands of those camping nearby and exploring the area. Perhaps signage interpretation, markers reminding people that the material should not be collected, and some developed campsites at the base of the hill (with hosts during busy seasons?) would help deter poaching.	Acceptance - DFFSL is aware of this management issue and is considering management strategies to address quarry vandalism and dispersed camping in the future.
8	2	Paleo	The Museum of Moab is working on repository status for paleontological materials from public land and is also coordinating with the state paleontologist at the UGS in preparation for obtaining an excavation permit for the site so that we can continue to study and interpret it where BYU left off. This may also help provide some security in having people on site working at times. In the interim and between digs, UFOP site stewards are perhaps the best on-site presence for patrolling the quarry itself and keeping an eye out of destructive, unauthorized digging.	Acceptance - DFFSL must be notified before any excavation can occur on the Dalton Wells Unit. DFFSL is appreciative of the local site stewardship support for the area.
8	3	Process	Glad you all are trying to do something for this site!	Non-acceptance - Thank you for your comment.

