

Russian thistle (*Salsola iberica*), halogeton (*Halogeton glomeratus*), and cheatgrass (*Bromus tectorum*) are the primary invasive annual species that dominate disturbed areas throughout the GDBR. Russian thistle and halogeton are less aggressive and are generally out-competed by perennial native species. Cheatgrass is a much stronger competitor that is difficult to control once it becomes established, thus, it is commonly seen throughout disturbed portions of the GDBR. Such species, introduced primarily by disturbances from vehicles, animals, or wind, tend to dominate disturbed sites. Weed species also tend to invade newly revegetated or reclaimed sites regardless of the reclamation seed mixtures that may have been applied or the climatic regime.

3.5.4 Special Status Plant Species

Special status plants include federally listed species, species that are candidates for listing and species that are listed as sensitive by the BLM. Appendix 3.5-1 lists all the special status species listed for the Vernal Field Office and evaluates the occurrence or potential of occurrence of each species within the GDBR area. Two special status plant species occur or have the potential to occur within the GDBR, Uinta Basin hookless cactus (*Sclerocactus glaucus*) and horseshoe milkvetch (*Astragalus equisolensis*).

3.5.4.1 *Uinta Basin Hookless Cactus (Sclerocactus glaucus)*

The Uinta Basin hookless cactus' (federally threatened) unhooked large central spine differentiates it from other members of the *Sclerocactus* genus, which have either a hooked large central spine or none (USFWS 1990). However, at least a few individuals in most Uinta Basin hookless cactus populations possess moderately to strongly hooked spines (Goodrich and Neese 1986).

Habitat for the Uinta Basin hookless cactus generally consists of gravelly or rocky surfaces on river terrace deposits and lower mesa slopes (USFWS 1990), as well as gravel littered draws (Goodrich and Neese 1986), that are underlain by clay or silty clay. This species does not grow in sandy soils. The species occurs on varying exposures, but is more abundant on south-facing exposures, slopes to about 30 percent grade, and where terrace deposits break from level tops to steeper side slopes. The Uinta Basin hookless cactus is found at elevations from 4,500 to 5,900 feet amsl within the desert shrub vegetation community (USFWS 1990). No populations of Uinta Basin hookless cactus currently occur in the GDBR but potential habitat for the species occurs in the southern and west portions of the GDBR in the Uinta Geological formation. Populations are found adjacent to the GDBR in the west near Pelican Lake and to the southeast near the Bonanza Power Plant.

3.5.4.2 *Horseshoe Milkvetch (Astragalus equisolensis)*

The horseshoe milkvetch, formerly a candidate species until it was removed from the listing in September 2006, is a BLM-designated sensitive species. The species is endemic to a single location in central Uintah County (UDWR 2003) that was surveyed and delineated in 1991 by Ben Franklin of the Utah Heritage Program. This species, a member of the bean family, is a perennial herb with pink-purple ascending or spreading flowers that bloom from late April to early June. Horseshoe milkvetch grows on river terrace sands and gravels overlying the Duchesne River Formation, and on sandy-silty soils weathered directly from it. Elevations range from 4,700-5,200 feet (UDWR 2003). Approximately 1,631 acres of horseshoe milkvetch habitat occurs in the GDBR within the desert shrub community north of Baser Wash. Potential habitat may occur in the Duchesne River Formation immediately east of Johnson Bottom which has similar characteristics to the population area and has not been documented as surveyed for this species.

3.6 WILDLIFE & FISHERIES

3.6.1 Introduction

The GDBR supports a diversity of wildlife and wildlife habitats. Species' occurrences are typically dependent on habitat availability, relative carrying capacities, and degree of existing habitat disturbance. The proposed GDBR supports approximately 98,785 acres of wildlife habitat encompassing large, fairly contiguous upland habitats, dissected by incised drainages and canyon systems. Water resources are limited within the greater GDBR and therefore, provide the greatest habitat value for wildlife. For a more detailed description of the habitat types in the GDBR please refer to Section 3.5.2 (Vegetative Communities).

3.6.2 General Wildlife

Small mammals potentially found within the GDBR and surrounding region include cottontail rabbits (*Sylvilagus* spp.), black-tailed jackrabbit (*Lepus californicus*), white-tailed prairie dog (*Cynomys leucurus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), striped skunk (*Mephitis mephitis*), western spotted skunk (*Spilogale gracilis*), and various species of rodents and bats. Smaller migratory birds (See Section 3.6.7) common to the region include black-billed magpie (*Pica pica*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), loggerhead shrike (*Lanius excubitor*), several species of sparrow, and numerous others. Herptiles potentially found in the region include wandering garter snake (*Thamnophis elegans vagrans*), Great Basin gopher snake (*Pituophis catenifer deserticola*), Great Basin spadefoot (*Scaphiopus intermontana*), western whiptail (*Cnemidophorus tigris*), sagebrush lizard (*Sceloporus graciosus*), and shorthorned lizard (*Phymosoma douglassii*).

Although all of these species are important members of wildland ecosystems and communities, most are common and have wide distributions within the region. Consequently, the relationship of most of these species to the proposed project is not discussed in the same depth as species which are threatened, endangered, sensitive, of special economic interest, or are otherwise of high interest or unique value.

3.6.3 Big Game

Three resident big game species are commonly found in the Uintah Basin: pronghorn antelope (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*). Both pronghorn and mule deer ranges are found within the GDBR. Elk have been identified in the GDBR, but were likely passing through. Both the BLM and UDWR have not identified elk range in the GDBR. Therefore, elk are not discussed further in this document.

Both BLM and UDWR big game seasonal ranges are referenced in this EIS; however, it is important to note that while UDWR ranges are used to describe existing conditions, seasonal restrictions imposed by the BLM are applicable only to BLM-designated big game habitat. BLM rankings are defined below.

BLM- identified habitat:

Crucial: Crucial ranges are areas on which a species depends for survival; there are not alternative ranges due to climate conditions or other limiting factors.

High Priority: Wildlife habitat used intensively by one or more wildlife species. Current or potential habitat composition and biological production exists to support wildlife use during the spring, summer, and fall seasons. Note that crucial habitat is generally applied to winter use areas.

Similar to the BLM, the UDWR has identified various values of big game ranges. These ranges are ranked according to their relative biological value (Dalton et al., 1990). Each of these ranking is defined in detail below.

UDWR-identified habitat:

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

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

3.6.3.1 Pronghorn Antelope

Pronghorn typically inhabit grasslands and semi-desert shrublands of the western and southwestern United States. This species is most abundant in short and mixed grass habitats at elevations from 4,000 to 6,000 feet amsl. Pronghorn are typically less abundant in xeric habitats, preferring areas that average 12-15 inches of precipitation per year. Home ranges for pronghorn can vary between 400 and 5,600 acres, according to factors including season, habitat quality, population characteristics, and local livestock occurrence. Typically, daily movements do not exceed 6 miles. Some pronghorn make seasonal migrations between summer and winter habitats, but these migrations are often triggered by availability of succulent plants and not local weather conditions (Fitzgerald et al. 1994).

Antelope from the Bonanza portion of the Vernal Herd Unit occupy much of the greater GDBR on a year-round basis. The BLM has identified 7,400 acres of high priority, year-long habitat occurring in the GDBR. No year-long crucial habitat has been identified by the BLM. Additionally, the UDWR has identified 90,935 acres of crucial, year-long habitat and 7,168 acres of substantial, year-long habitat occurring within the GDBR. It is important to note that the BLM-identified habitat occurs only on the west side of the Green River and overlaps with the UDWR-identified substantial, year-long habitat. All pronghorn habitat found in the GDBR to the east of the Green River is composed of only UDWR-identified crucial, year-long habitat. The crucial, year-long habitat has also been identified by the UDWR as potential pronghorn fawning habitat. The extent of both the BLM and UDWR identified habitat is shown on Figure 3.6-1.

3.6.3.2 Mule Deer

Mule deer occur throughout the western mountains, forests, deserts, and brushlands. Typical habitats include shortgrass and mixed-grass prairies, sagebrush and other shrublands, coniferous forests, and forested and shrubby riparian areas. The species is common state-wide in Utah, where it can be found in many types of habitat, ranging from open deserts to high mountains to urban areas. Mule deer usually are migratory, spending the warmer months at higher elevations. During this time mule deer prefer foraging on the succulent regrowth of forbs and the new twigs of trees and shrubs. As summer progresses and the

herbaceous plants mature and dry, the diet shifts more toward woody browse. This diet then continues as the deer are driven down to foothill areas in winter (Wilson and Ruff 1999). Fawn mortality is typically due to predation or starvation. Adult mortality often occurs from hunting, winter starvation, and automobile collisions. Predation may occur from coyotes, bobcats, golden eagles, mountain lions, and bears; however these impacts would be minimal.

Mule deer from the Vernal Herd Unit occupy much of the greater GDBR on a year-round basis. No habitat within the GDBR has been identified by the BLM as crucial mule deer habitat. However, the UDWR has identified approximately 40 acres of crucial winter habitat, 1,120 acres of crucial, year-long habitat and 2,756 acres of substantial value, year-long habitat. The extent of the UDWR identified habitat is shown on Figure 3.6-1.

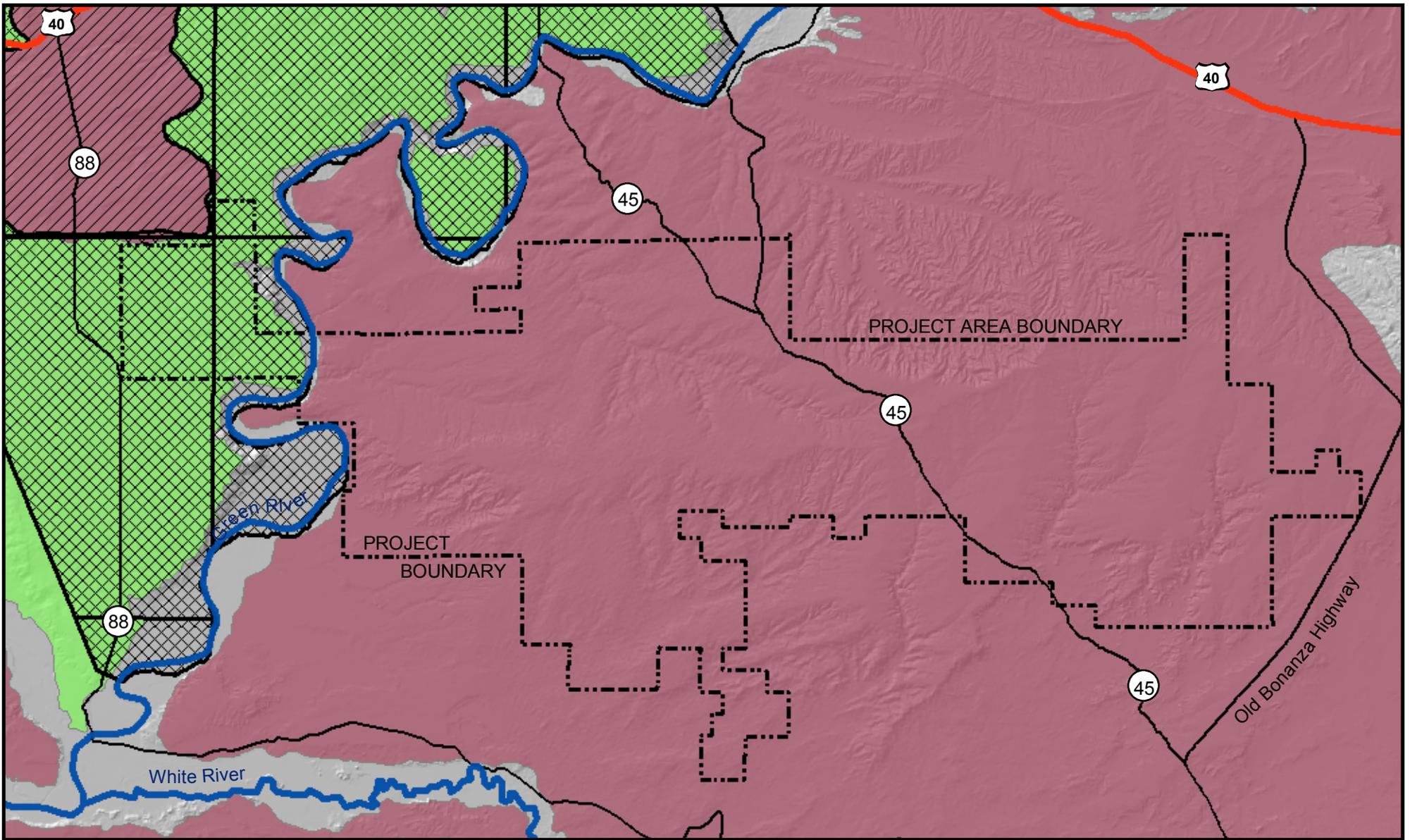
3.6.4 Raptors

Some of the more common and visible birds within the GDBR include raptors, or birds of prey. The GDBR provides diverse breeding and foraging habitat for raptors: higher elevation woodlands, cool desert shrub communities, rocky outcrops, riparian zones, and lower elevation shrublands. All raptor species and their nests are protected from take or disturbance under the Migratory Bird Treaty Act (16 USC, 703 et seq.). Raptors that commonly breed in the GDBR and surrounding region include:

- ferruginous hawk (*Buteo regalis*),
- golden eagle (*Aquila chrysaetos*),
- red-tailed hawk (*Buteo jamaicensis*),
- Swainson’s hawk (*Buteo swainsoni*),
- turkey vulture (*Cathartes aura*),
- northern harrier (*Circus cyameus*),
- prairie falcon (*Falco mexicanus*),
- American kestrel (*Falco sparverius*),
- long-eared owl (*Asio otus*),
- sharp-shinned hawk (*Accipiter striatus*),
- Cooper’s hawk (*Accipiter cooperii*), and
- great-horned owl (*Bubo virginianus*) (Behle and Perry 1975)

3.6.4.1 Historical Data

BLM records document a total of 166 raptor nests within a one-mile radius of the GDBR. Of these nests, only 23 have been active within the last 3 years. This total number of recently active nests includes 14 nests within the boundaries of the GDBR (seven red-tailed hawk, six ferruginous hawk, one prairie falcon), and nine nests within a one-mile radius of the GDBR (four ferruginous hawk, three red-tailed hawk, one burrowing owl, one golden eagle, and one unknown species). Based on numerous factors including habitat types, local resident species, known raptor phenology, and lack of comprehensive survey data, additional breeding raptors may have established territories within the GDBR and one-mile radius analyzed. Nest sites could occur on other cliff faces, rock outcrops, and in white-tailed prairie dog colonies.



BLM Data

-  Year-Long, Crucial Habitat
-  Year-Long, High Priority Habitat

DWR Data

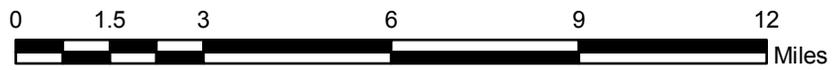
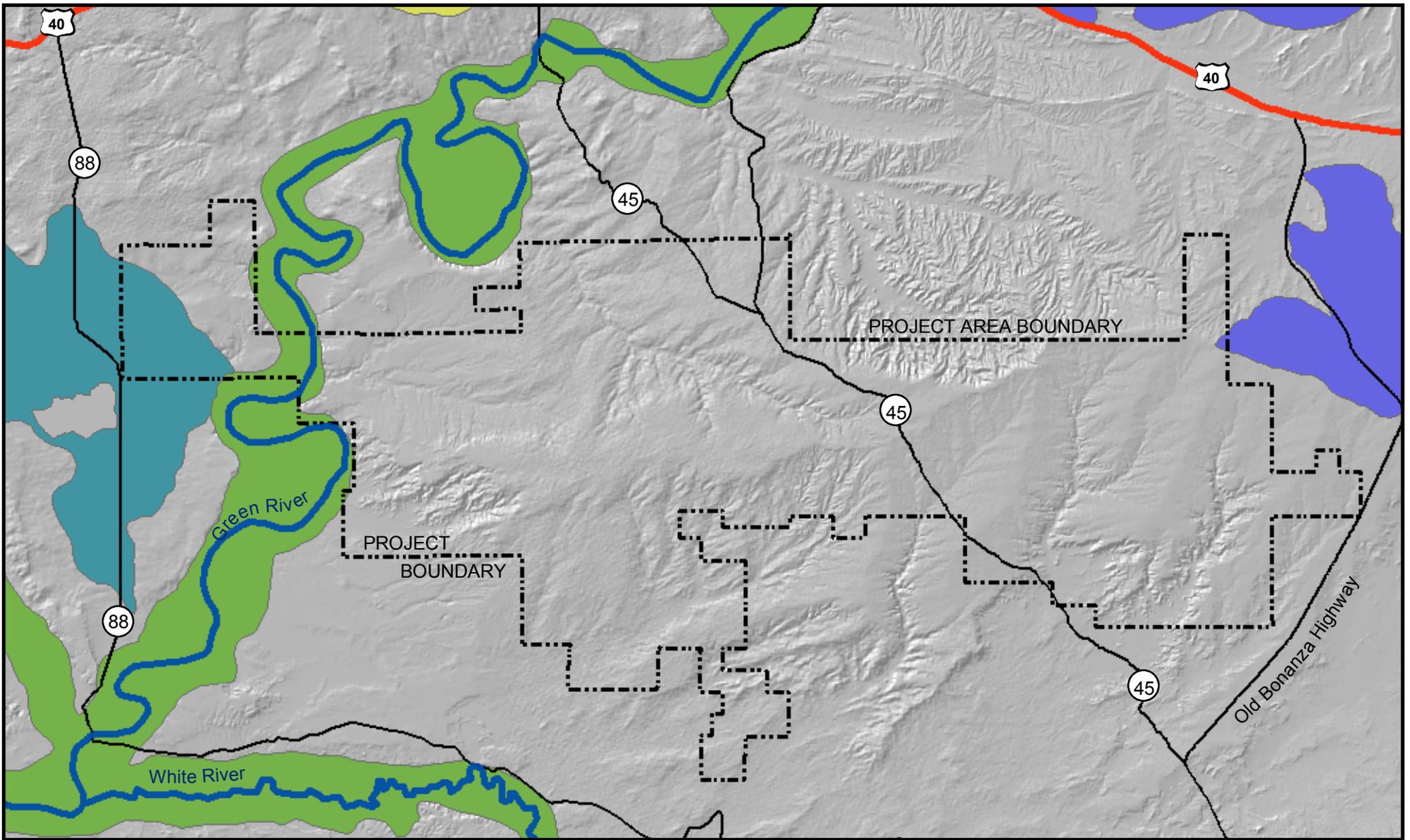
-  Year-Long, Crucial Habitat
-  Year-Long, Substantial Habitat



Figure 3.6-1. Pronghorn Antelope Habitat

Source: UDWR; BLM Vernal

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- DWR Data***
-  Winter, Crucial Habitat
 -  Year-Long, Crucial Habitat
 -  Year-Long, Substantial Habitat



Source: UDWR

Figure 3.6-2. Mule Deer Habitat

*No BLM Designated Habitat in the Project Area

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3.6.4.2 2004 Survey Results

Buys & Associates conducted aerial and ground surveys of the GDBR and out to a one-mile radius of the GDBR in April, 2004. A total of 66 previously unidentified raptor nests were identified including 58 ferruginous hawks, five red-tailed hawks, one golden eagle, one great horned owl, and one unknown owl. Of the 66 newly identified nests, 10 (six ferruginous hawk, two red-tailed hawk, one golden eagle, and one great horned owl) were found to be active. In addition to the newly identified nests, all 166 previously identified nests were inspected to verify current activity status. Seven previously identified nests were found to be active (three red-tailed hawks, two ferruginous hawks, and two golden eagles). Fifteen artificial nesting/roosting platforms located within the GDBR were also visited to determine current usage. None of these structures were currently being used for nesting. In total, 17 active nests were identified within the GDBR and a one-mile radius. In addition, QEP installed two tall nesting platforms on tribal lands. In 2006, one nest fledged three ferruginous hawks and the other nest fledged four ferruginous hawks.

Discussions regarding federally and state sensitive raptor species potentially found within the GDBR are presented under Special Status Wildlife Species.

3.6.5 Upland Game Birds

Four species of upland game birds are known to occur in or around the GDBR: greater sage grouse (*Centrocercus urophasianus*), chukars (*Alectoris chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*).

3.6.5.1 Greater Sage Grouse

The greater sage grouse has recently been classified by the state as a sensitive species (UDWR 1998) and is discussed further in Section 3.6.8.15, Special Status Wildlife Species. Sage grouse habitats within the GDBR are depicted in Figure 3.6-3.

3.6.5.2 Mourning Dove

The mourning dove is a common spring and fall migrant and summer resident occurring in appropriate habitats throughout the State of Utah (including the project area). This species is typically associated with open, upland communities with shrubs and trees that are large enough for nesting (Sibley 2003). Weed patches and grains in proximity to nesting and roosting cover provide excellent food. The Mourning dove is the most widely distributed upland game bird in North America. In addition, mourning dove populations and habitats are abundant and widely distributed throughout Utah. Habitat for this species is found in all 29 counties throughout Utah, and an estimated 250,000 mourning dove are taken annually by hunters in the state (Rawley et al., 1996).

3.6.5.3 Wild Turkey

The wild turkey is a fairly common resident in the foothills and mesas of the western states. The species' preferred habitat is the ponderosa pine community with an understory of scrub oak. Tall pine trees within this community are used for roosting. Turkeys also occur in mountain mahogany, pinyon-juniper woodlands, foothill riparian corridors, and in agricultural areas (Rawley et al. 1996). A total of 1,126 acres of critical yearlong wild turkey habitat exists in the GDBR. Turkeys have been observed along drainage bottoms and along the Green River in the GDBR.

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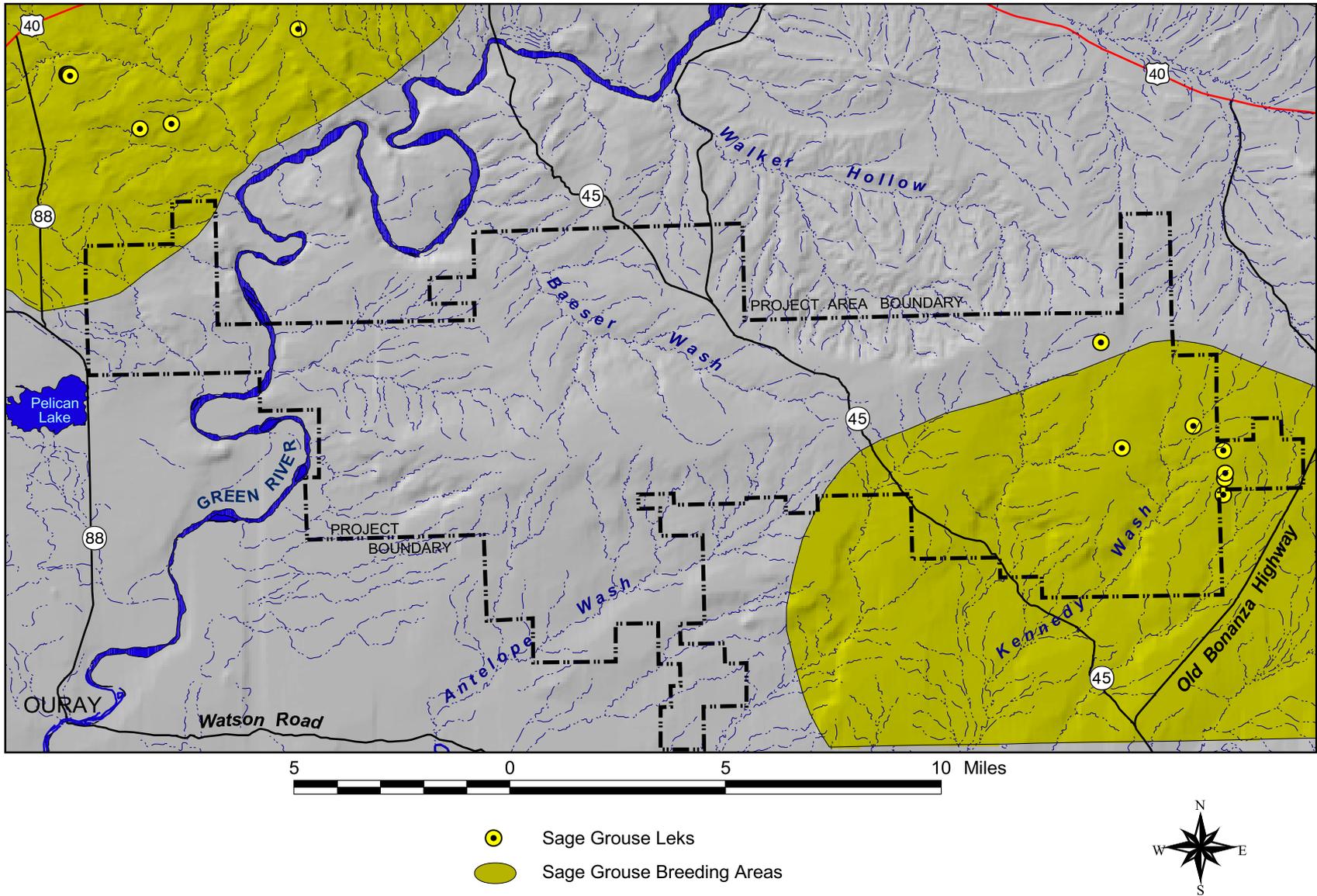


Figure 3.6-3 Sage Grouse Leks and Breeding Areas

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3.6.6 Migratory Birds

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

Numerous migratory bird species occupy the GDBR. Those migratory bird species that are federally listed under the Endangered Species Act of 1973, as amended (ESA), or listed as Sensitive by the BLM, are addressed in Section 3.6.8. This section addresses migratory birds that may inhabit the proposed GDBR, including those species classified as High-Priority birds by Partners in Flight. High-Priority species are denoted by an asterisk (*). Migratory bird species are addressed according to the habitat types found within the GDBR.

Avian species commonly associated with the desert shrub communities include the horned lark (*Eremophila alpestris*), sage sparrow (*Amphispiza belli*), vesper sparrow (*Pooecetes gramineus*), black-throated sparrow (*Amphispiza bilineata*), sage thrasher* (*Oreoscoptes montanus*), Brewer's sparrow* (*Spizella breweri*), western kingbird (*Tyrannus verticalis*), Say's phoebe (*Sayornis saya*), prairie falcon, and Swainson's hawk.

Bird species commonly associated with pinyon-juniper woodlands include the black-chinned hummingbird* (*Archilochus alexandri*), gray flycatcher* (*Empidonax wrightii*), gray vireo* (*Vireo vicinior*), Lewis' woodpecker (*Melanerpes lewis*), Clark's nutcracker* (*Nucifraga columbiana*), pinyon jay (*Gymnorhinus cyanocephalus*), western scrub jay (*Aphelocoma californica*), black-throated gray warbler (*Dendroica nigrescens*), bushtit (*Psaltriparus minimus*), juniper titmouse* (*Baeolophus ridgwayi*), northern shrike (*Lanius excubitor*), blue-gray gnatcatcher (*Polioptila caerulea*) and Say's phoebe.

Bird species commonly found in riparian habitats of the GDBR include hermit thrush (*Catharus guttatus*), veery (*Catharus fuscescens*), yellow-breasted chat (*Icteria virens*), Cordilleran flycatcher (*Empidonax occidentalis*), Lewis' woodpecker* (*Melanerpes lewis*), Wilson's warbler (*Wilsonia pusilla*), black-chinned hummingbird* (*Archilochus alexandri*), broad-tailed hummingbird* (*Selasphorus platycercus*), and Swainson's thrush (*Catharus ustulatus*).

3.6.7 Fisheries

The GDBR is located along the Upper Colorado River Basin. Sections of the Green River and drainages of the Green and White Rivers occur within the GDBR, and provide critical habitat for numerous fish species. Those fish species that are federally listed under the Endangered Species Act of 1973, as amended (ESA), or listed as Sensitive by the BLM, are addressed in Section 3.9. Table 3.6-1 lists all fish species that may be affected by development activities in the GDBR. However, these species would typically occur in the Green River and very occasionally in drainages to the Green and White during spring snow melt.

Table 3.6-1. Fish Species Potentially Affected by Development Activities in the GDBR

Common Name	Scientific Name	Status	Native/Non-Native
Bluehead Sucker	<i>Catostomus discobolus</i>	Utah State Sensitive Species	Native
Bonytail	<i>Gila elegans</i>	Federally Endangered	Native
Carp	<i>Cyprinus carpio</i>	Common	Non-Native
Channel Catfish	<i>Ictalurus punctatus</i>	Common	Native
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Federally Endangered	Native
Cutthroat Trout	<i>Oncorhynchus clarki</i>	Common	Native
Flathead Minnow	<i>Pimephales promelas</i>	Common	Non-Native
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	Utah State Sensitive Species	Native
Humpback Chub	<i>Gila cypha</i>	Federally Endangered	Native
Northern Pike	<i>Esox lucius</i>	Common	Native
Razorback Sucker	<i>Xyrauchen texanus</i>	Federally Endangered	Native
Red Shiner	<i>Cyprinella lutrensis</i>	Common	Non-Native
Roundtail Chub	<i>Gila robusta</i>	Utah State Threatened Species	Native
White Sucker	<i>Catostomus commersoni</i>	Common	Non-Native

3.6.8 Special Status Wildlife Species

This section discusses species that have a federal and/or state special-status designation. This includes:

- Species listed as threatened or endangered, proposed for listing as threatened or endangered, or considered a candidate for listing as threatened or endangered under the ESA;
- Species listed as sensitive by BLM; and
- Species listed as threatened, endangered, or a species of special concern by the UDWR.

In accordance with the ESA, the policy is to not take actions that lead to listing or that jeopardize the continued existence of listed species. Agencies can take actions that adversely affect as long as it doesn't lead to listing or jeopardy. It is BLM's current policy that USFWS candidate species and state of Utah Species of Special Concern (previously federal category 2 species) and state-sensitive species also be managed to prevent a future federal listing as threatened or endangered.

Numerous federally listed and Utah Sensitive species have the potential to occur within the GDBR. The list of Threatened, Endangered and Candidate species with the potential to occur in the GDBR was provided by the USFWS Utah Field Office (Appendix 3.5-2). The list of Sensitive species with the potential to occur in the GDBR was provided by BLM. A brief description of each of the federally listed and Sensitive Species with the potential to occur in the GDBR is presented below:

3.6.8.1 White-tailed Prairie Dog (*Cynomys Leucurus*)

The white-tailed prairie dog is a Utah State Sensitive Species. In Utah, white-tailed prairie dogs occur in the eastern portion of the state, primarily in the Uintah Basin and the northern portion of the Colorado Plateau. Rangewide, the white-tailed prairie dog population is estimated at 1-2 million individuals

(Knowles 2002). In northeastern Utah, the species occurs in areas around Flaming Gorge/Manila, Diamond Mountain, and in the Uintah Basin. To date, 87,524 acres of an estimated 90,000 to 100,000 acres of active prairie dog colonies have been identified in the Northeast Region. Areas that remain to be surveyed should only contain scattered, small colonies surrounded by rocky terrain that is unsuitable as prairie dog habitat.

White-tailed prairie dogs inhabit mountain valleys, semidesert grasslands, agricultural areas, and open shrublands in Western North America (Fitzgerald et al. 1994, Hall 1981). They are distributed in relatively large, sparsely populated complexes and live in loosely knit family groups or “clans” (Tileston and Lechleitner 1966). Clan boundaries are ill-defined with most activity being concentrated around feeding sites.

Breeding occurs in late March to early April after adults emerge from burrows. Females produce a single litter each year. Gestation lasts 30 days (Bakko and Brown 1967) with an average of 5.6 young born in late April to May. White-tailed prairie dogs, however, are dynamic breeders and appear to be able to adjust their reproductive output in response to resource abundance (Menkens and Anderson 1989). Reproductive success has been found to be dependent on body weight with heavier males siring more offspring, juveniles reaching sexual maturity earlier, and litter size correlating directly with female body mass (Rayor 1985, Hoogland 2001).

The main threat to White-tailed prairie dog populations has been the introduction of sylvatic plague (*Yersinia pestis*) into North America in the late 1930's (Lechleitner et al. 1968, Cully 1993). Prairie-dogs appear to have little immunity to this disease, and plague epizootics frequently kill greater than 99 percent of prairie-dogs in infected colonies (Cully and Williams 2001, Clark et al. 1989). Other threats include oil, gas, and mineral extraction, urbanization, conversion of land to agriculture, and Federal and State sponsored eradication campaigns. Recreational shooting pressure can reduce prairie-dog numbers on a local scale, in conjunction with outbreaks of sylvatic plague. However, it has not been documented to threaten population stability alone (Knowles 2002).

Although formal prairie dog colony surveys and burrow density estimates have not been completed in the GDBR, the area of active prairie dog habitat within the GDBR was estimated during field reconnaissance and from BLM records. BLM records indicate that approximately 1,827 acres of White-tailed prairie dog colonies exist within the GDBR (Sect. 3 T7S, R24E; Sect. 1, 12 T8S, R23E; Sect. 2, 5-11, 14-17 T8S, R24E) (Figure 3.6-4). Field reconnaissance also identified numerous smaller colonies throughout portions of the GDBR.

3.6.8.2 Black-footed Ferret (*Mustela nigripes*)

The black-footed ferret is a federally endangered species. The species' original distribution in North America closely corresponded to that of prairie dogs (Hall and Kelson 1959, Fagerstone 1987). In Utah, white-tailed prairie dog (*Cynomys leucurus*) colonies provide essential habitat for black-footed ferrets. Ferrets depend almost exclusively on prairie dogs for food and they also use prairie dog burrows for shelter, parturition, and raising their young (Fagerstone 1987). In accordance with the USFWS' current threshold for white-tailed prairie dog colonies, a minimum of 200 acres of contiguous habitat and a minimum density of eight active burrows per acre is required to sustain a viable ferret population (USFWS 1989). Although formal prairie dog colony surveys and burrow density estimates have not been completed in the GDBR, the area of active prairie dog habitat within the GDBR was estimated during field reconnaissance and from BLM records. BLM records indicate that approximately 1,827 acres of white-tailed prairie dog colonies exist within the GDBR (Sect. 3 T7S, R24E; Sect. 1, 12 T8S, R23E; Sect. 2, 5-11, 14-17 T8S, R24E) (Figure 3.6.3). Field reconnaissance also identified numerous smaller colonies throughout portions of the GDBR.

In 1999, black-footed ferrets were released in Coyote Basin, an area approximately 32 miles southeast of Vernal, Utah and 5 miles from the southeastern end of the GDBR (BLM 1999). The GDBR is not within the ferret release location, but the southeast portion (i.e., T8S, R24E, Sections 2-11 and 14-17) is directly within the Coyote Basin Black-Footed Ferret Primary Management Zone (PMZ). Ferret reintroduction in the Coyote Basin PMZ was authorized by the USFWS, in cooperation with the BLM, the Colorado Division of Wildlife and the Utah Division of Wildlife Resources. Section 10j of the ESA classifies reintroduced populations such as those ferrets in the Coyote Basin as “nonessential-experimental”, and these species are treated as a candidate species.

The BLM, USFWS, and UDWR are monitoring the released population closely and have noted that the ferrets are expanding into surrounding areas. Although ferrets have not been documented within the specific GDBR, it is possible that the species could eventually migrate into the GDBR as released populations grow and expand into other suitable habitats.

3.6.8.3 Bald Eagle (*Haliaeetus leucocephalus*)

The USFWS recently downlisted the bald eagle from endangered to threatened (USFWS 1995b). This raptor species is also listed as state-threatened and protected under the Bald Eagle Protection Act. Bald eagle nesting is currently limited in Utah to four known locations. No bald eagle nests have been documented within the GDBR. The closest documented bald eagle nest is located along the White River in Colorado, approximately 9 miles southeast of the GDBR.

Bald eagle wintering habitat is typically associated with food source concentrations. These areas include major rivers that remain unfrozen whereby fish and waterfowl are available, and near ungulate winter ranges that provide carrion (Montana Bald Eagle Working Group 1990). Bald eagles are often seen in and near the western portion of the GDBR during winter months, usually from early November through late March. They normally roost in cottonwoods along the Green River about ¼ mile south of the GDBR, and forage in upland habitats for carrion and small mammals. No winter roosting areas have been identified in the GDBR, although there are winter roost areas within 1/4 mile of the GDBR boundary. Cottonwood galleries are in the GDBR, and suitable roosting habitat has been identified along the Green River.

3.6.8.4 Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)

The western yellow-billed cuckoo, a Federal Candidate for listing under the ESA, is a riparian obligate bird that feeds in cottonwood groves and nests in willow thickets. Nest sites have been correlated with large and relatively large willow-cottonwood patches, dense understories, high local humidity, low local temperature, and in proximity to slow or standing water. In Utah, this neotropical migrant nests in riparian areas and has been documented in cottonwood habitat along the Green River (Howe and Hanberg 2000). Similar breeding habitat occurs in the western portion of the GDBR along the Green River. Therefore, the species has the potential to occur there.

3.6.8.5 Golden Eagle (*Aquila chrysaetos*)

The golden eagle is protected under the Bald Eagle Protection Act, based upon the similarity of the juvenile bald eagle’s physical appearance to that of the adult golden eagle. Throughout the summer, golden eagles are found in mountainous areas, canyons, shrub-land and grassland. During the winter they inhabit shrub-steppe vegetation, as well as wetlands, river systems and estuaries. Golden eagles are quite common to Uintah County and the Book Cliffs resource area. A total of 17 golden eagle nests are located within the GDBR plus a one-mile buffer. Of these 16 nests, only three have been documented as active within the last 3 years.

3.6.8.6 *Ferruginous Hawk (Buteo regalis)*

The ferruginous hawk is a State threatened raptor. Throughout their range, ferruginous hawks have been found nesting on a wide variety of substrates (Evans 1982). The ferruginous hawk is a common species in western, northeastern, and southeastern Utah. Within the State of Utah, ferruginous hawks nest on junipers, pinyon pines, cottonwoods, on the ground, on low hills and knolls, on low cliffs, and on artificial structures (Smith and Murphy 1978). Generally, this species nests where visibility is extensive and this, in part, may contribute to the species' relatively high sensitivity to human disturbance (Suter and Jones 1981). Ferruginous hawks lay eggs from mid-March through early April and the young fledge from early June to early July (Call 1978).

In the GDBR, ferruginous hawk stick nests are typically located on rock outcrops and low cliffs elevated from the surrounding terrain, as well as in isolated junipers. BLM records and Buys & Associates surveys document 171 ferruginous hawk nests within a one-mile radius of the proposed project. Notations within BLM records along with Buys & Associates ground surveillance indicate that many of these nests (155) have been inactive in the last 4 years. However, raptors will regularly return to nests even after several years of inactivity.

3.6.8.7 *Western Burrowing Owl (Athene cunicularia)*

The Western burrowing owl is a UDWR Species of Special Concern. Western burrowing owls are summer residents on the plains over much of Utah and usually arrive on breeding grounds from late March to mid-April (Johnsgard 1988). The species is associated with dry, open habitat that has short vegetation and contains an abundance of burrows (Thomsen 1971; Wedgwood 1978; Haug and Oliphant 1990). In Utah, prairie dog burrows are the most important source of Western burrowing owl nest sites. Western burrowing owl use of abandoned prairie dog towns is minimal, and active dog towns are the primary habitat for the owls (Butts 1973). As the range and abundance of these burrowing mammals have decreased, so too has the status of the Western burrowing owl. One active Western burrowing owl nest has been documented in the southern portion of the GDBR. Additional potential habitat exists within active prairie dog towns in the GDBR.

3.6.8.8 *Greater Sage-grouse (Centrocercus urophasianus)*

The greater sage grouse is an important game bird found in the Uintah Basin. Greater sage grouse, as the name implies, are restricted to sagebrush habitats. The greater sage grouse is considered a Species of Special Concern because of widespread losses of sagebrush habitat throughout the western states including Utah. From 1967 to 2001, the average number of males per breeding ground in Utah has declined by approximately 40 percent (UDSWR 2003).

Greater sage grouse habitat is primarily found in the sagebrush dominated desert shrub community found throughout the central and southeastern portions of the GDBR. Sage grouse have been recorded in these areas, and suitable nesting, brooding, and lek habitat occurs. UDWR records indicate that 14 leks exist within the 5 miles of the GDBR, half of which occur within its boundary (Figure 3.6.4). Given the abundance of sagebrush habitat along the eastern half of the GDBR, other greater sage grouse leks, nesting areas, and wintering areas may exist. Use of leks can vary from year to year. FWS indicates that in 2006, two of the 14 known leks were active.

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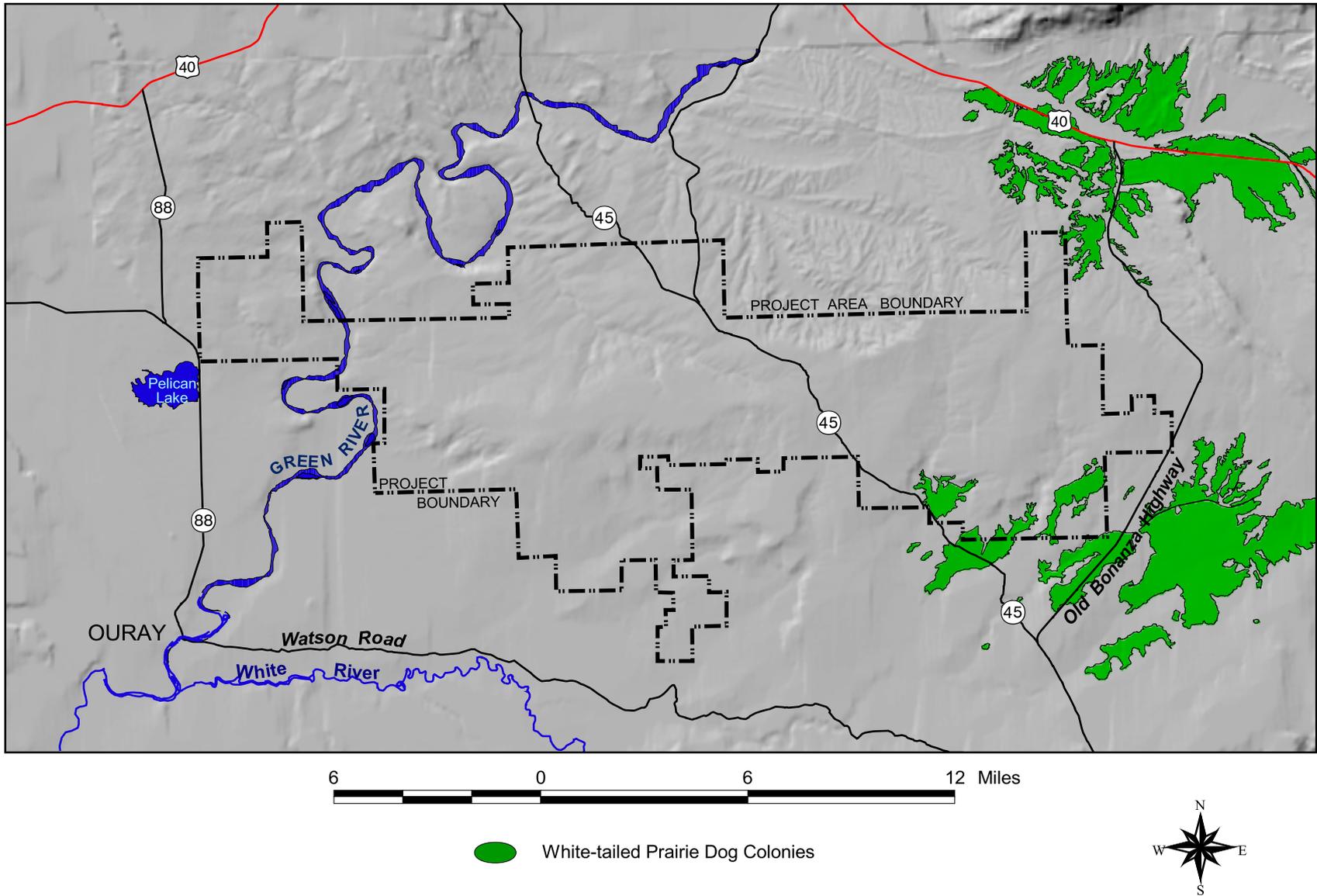


Figure 3.6-4 White Tailed Prairie Dog Habitat

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3.6.8.9 Common Yellowthroat (*Geothlypis trichas*)

The common yellowthroat is included on the Utah BLM's Sensitive Species list. The species occurs in Utah during the breeding and nesting season, but is declining throughout the state due to loss of riparian habitats. Preferred habitats include riparian corridors, marshes, brushy pastures, and old fields. The diet of the common yellowthroat is composed almost exclusively of spiders and insects. Breeding begins in the late spring. Nests are constructed by the female, generally in riparian vegetation or weeds and other shrubs. Nests are commonly parasitized by brown-headed cowbirds, another cause of the species decline (UDWR 2003). Suitable nesting habitat occurs in the riparian habitats of the GDBR (along the Green River), and the species has the potential to occur there.

3.6.9 Special Status Aquatic Species

The USFWS (1997) has identified four federally listed fish species historically associated with the Upper Colorado River Basin: Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). These fish are federally and state-listed as endangered and have experienced severe population declines. Populations have declined since the 1960s due to impoundment of the mainstream Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell) (UDWR 2003). Critical habitat has been designated for the four endangered fish in the Green River 100-year floodplain. The White River floodplain, about five miles south of the Project Area also is designated as critical habitat for the Colorado pikeminnow (USFWS 1995b).

Three additional fish species are endemic to the Colorado River Basin and have been affected by flow alterations, habitat loss or alteration, and introduction of non-native fish: roundtail chub (*Gila robusta*), flannelmouth sucker (*Catostomus latipinnis*), and bluehead sucker (*catostomus discobolus*). The roundtail chub is considered to be a state-listed threatened species, while the two suckers are species of special concern due to declining population numbers and distribution.

3.6.9.1 Colorado Pikeminnow (*Ptychocheilus lucius*)

The Colorado pikeminnow, also known as the Colorado squawfish, is federally listed as endangered by the USFWS. The Colorado pikeminnow thrives in swift flowing muddy rivers with quiet, warm backwaters. Colorado pikeminnow are primarily piscivorous (fish-eaters), but smaller individuals also eat insects and other invertebrates. The species spawns during the spring and summer over riffle areas with gravel or cobble substrate. Eggs are randomly splayed onto the bottom, and usually hatch in less than one week (Sigler and Sigler 1996).

The Colorado pikeminnow were historically found in the mainstem Colorado River and its tributaries from Wyoming to the Gulf of California. Currently, wild populations of pikeminnow persist only in the upper basin. The White River currently supports some of the highest densities of Colorado pikeminnow in the Green River sub-basin. The White River is used for year round residence and also as a migration corridor to other connected habitats in the Green and Yampa rivers. Adult Colorado pikeminnow are present in the White River upstream to the Taylor Draw Dam. Portions of the White River and its 100-year floodplain, about five miles south of the Project Area, is officially designated as critical habitat for the Colorado pikeminnow. Portions of the Green River and its 100-year floodplain in the Project Area is also officially designated as critical habitat for the Colorado pikeminnow (USFWS 2003).

3.6.9.2 *Humpback Chub (Gila cypha)*

The humpback chub is a federally endangered minnow found in the Upper Colorado River Basin. The humpback prefers deep, fast-moving, turbid waters often associated with large boulders and steep cliffs. Humpback chubs feed predominately on small aquatic insects, diatoms and filamentous algae. Spawning occurs between April and July during high flows from snowmelt (Sigler and Sigler 1996).

Historically, the humpback chub inhabited canyons of the Colorado River and four of its tributaries: the Green, Yampa, White and Little Colorado rivers. Today, populations currently exist near the Colorado/Utah border in Westwater Canyon in Utah and at Black Rocks, in Colorado. Smaller numbers have been found in the Yampa and Green Rivers in Dinosaur National Monument, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah and the Colorado River in Arizona. The largest known population is in the Little Colorado River in the Grand Canyon, where there may be up to 10,000 fish. There are no population estimates available for the rest of the upper Colorado River basin (USFWS 2003).

3.6.9.3 *Bonytail (Gila elegans)*

The bonytail is a federally listed endangered species found in the Upper Colorado River Basin. This fish typically lives in large, fast-flowing waterways of the Colorado River system; however, their distribution and habitat status are largely unknown. Adult bonytail feed on terrestrial insects, zooplankton, algae and plant debris. Young feed mainly on aquatic insects. Although bonytail spawning in the wild is now rare, the species does spawn in the spring and summer over gravel substrate. Many bonytail are now produced in fish hatcheries, with the offspring released into the wild when they are large enough to survive in the altered Colorado River system environment (Sigler and Sigler 1996).

Bonytail once were common in portions of the upper and lower Colorado River basins. The bonytail is now the rarest of the endangered fish species in the Colorado River basin. Upstream of Lake Powell, this fish is nearly extinct, and in the last decade only a handful have been captured on the Yampa River in Dinosaur National Monument, on the Green River at Desolation and Gray canyons and on the Colorado River at the Colorado/Utah border. In the lower basin, bonytail exist in Lake Mohave and Lake Havasu (USFWS 2003).

3.6.9.4 *Razorback Sucker (Xyrauchen texanus)*

The razorback sucker is a federally listed endangered species found in the Upper Colorado River Basin. This species is a large, bronze to yellow fish that grows to a weight of about 15 pounds and has a sharp-edged keel behind the head. Razorbacks are found in deep, clear to turbid waters of large rivers and some reservoirs over mud, sand or gravel. Like most suckers, the razorback feeds on both plant and animal matter. The razorback sucker spawns in the spring. Breeding males turn black up to the lateral line, with brilliant orange extending across the belly (Sigler and Sigler 1996).

Historically, the federally endangered razorback sucker inhabited the Colorado River and its tributaries from Wyoming to the Gulf of California. The current distribution of razorback suckers in the Upper Colorado River basin is confined to small groups of fish in several widely distributed locations. Most of these fish occur in an area including the lower Yampa River, and the Green River from the mouth of the Yampa River downstream to its confluence with the Duchesne River. Small populations may also occur in the lower Green River, the Colorado River at Grand Valley, and in the San Juan River upstream from Lake Powell (USFWS 1997). Portions of the White and Green rivers and their 100-year floodplains are officially designated as critical habitat for the razorback sucker (USFWS 2003).

3.6.9.5 Roundtail Chub (*Gila robusta*)

The roundtail chub is Utah State Threatened Species that is found in the Upper Colorado River Basin. This species is a large member of the minnow family found most often in major rivers and smaller tributary streams. Although movement patterns are poorly understood, the roundtail chub has been described as sedentary and mobile, depending on life stage and habitat conditions. Roundtail chubs typically mature from ages three to five, and fecundity varies with fish from as low as 1,000 eggs to over 40,000 eggs per female (UDWR 2003).

Extant roundtail chub populations include the Green River from the Colorado River confluence upstream to Echo Park and in the White River from the Green River confluence upstream to near Meeker, Colorado. The roundtail chub now occupies approximately 45 percent of its historical range in the Colorado River Basin. In the Upper Colorado River Basin (New Mexico, Utah, Colorado and Wyoming), it has been extirpated from approximately 45 percent of its historical range, including the Price River and portions of the San Juan, Gunnison and Green rivers. Data on smaller tributary systems are largely unavailable, and population abundance estimates are available only for short, isolated river reaches (UDWR 2003).

3.6.9.6 Flannelmouth Sucker (*Catostomus latipinnis*)

The flannelmouth sucker is a Utah State Sensitive Species found in the Upper Colorado River Basin. Flannelmouth suckers typically inhabit deep water habitats of large rivers, but are also found in small streams and occasionally in lakes. Flannelmouth typically spawn during March and April in the southern portions of Utah and from May to June in the North and higher elevations. Fecundity of females is proportional to fish size and varies with environmental conditions (UDWR 2003).

Extant flannelmouth sucker populations include the Green River from the Colorado River confluence upstream to Flaming Gorge Reservoir, and the White River from the Green River confluence to Kenny Reservoir, Colorado. Recent investigations of historical accounts, museum specimens, and comparison with recent observations indicate that flannelmouth suckers occupy approximately 50% of their historic range in the Upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico). Populations have declined since the 1960s due to impoundment of the mainstream Green River in Wyoming and Utah (Flaming Gorge Reservoir) and the Colorado River in Glen Canyon, Utah (Lake Powell) (UDWR 2003).

3.6.9.7 Bluehead Sucker (*Catostomus discobolus*)

The bluehead sucker is a Utah State Sensitive Species found in the Upper Colorado River Basin. Bluehead suckers occur in small to large streams and rivers and tributaries in the Upper and Lower Colorado River Basin and in the Weber and Bear River drainages in the Bonneville basin. Large adult bluehead may inhabit stream environments as deep as two to three meters, although they most commonly feed in riffles and swift runs. Life expectancy is typically six to eight years. Spawning occurs in spring and early summer at lower elevations and mid- to late summer in higher, colder waters. Spawning occurs on gravel beds in shallow water (UDWR 2003).

Bluehead suckers historically occurred in the Colorado River Basin above the mouth of the Grand Canyon in mainstream and tributary habitats. In Utah, bluehead suckers continue to be found in mainstream rivers and tributary streams above Glen Canyon Dam to headwater reaches of the Green and Colorado rivers. Populations currently occur in the mainstream Green River from the Colorado River confluence upstream to Lodore, Colorado, and in the White River from the Green River confluence upstream to Meeker, Colorado. In the upper Colorado River Basin (Utah, Wyoming, Colorado, and New Mexico), bluehead suckers currently occupy approximately 45 percent of their historical habitat. Recent

declines of the species have occurred in the White River below Taylor Draw Dam, and in the upper Green River (UDWR 2003).

3.7 CULTURAL RESOURCES

3.7.1 Regional Overview

The Uintah Basin and GDBR has been a region for human activity for thousands of years. Much has been written about the prehistory and history of the eastern Utah region. Comprehensive overviews of the prehistory and history of the Uinta Basin are available in *Paradigms and Perspectives, a Class I Overview of Cultural Resources in the Uinta Basin and Tavaputs Plateau* (Spangler 1995, update in progress) and *A History of Uintah County, Scratching the Surface* (Burton 1996). Spangler incorporated data from southwest Wyoming, northwest Colorado, and areas adjacent to those administered by BLM, Vernal Field Office into his review.

Spangler divided the cultural history of the broader eastern Utah region into five basic occupation periods that are defined temporally, behaviorally, and technologically. They are largely based on differences in artifact assemblage data through time although behavior pattern data and use practice data are also taken into consideration.

The five occupation periods provided as a basic context in which to consider known cultural resources are:

- Paleoindian period 12,000 to 6,000 B.C.
- Early Archaic period 6,000 to 3,000 B.C.
- Late Archaic period 500 B.C. to 550 A.D.
- Formative stage 500 to 1300 A.D.
- Shoshonean stage 1300 A.D. to present
- Historic Euroamerican period 1776 A.D. to present.

3.7.2 Summary of Existing Cultural Resource Database

A Class 1 data review was conducted to ascertain the extent of previous cultural resource investigations within the GDBR and to determine the number, locations, types, and significance of previously documented cultural resources within the same. Archival records searches were performed at the BLM Vernal Field Office, and the State Historic Preservation Office, Salt Lake City. Of specific concern were the nature and extent of previous cultural resource inventories within the GDBR and the number and type of archaeological sites that had been previously documented. Record searches involved plotting previous project areas and archaeological sites onto 7.5 minute USGS maps and creating tables summarizing previous work and findings.

Archival record searches resulted in the identification of 158 previous cultural resource studies in the GDBR. These studies have been conducted extensively in the area since the late 1970s for oil and gas development, which has mainly involved seismic line, well pad, access road, and pipeline corridor construction. 80 percent of the previous cultural resource studies located no cultural resources. Of the 32 previous inventories (20%) that located cultural resources, only those that resulted in the new or additional documentation of cultural resources within the GDBR are mentioned below.

Prehistoric open campsites, lithic scatters, and historic sites are dominant among the identified cultural resources. Of the 63 sites documented, (Table B), prehistoric campsites number 22, prehistoric lithic scatters number 14, prehistoric lithic/ceramic scatters number 4, and historic sites number 16. One pot drop and two lithic procurement localities also are documented. Finally, four sites having both prehistoric and historic components are recorded in the GDBR. Sites are listed below by type.

- Prehistoric Campsites - 35%
- Prehistoric Lithic Scatters - 22%
- Prehistoric Lithic/Ceramic Scatters - 6%
- Prehistoric Lithic Procurement Locality - 3%
- Prehistoric Pot Drop - 2%
- Historic Sites - 25%
- Multi-component Sites - 6%

3.7.3 Likely Cultural Resources within the GDBR

An evaluation of the extent of previous cultural resource investigations within the GDBR and the number, locations, types, and significance of previously documented cultural resources within the same is essential to estimating the likelihood of encountering further cultural resources.

The 158 previous cultural resource studies resulted in the intensive inventory of approximately 24.8 square miles, or 16% of the GDBR. The previous investigations have documented 63 archaeological sites, a site density of approximately 2.54 sites/square mile. This compares closely with an overall site density of 1.78 sites/square mile calculated for a nearby oil and gas project of 29,092 acres (45.45 square miles) proposed in the Kennedy Wash area (Elkins et al. 2003).

Another estimate of site density for the GDBR derives from the 1979 study by Nickens and Associates entitled Archaeological Inventory of the Red Wash Cultural Study Tract, Uintah County, Utah (Larralde and Nickens 1980). Of the GDBRs 15,581 acres previously surveyed, slightly fewer than half (about 6880 acres) coincide with the 1979 Red Wash study, in which a ten percent stratified random sampling was conducted for the BLM. Within the GDBR, Nickens and Associates inventoried 10.75 square miles, and identified 11 archaeological sites. This translates to a site density of approximately 1 site/square mile for the acreage surveyed by Nickens and Associates that lies within the current GDBR. Analysis based on previously recorded archaeological sites in GDBR indicates that there is a tendency towards clustering of sites.

The 1979 Red Wash study (Larralde and Nickens 1980) found that 92% of the prehistoric sites were located in areas dominated by juniper or associated with sand dunes. Prehistoric lithic scatters were found to occur more frequently in juniper, campsites more frequently on dunes. Site location did not appear to be influenced by proximity to a drainage, the presence of sandstone outcrops, slope, or site orientation (Ibid:40). A 2002 geologic study of surficial and bedrock geology in T8S, R22E by Nancy Lamm concluded that areas mantled by aeolian deposits or characterized by scattered, isolated dunes should be considered to have potential for buried cultural deposits. Likewise, alluvial and colluvial deposits common along drainages in the area are active and should be considered to have potential for buried cultural deposits (ibid). Old piedmont-slope deposits and bedrock outcrops are less likely to contain buried cultural deposits.

Sites within the GDBR are dominated by three types: prehistoric campsites, prehistoric lithic and/or ceramic scatters, and historic sites. Site documentation suggests that the prehistoric campsites and lithic and/or ceramic scatters are reflective of broad temporal use of the area, but probably on an occasional and temporary basis. Diagnostic artifacts associated with specific cultural groups are few, but they indicate Archaic, Fremont, and Numic (Ute) visitation. A number of the historic sites (camps, trash scatters, etc.) also suggest use of the area that was mostly sporadic and temporary, although several canals and road segments are testimony to the Euro-American settlement of the area and the eventual permanence of human occupation.

Of the 63 sites documented within the GDBR, 24 (38%) have been recommended as eligible to the National Register of Historic Places (NRHP) and 39 (62%) have been recommended as not eligible. Fourteen of the 24 eligible sites are prehistoric campsites that may possess buried cultural remains and additional research potential. Five of the eligible sites are lithic and/or ceramic scatters, one is a lithic procurement locality, one is a lithic scatter/historic trash scatter, and three are historic sites. The remaining 39 sites have been recommended as not eligible because they fail to meet NRHP criteria.

With considerably less than 20% of the GDBR having been inventoried for cultural resources, predictions about site density, location, type, and sensitivity can be made only tentatively. Because inventories have been done mostly in response to clearances required for random individual projects, their findings may not be representative of the GDBR as a whole. Indeed, it is likely that biases have been introduced that relate to access, ruggedness of terrain, elevation, geology, and other factors. However, given the available information, the following can be estimated concerning the likelihood of encountering cultural resources within the GDBR:

- site density likely ranges from 1 to 3 sites/square mile;
- sites will likely be mostly prehistoric campsites, prehistoric lithic and/or ceramic scatters, or historic sites; and
- sensitive sites (eligible to the NRHP) having potential for additional research will likely be located in association with aeolian deposits or juniper.

3.8 PALEONTOLOGICAL RESOURCES

3.8.1 Regional Overview

The GDBR is located in the Uinta Basin of northeastern Utah, on the north edge of the Colorado Plateau province. The Uinta Basin is a asymmetric synclinal basin trending east-west immediately south of the Uinta Mountains, west of the Douglas Creek Arch, northwest of the Uncompahgre Plateau, southeast of the San Rafael Swell and Wasatch Plateau, and east of the Wasatch Mountains. This intermontane basin formed in early Tertiary times, subsiding as a response to the uplift of the Uinta Arch. Rivers in southern and eastern Utah and western Colorado drained toward the basin creating a huge fresh-water lake during the Late Paleocene. This lake, called Lake Uinta, lasted into the Late Eocene and would extend at times into the Bridger Basin in southwestern Wyoming and the Piceance Basin in western Colorado. Deposition of sediments continued during gradual subsidence of the Uinta Basin, filling it with nearly three vertical miles of lacustrine and terrestrial strata during the Tertiary (Hintze, 1964).

The GDBR occupies a small portion of the Uinta Basin, in a topographic district Clark (1957) called the Central Badlands District. This area is composed of fairly stable Pleistocene and Quaternary pediments of sand and silty soils, and erosional benches carved and dissected by ephemeral drainages, exposing vast

badland rims of variegated mudstone and thin sandstone units of the lower Duchesne River Formation (Brennan Basin Member) and inter-tongued beds of the upper Uinta Formation (Myton Member, Uinta C). These Eocene bedrock units dip gently north-northeastward, resulting in the lower units being exposed primarily in the southwest portion of the GDBA.

The Uinta Formation consists of fluvial deposits of wide meandering streams in the east and west ends of the basin and predominantly lacustrine sediments near the center of the basin, recording the last several million years of the dwindling Lake Uinta (Bryant et al, 1990; Ryder et al, 1976). Fluvial channel sands trend north-northwest and are often feldspar-rich; suggesting the source for the Uinta Formation was from the erosion of Laramide uplifts of western Colorado (Stagner, 1941; Bruhn et al, 1986). Originally, the Uinta Formation was divided into three lithologic units: Uinta A (lower), B (middle) and C (upper) (Osborn, 1895, 1929). Years later, Uinta A and B were combined into the Wagonhound Member, and Uinta C, exclusive of the lower beds of the Duchesne River Formation, was named the Myton Member (Wood, 1941). Uinta A has rarely yielded fossil mammals, but to the credit of two classic localities within the White River Pocket (in the Uinta B) and the Myton Pocket (in the Uinta C), two distinct mammalian faunas were identified. These faunas have been referred to as the early Uintan mammal and late Uintan mammal assemblages, which correlate to Uinta B and C members (Riggs, 1912; Peterson and Kay, 1931; Kay, 1934). The emphasis in more recent decades on magnetostratigraphy, radioscopic chronology, and continental biostratigraphy (Flynn, 1986; Prothero, 1990; Prothero and Swisher, 1990, 1992; Walsh, 1996) has produced better stratigraphic control. With the more recent discovery of localities throughout the Uinta Formation, the faunal turnover between early and late Uintan becomes less apparent (Rasmussen et al, 1999; Townsend et al, 2000). In addition to mammals, the Uinta bears a diverse assemblage of turtles, fish, crocodiles, flamingoes, and fresh-water mollusks.

Duchesne River Formation consists of predominantly south-southwest trending fluvial deposits of a distal alluvial plain of recycled sedimentary and low-grade meta-sedimentary rocks from the actively rising and eroding Uinta Mountains (Anderson & Picard, 1972). It is composed of pale reddish sandstones and mudstones of low gradient meandering streams and overbank floodplain deposits in a broad east-west swath across the northern part of the Uinta Basin. Four members of the Duchesne River Formation are recognized: the lower Brennan Basin Member (which includes the Randlett and lower Halfway Horizons); the Dry Gulch Creek Member (which includes the upper Halfway Horizon); the Lapoint Member; and the upper Star Flat Member (Anderson & Picard, 1972). Of these four members, the Brennan Basin Member is the most fossiliferous, with a fauna regarded as Uintan in age. The remaining members of the Duchesne River Formation contain sparse fossils, except for the Lapoint Horizon which is the basis for the type locality for the Duchesnean North American Land Mammal Age (Rasmussen et al, 1999; Clark et al, 1957).

Scientific interest in the paleontologic record of the Uinta Basin lies in the major fossil assemblages that are preserved in a fairly continuous record of deposition within a closed basin throughout Eocene times. More specifically, most of the attention has focused on the fossiliferous beds of the Uinta and Duchesne River Formations that were laid down 49 to 40 million years ago (Prothero, 1990, 1996; Prothero & Swisher, 1990, 1992). During this time, the Uinta Basin was changing from a tropical/subtropical region teeming with rich floral and faunal ecosystems to drier and more seasonal climates with corresponding changes in evolutionary trends. These changes were global, due to the separation of Europe from North America and eventually the splitting of Antarctica from Australia. These tectonic events changed the pattern of oceanic currents which had a profound effect on climates (Prothero, 1996). Changes in the ecosystems within the Uinta Basin are thought to have been compounded due to the increased elevation and rising highlands surrounding the basin (Rasmussen et al, 1999). Comparisons of coeval faunas from other parts of the country help to define these changes (Rasmussen & Townsend, 1995).

3.8.2 Paleontologic Resources

Collection of Eocene vertebrates from the Uinta Basin began with O.C. Marsh of the Yale Peabody Museum in 1870. In the 1880's, Princeton University amassed extensive collections from the Uinta Basin that were subsequently studied by Professors W.B. Scott and H.F. Osborn. Their work showed a distinctive evolutionary stage in Tertiary mammals which was later formalized as the Uintan Land Mammal Age by Wood and others in 1941 (Rasmussen et al, 1999). Brief collecting trips were conducted by the Carnegie Museum during the first half of the 20th century with an emphasis on large mammals, and then only recently by Washington University, St. Louis, for the small and minute mammalian taxa (Rasmussen et al, 1999). Other institutions have collected only briefly in the Uinta Basin over the last century (i.e., Field Columbian Museum of Chicago, Utah Museum of Natural History, Brigham Young University, and others) for a sample of Uinta Basin fossils for their collections or for samples of exhibit quality specimens. Many localities known today are a result of the collecting by the Utah Field House in Vernal and through paleontologic surveys required of oil and gas interests by the BLM before ground disturbing activities are conducted.

The GDBR is largely unsurveyed for paleontological resources. Of the 116 reported fossil localities within the boundaries of the GDBR, about 34 of them occur in the Myton member of the Uinta Formation. Uinta beds are found in the western and southwestern regions of the GDBR, inter-tongued with southwestward thinning wedges of the Duchesne River Formation. Exposures of the Brennan Basin Member of the Duchesne River are the predominant outcrop in the rest of the region. About 82 known localities of the GDBR occur in the Duchesne River Formation. Twenty three localities identified during an Archaeological inventory in the Red Wash Cultural Study Tract were not identified to geologic units (nor to taxonomic status), but many of them occur in areas that are mostly Duchesne River outcrop. Half of the known Duchesne River localities were found during a survey of a Utah State Trust Lands section (Section 16, T7S, R23E). This survey is probably the best measure of potential for the Brennan Basin Member in the GDBR, as it was conducted by a paleontologist in a block survey, as opposed to spot surveys confined to pipeline corridors or well pads for which the remaining 17 localities were discovered. Most of the State Trust section is comprised of fairly good outcrops, with nearly all of the localities occurring in the lower portion of the Brennan Basin Member in the northern half of the section. Based on numbers of localities within a broad area, the survey suggests that the lower portion of the Brennan Basin Member could have a locality occurrence of one per every 8 acres. This is especially important as the fossils of the Brennan Basin Member have been regarded as relatively uncommon and have received relatively little attention in the past (Rasmussen et al, 1999). It is only recently that the Utah Field House in Vernal and Washington University in St. Louis has recognized these beds for their paleontological potential.

3.9 LAND USE AND STATUS

The GDBR, located approximately 20 miles south of Vernal, Utah, comprises 98,975 acres entirely within Uintah County, Utah. The GDBR includes a mix of mostly federal public lands administered by the Bureau of Land Management - Vernal Field Office, State of Utah lands administered by the State Institutional Trust Lands Administration (SITLA), and various privately-owned properties. The BLM-administered lands within the GDBR lie primarily within the Book Cliffs Resource Area, with a small portion within the Diamond Mountain Resource Area on the west side of the Green River. Table 3.9-1 provides a breakdown of land ownership in the GDBR. Figure 1.2 shows the extent of federal, state, and private lands in the GDBR.

Table 3.9-1. Land Ownership in the GDBR

Ownership	Acres	Percent of GDBR
Federal – BLM Administered	83,864	85%
State of Utah	11,448	12%
Private	3,473	3%

Current land uses within and adjacent to the GDBR consist of existing oil and gas development, wildlife habitat, dispersed recreation, and sheep and cattle ranching. Apart from oil and gas facilities, there are very few developed land uses in the GDBR, giving it an open, unpopulated character. There are no commercial businesses within the GDBR and only a few occupied residences on private lands west of the Green River. The GDBR includes a total of 13 grazing allotments on public lands, which are described in detail in Section 3.11 – Range Management. There is also limited irrigated agriculture adjacent to and west of the Green River on the west side of the GDBR.

In terms of man-made structures and surface disturbance, there are approximately 278 existing oil and water injection wells, and 300 natural gas wells in the GDBR, along with an extensive road network, aboveground and buried pipelines, tank batteries, ponds, compressors, and miscellaneous oil and gas treatment equipment. There is also a high voltage transmission line and various regional pipelines that cross the GDBR. Routine operation and maintenance activities associated with existing gas exploration and production, pipelines and transmission lines generate vehicle traffic and human activity in and around the GDBR.

The BLM’s Book Cliffs and Diamond Mountain Resource Management Plans (RMPs) authorize the leasing and development of federal oil and gas resources, provided appropriate protection of other resource values is incorporated into development activities. Accordingly, oil and gas development in these BLM resource areas is subject to various Lease Stipulations, Information Notices, and Conditions of Approval based on the sensitivity of resources present, and mitigation that are appropriate to address impacts that could result from oil and gas development activities. Assuming the operators comply with applicable stipulations, notices, and conditions of approval, oil and gas extraction in the GDBR is consistent with the planning objectives of the BLM.

Several existing and permitted rights-of-way were identified across BLM administered lands within the GDBR. These include roads maintained by Uintah County, resource roads used by oil and gas operators, natural gas pipelines, electric transmission lines of various voltages, telecommunications lines, and water pipelines used in oil field and nearby power generation operations (BLM 2004a). Table 3.9-2 lists existing and authorized rights-of-way granted by BLM in the GDBR.

Table 3.9-2. BLM Rights-of-Way in the GDBR

Permittee ^a	Type	Location	Acreage ^b
Deseret Generation & Transmission	Water Pipeline	T7S, R20E, 22E, and 23	665.4, 242.0, 546.3, 146.5
Moon Lake Electric Association	Transmission Lines	T7S, R20E, R21E, and 22E T8S, R21E, 22E, and 23E	29.7, 92.3 26.2, 51.5 87.2, 17.5
Uintah County	County Roads	T7S, R20E and 22E T8S, R22E and 24E	25.6, 527.3 57.6, 115.7

Permittee ^a	Type	Location	Acreage ^b
Mar/Reg Oil Co.	Resource Roads	T7S, R21E and 22E	34.6
Westport Oil & Gas Co. LP	Resource Roads, Gas Pipelines	T7S, R21E and 22E T8S, R21E and 22E	13.4, 5.82 6.5, 10.2 13.2, 16.7
Uintah Basin Telephone	Telecom. Line	T8S, R21E	1.21
Rosewood Resources	Gas Pipeline	T7S, R22E	20.1
Retamco Operating, Inc.	Resource Roads	T7S, R22E	5.8
Qwest Communications	Telecom. Lines	T7S, R22E, 23E, and 24E	24.8, 38.8, 33.1
Chevron Pipeline Co.	Oil/Gas Pipeline	T8S, R22E and 23E	186.6, 97.0
EnCana Gas Gathering SVC	Gas Pipeline	T8S, R22E	12.7
EnCana Oil& Gas (USA), Inc.	Resource Roads	T7S, R22E and 23E	13.5, 14.6
NW Pipeline Corp.	Gas Pipeline	T7S, R23E and 24E	41.7
AMOCO Production Co.	Water Pipeline	T7S, R23E	8.6
Citation O&G Corp	Gas Pipeline	T7S, R24E	25.5

Source: BLM LR2000 Database

^a Does not include rights-of-way held by Questar/QEP

^b Indicates acreage in multiple rights-of-way

With respect to county land use planning policies and objectives, the *Uintah County General Plan for Management of the Book Cliffs Resource Area* (Uintah County Plan) contains specific policy statements and regulations addressing land uses related to natural resource development on public lands, including natural gas extraction. In general, the Uintah County Plan supports multiple use management practices, adequate public and private access to BLM lands, responsible increases in recreational activity on public lands, and underscores the importance of oil and gas development to the local and regional economy. The plan specifically states “*Uintah County’s economy is based upon extractive mineral industries and would continue to be in the foreseeable future. The County supports maintaining and increasing renewable resource values, but the vital importance of the minerals industry should be given the highest priority possible. Utilizing Best Management Practices has demonstrated that the minerals industry and renewable resources can thrive at the same time...*” (Uintah County 1996)

3.10 TRANSPORTATION

Access to the GDBR is limited to three routes (see Figure 1.1 in Chapter 1). The main access is from the north on State Highway 45 from Vernal. This highway is locally known as the New Bonanza Highway. Secondary access roads from the east and northeast are the Redwash and Old Bonanza Highways from U.S. Highway 40. An alternative, but generally longer access would be from the west along State Highway 88 (Watson Road) crossing the Green River south of the Ouray National Wildlife Refuge and then north on State Highway 45.

Use of these transportation corridors is monitored by the Utah Department of Transportation (UDOT 2002). The latest traffic volume data, expressed as average annual daily traffic (AADT), is from 2002. The AADT on these accesses to the GDBR are listed in Table 3.10-1 below.

The transportation system within the GDBR consists of approximately 600 miles of mostly unpaved access roads that service existing oil and gas operations as well as livestock transportation for grazing. The existing road network is shown on Figure 2.1 in Chapter 2. Most of these roads are included on the Uintah County Transportation Plan. The Class B roads are improved and maintained by Uintah County. However, the Class D roads, are not maintained..

Table 3.10-1. Average Daily Traffic to the GDBR

Route	AADT
South on State HW 45 from intersection of U.S. 40 and State HW 45	2055
Red Wash Highway between State HW 45 and U.S. 40	640
Old Bonanza Highway between State HW 45 and U.S. 40	1667
Watson Road east from Green River Bridge	Not monitored by UDOT

3.11 RANGELAND MANAGEMENT

The GDBR contains portions of 13 rangeland allotments. The 13 rangeland allotments range from approximately 9-17 acres/animal unit month (AUM). An AUM is defined as “the amount of forage required to support one cow, or five sheep for one month”. Of the 13 allotments in the GDBR, 5 are grazed by sheep, 5 by cattle, and 3 by sheep and cattle. Grazing periods are different for each allotment. The total allotment acreage in the Project Area (99,103 acres) supports approximately 7,621 AUMs. Details pertaining to individual allotments within the GDBR are displayed in Table 3.11-1 and the extent of each allotment is shown on Figure 3.11-1.

Table 3.11-1. Grazing allotments in the GDBR

Name	Type	Grazing Period	Total Acreage	Total AUMs	Acres /AUM	Acreage in Project Area	AUMs in GDBR
Badlands	Cattle	4/6 - 5/5 11/1 - 1/17	13,422	780	17	2,914	171
Pelican Lake	Cattle	11/1 - 3/31	6,516	544	12	4,269	356
Ouray Valley	Cattle	10/15 - 10/25	416	26	16	686	43
Walker Hollow	Cattle	11/15 - 1/31	9,380	753	12	1,881	157
Bohemian Bottoms	Cattle	4/16 - 5/31 8/31 - 10/15 11/16 - 1/15	9,773	617	16	6,762	423
Horned Toad	Sheep	12/1 - 5/1	19,773	2,238	9	11,039	1,227
Bonanza	Sheep	12/5 - 5/5	24,377	1,939	13	13	1
Stateline	Sheep	12/5 - 4/30	21,840	1,713	13	3,576	275
Powder Wash	Sheep	11/1 - 5/1	22,592	2,100	11	1,591	145
Antelope Draw	Sheep	11/16 - 4/27	56,927	3,679	15	32,296	2,153
Baerer Wash	Cattle & Sheep	12/21 - 4/25 3/1 - 4/25 6/1 - 7/15	14,732	1,246	12	6,675	556
West Deadman	Cattle & Sheep	11/1 - 4/30 3/1 - 4/30 11/16 - 1/15	25,154	1,942	13	26,936	2,072

Name	Type	Grazing Period	Total Acreage	Total AUMs	Acres /AUM	Acreage in Project Area	AUMs in GDBR
Cocklebur	Cattle & Sheep	12/21 - 2/28 12/21 - 4/30	18,374	1,729	11	465	42

3.12 RECREATION

The GDBR is located primarily on public lands administered by the BLM, with some state and private properties interspersed. The majority of the GDBR is part of the Book Cliffs Extensive Recreation Management Area, which is managed to provide unstructured recreation opportunities for a diversity of uses (BLM 1985). In general, the GDBR offers abundant open lands where visitors can participate in primitive or unconfined recreational activities.

The lands in the GDBR are crossed by numerous dirt and gravel roads that provide plentiful access. However, these roads, along with existing oil and gas facilities and other man-made features, reduce the wild character of the GDBR for visitors seeking solitude and relatively pristine landscapes. Accordingly, recreational use in most of the GDBR primarily consists of off-highway vehicle use where permitted, and some hunting and shooting. Hunting activities consist mainly of small game (rabbits and coyotes) and waterfowl along the Green River. To a lesser extent, the GDBR is also used for biking and wildlife observation (BLM 2003).

Recreational activities on and adjacent to the Green River include rafting and canoeing, boating, fishing, hunting, and sightseeing along roads that parallel the river (BLM 2003a). The Ouray National Wildlife Refuge abuts the south and west edges of the GDBR along the Green River. The Refuge is an attractive recreational resource for the region as it provides abundant opportunities for wildlife viewing and photography, as well as hiking, horse riding, and rafting and canoeing on the river (U.S. Fish and Wildlife Service 2003). While it is an important resource for recreation, the Green River is not designated as a Wild and Scenic River where it passes through the GDBR.

The Pelican Lake Special Recreation Management Area (SRMA) is located just southwest, but outside, of the southwestern corner of the GDBR. Pelican Lake is used primarily for fishing and is noteworthy as a bluegill fishery in particular. Hunting and boating are also popular recreational activities at Pelican Lake. It includes a campground with 18 sites and a boat ramp for recreational visitors and, with the exception of the Ouray National Wildlife Refuge, is the only developed recreational facility in close proximity to the GDBR.

In terms of recreational off-highway vehicle (OHV) use in the GDBR, approximately half of the GDBR (the northern and northwestern portion) is designated as “open” to year-round travel, while the rest of the GDBR is designated for “limited travel” to protect resource values including important wildlife habitat, and watershed protection. Areas designated for “limited travel” restrict OHV use to designated trails and travel routes (BLM 1985, BLM 1994). Portions of section 22-27, T8S, R22E lie within the Devils Playground, an area currently open to OHV use. This area receives directed and concentrated OHV use, especially in the spring around Easter. Approximately 300 all-terrain vehicles (ATVs), including both motocross cycles and 4-runners, along with associated Recreational Vehicles, pick-up trucks, and campers may occupy this 1,200-acre area over the 7-day period around Easter. Another 500-800 people will bring ATVs to the site during the remainder of the calendar year.

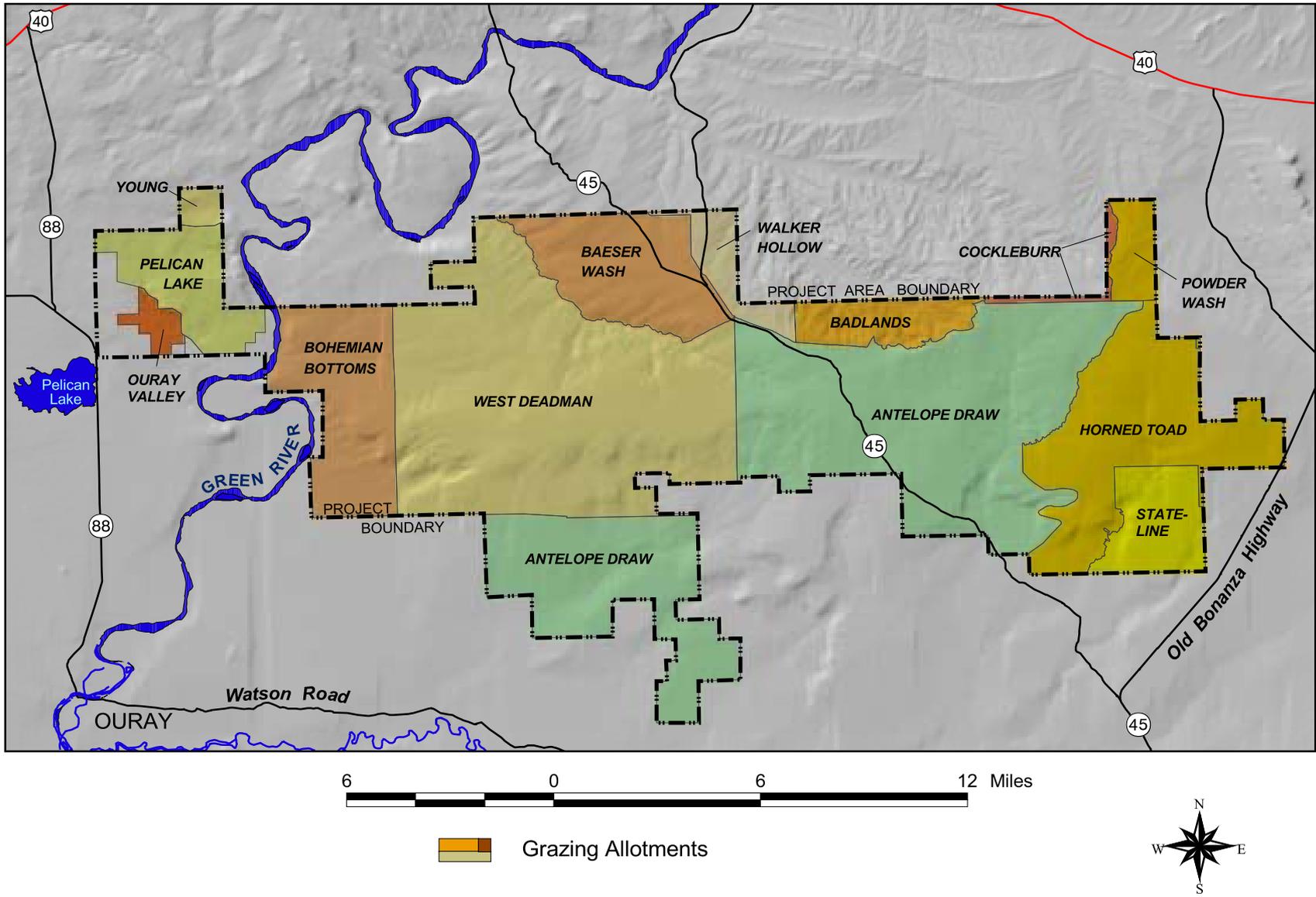


Figure 3.11-1. Grazing Allotments

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3.13 VISUAL RESOURCES

The GDBR consists of public, state, and private lands in Uintah County. The GDBR lies within the Uinta Basin physiographic unit, a distinctly bowl-shaped geologic structure (Stokes 1988). The entire Uinta Basin ecosystem is within the Green River drainage, considered to be the northernmost extension of the Colorado Plateau. As part of the Central Badlands District of the Uinta Basin, the GDBR exhibits broad erosional benches and extensive badland rims adjacent to drainages. Benches and mesas are capped with sand and silt; erosion of these surfaces forms sand dunes, sand sheets, and colluvial clays downslope. General relief is from north to south with elevation ranging from 5,860 to 4,680 feet msl. Vegetation includes scattered juniper, greasewood, shadscale, snakeweed, cheat grass, and Indian ricegrass. Existing disturbance of the landscape include livestock grazing, roads, and oil and gas facilities.

Public lands managed by BLM within the GDBR have been classified according to BLM's visual resource management (VRM) system (BLM 2004). The VRM system is an analytical process used to inventory, manage, and set management objectives for visual resources on public lands. As part of the VRM, visual management classes are identified that designate permissible levels of landscape alteration with the goal of protecting the overall visual quality of public lands. Visual management classes are as follows:

- Class I:* Objective: To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention
- Class II:* Objective: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- Class III:* Objective: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- Class IV:* Objective: To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

The area classification can be used to determine the visual impact of proposed activities and to measure the amount of disturbance an area can tolerate before the proposed activity exceeds the VRM objective.

The extent of VRM classifications is shown on Figure 3.13-1. Currently, most lands within the GDBR are classified VRM Class IV (the classification V is encompassed in Classification IV) that the level of change to the characteristic landscape can be high. The small portion (2,846 acres) of VRM Class III in the southeast part of the GDBR is associated within the badlands topography within the viewing range of motorists along the New and Old Bonanza Highways.

3.14 SOCIOECONOMIC ANALYSIS

The GDBR is located in Uintah County, Utah. The following is a description of the demographics, local economy, and community services in the county that may be affected by the GDBR project.

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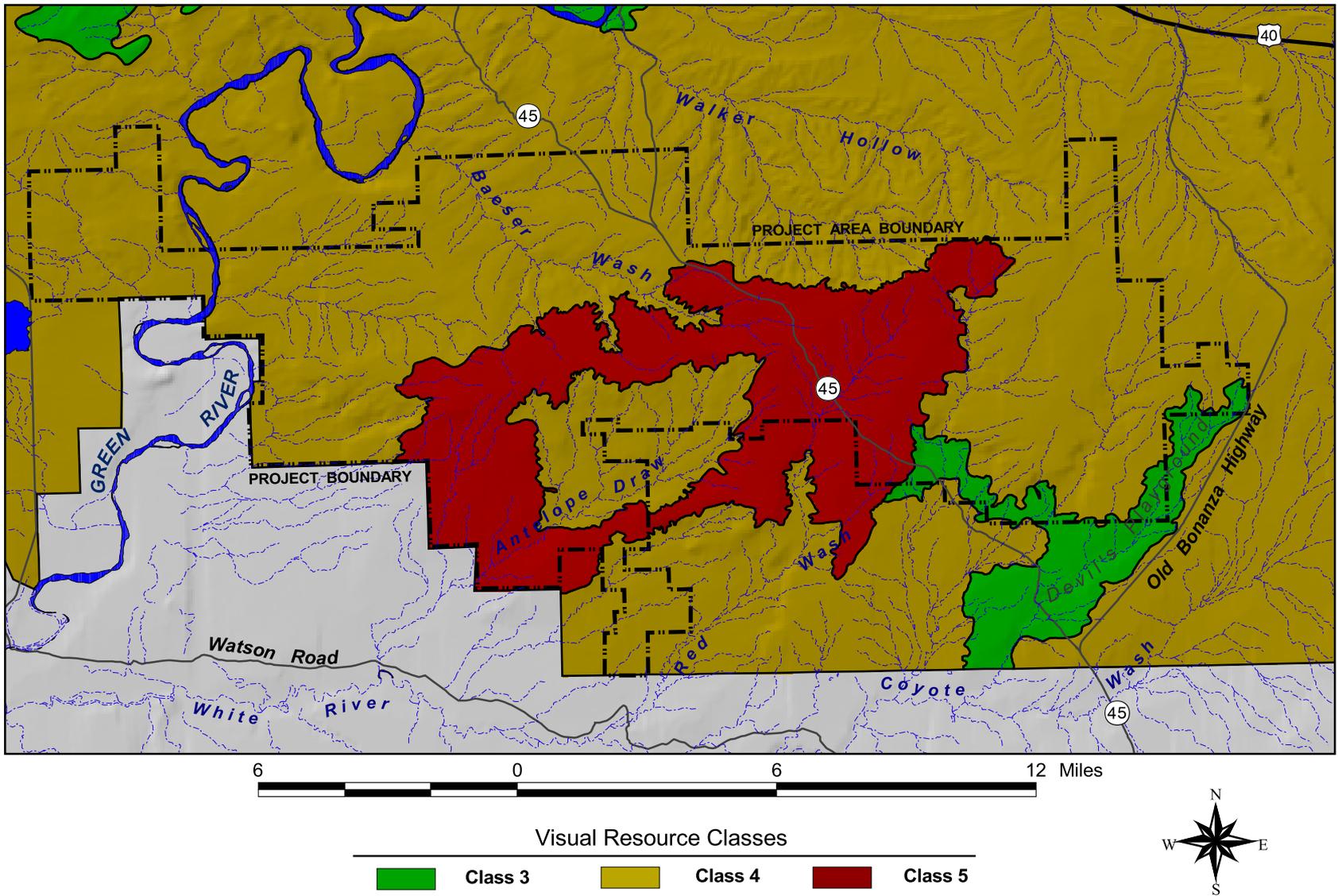


Figure 3.13-1. Visual Resource Classes

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3.14.1 Demographics

Population centers within a reasonable commuting distance of the GDBR include Vernal, Naples, and the northern part of unincorporated Uintah County. In 2002, Uintah County as a whole had a population of 26,155, while the City of Vernal had a population of about 7,879, the City of Naples had a population of about 1,378, and the Town of Ballard to the west had a population of 581. The majority of Uintah County's population is in unincorporated communities such as Maeser, Fort Duchesne, Whiterocks, Jensen, Randlett, and other rural areas, and was estimated to be approximately 16,317 in 2002 (U.S. Bureau of the Census 2002). Figure 1.1-1 shows the geographic locations of the communities in Uintah County. The vast majority of the population of Uintah County resides in communities along Highway 40 and to the north. The GDBR is located south of the more populated part of the county and is virtually uninhabited. In terms of racial composition, approximately 85.9 percent of Uintah County's population is Caucasian, 9.4 percent is Native American, and the remaining 4.7 percent is Hispanic/Latino and of other ethnicities (U.S. Bureau of the Census 2002).

Over the last 30 years, the communities in Uintah County have experienced varying degrees of population growth or decline in response to changes in the economy and the energy industry in particular. From the 1970s to 1983, the population of Uintah County grew steadily in response to employment growth in the energy industry. Following a decline in energy prices and reduced employment in the energy economic sector, the population of Uintah County declined gradually from 1983 to 1989. Throughout the 1990s and to the present, the local population has grown gradually as a result of the diversification of the regional economy and increased activity in the energy sector. This population trend is assumed to continue into the future, with gradual population growth forecasted to the year 2020 (Utah Department of Workforce Services, 2004). Table 3.14-1 provides a summary of population change in Uintah County and the City of Vernal from 1980 to 2000, and projections of future populations to the year 2020.

Table 3.14-1. Population Estimates for Uintah County, Utah 1980 – 2020

Community	1980	1990	2000	2010	2020
Uintah County	20,700	22,230	25,297	27,556	30,302

Source: U.S. Census Bureau, 2002

3.14.2 Local Economy and Employment

Uintah County has experienced broad economic swings over the last 25 years. The local economy has historically been, and remains, heavily dependent on the oil and gas industry. Economic conditions in Uintah County continue to mirror the state of that industry in good times and bad. During the late 1970s to the early 1980s, the county experienced considerable economic growth associated with the energy boom. From 1983 to 1990, the decline of the local oil and gas industry and the regional energy bust resulted in high unemployment and severe economic hardship for many area residents. Since 1990, the economy of Uintah County has diversified to some extent and grown gradually as the oil and gas industry has benefited from rising energy prices and increased profitability. Education, health services, leisure, and hospitality industries have added to Uintah County's economic diversification in recent years (Utah Department of Workforce Services, 2004). Long-term economic forecasts by the Governor's Office of Planning and Budget predict a gradual decline on the oil and gas industry in future years and growth in the lower-paying service sector (GOPB 2004).

Major sources of employment in Uintah County include the mining and oil and gas industries; local, state, and federal government; wholesale and retail trade; and services (GOPB 2004). Table 3.14-2 provides a

breakdown of nonagricultural sources of employment by economic sector in Uintah County. As of March 2004, Uintah County was experiencing an unemployment rate of 5.3 percent, which was comparable to the State of Utah and United States as a whole at 5.0 and 5.6 percent unemployment, respectively (Utah Department of Workforce Services, 2004). Total nonagricultural employment in Uintah County was approximately 10,324 as of July 2004.

Table 3.14-2 Sources of Employment in Uintah County by Sector, 2003-Present

Employment Sector	Number of Jobs	Percent of Total
Mining, Oil and Gas	1,845	17.9
Construction	551	5.3
Manufacturing	189	1.8
Trade (Wholesale and Retail), Transportation and Utilities	2,189	21.2
Information Services	133	1.3
Professional Services ^a	790	7.7
Education and Health Services	784	7.6
Services ^b	1,252	12.1
Government	2,591	25.1
Total	10,324	100.0

Source: Utah Governor's Office of Planning and Budget, 2005.

^a Professional Services include finance, insurance, real estate, and other professional services.

^b Services include leisure, hospitality, and other services.

Due to the prevalence of the oil and gas and trade industry in Uintah County, wages are generally higher than in other rural counties in Utah, although they are lower than in counties along the more prosperous Wasatch Front. Uintah County's average monthly wage of \$2,201 ranks 11th in the state, and is about 88% of the state average of \$2,510. Of the various employment sectors in the local economy, the mining (including oil and gas), transportation and utilities, and financial services sectors provide the highest wages in Uintah County, while the manufacturing, trade, education and health services sectors provide substantially lower wages. Table 3.14-3 provides a summary of monthly wages paid by the various industries that make up the Uintah County economy. Total personal income in Uintah County as of March 2004 was \$502.7 million. Per capita income was about \$19,374, which is lower than the state per capita income of \$24,157.

Table 3.14-3. Uintah County Average Monthly Wages by Economic Sector, 2002

Sector	Average Monthly Wage
Transportation & Utilities	\$3,791
Mining, Oil & Gas	\$3,596
Financial Services	\$2,957
Government	\$2,278
Construction	\$1,873
Professional & Business Services	\$1,773

Sector	Average Monthly Wage
Trade	\$1,746
Information Services	\$1,688
Other Services	\$1,697
Manufacturing	\$1,549
Education & Health Services	\$1,510
Leisure & Hospitality	\$625

Source: Utah Department of Workforce Services, 2004.

3.14.3 Community Emergency Response Services

In general, for law enforcement and fire response in the GDBR, the BLM is responsible for those services. In some cases, the Uintah County Sheriff may respond, depending on the nature of the crime or emergency that has occurred.

Medical services are provided by Ashley Valley Medical Center in Vernal. Ambulance service to the medical center is available and provided by Gold Cross Ambulance, a contract service provider. In situations requiring rapid evacuation of an injured worker or patient in distress, CareFlight helicopter service to St. Mary's Hospital in Grand Junction, Colorado is available.

3.14.4 Local Government Fiscal Conditions and Revenues from Oil and Gas Activities

Oil and gas operations contribute considerable revenue to various local, state, and federal government entities through payment of various royalties and taxes. The following types of revenues are typically generated by oil and gas development.

3.14.4.1 Property Tax Revenue

Among the most important sources of revenue in Uintah County are property taxes levied on locally and centrally assessed property. This revenue source is used by the counties to fund a wide variety of services and community facilities. Given their generally high assessed value, oil and gas and other types of industrial operations often contribute a significant portion of a county's property tax base.

In Uintah County, approximately 57 percent of total assessed valuation is associated with centrally assessed properties including oil and extraction operations, pipelines, mining operations, electric utilities, and telecommunications facilities. Locally assessed properties include residences, local businesses, farms, and other properties that are not centrally assessed. Locally assessed properties comprise approximately 38 percent of total assessed value in Uintah County. Personal property, including machinery and tools, office equipment and furniture, and medical equipment, comprises the remaining 5 percent of assessed value in Uintah County. Oil and gas extraction operations in Uintah County contribute substantially to the local property tax base. These operations were assessed at a value of \$418,801,897 in 2003, which amounts to about 26 percent of Uintah County's total assessed valuation of \$1,593,779,187 (Uintah County Clerk Auditor's Office, 2004).

In Uintah County, the Uintah County School District receives the largest portion of property tax revenue, followed by the Uintah County government, State-supported schools, the Uintah County Library, various local water districts, parks and recreation facilities, and the various local city and town governments. In

total, approximately \$16.6 million in property tax revenue was distributed to these entities in Uintah County in 2003 (Uintah County Clerk Auditor's Office, 2004).

In addition to ad valorem tax payments, Uintah County also collects payments-in-lieu of taxes (PILT) from the federal government for public lands within the county. In 2003, federal PILT taxes paid to Uintah County amounted to approximately \$1.2 million.

3.14.4.2 Federal Mineral Lease Royalties

Federal mineral lease royalties are collected from oil and gas, gas plant products, Gilsonite, and phosphate extraction operations located on federally administered public lands in Uintah County. At present, the federal royalty rate for gas is based on a step scale that varies by production rate. Federal mineral leasing regulations require the return of 50 percent of royalties collected from these operations to the state of origin.

The 50 percent state share is apportioned as follows: 70 percent to the Permanent Community Impact Fund (PCIF), and 30 percent to the Mineral Bonus Account (30%). The Mineral Bonus Account funds are then further distributed among several agencies and funds including the Utah Department of Transportation, Utah Department of Community and Economic Development (allocated to local county special service districts), the State Board of Education, the Utah Geological Survey, and the Water Research Laboratory at Utah State University (UC 59-21).

In 2001, total federal mineral lease royalties generated by operations in Uintah County amounted to approximately \$35.6 million, of which about \$3.2 million returned directly to Uintah County to the county recreation and transportation special service districts (U.S. Minerals Management Service, 2002). Moreover, the PCIF provided numerous grants and loans to Uintah County and other local municipal governments for the funding of various infrastructure projects. From 1999 to 2003, the PCIF provided a total of \$25.1 million to Uintah County, the Cities of Vernal and Naples, the Town of Ballard, and other water and special service districts for street improvements, water and sewer infrastructure, municipal buildings, and other facilities (Utah Department of Community and Economic Development 2004).

3.14.4.3 Sales and Use Tax Revenue

Sales taxes are paid by oil and gas operations when purchases of equipment, materials, or supplies are made in the local area. Examples of purchases that generate sales tax revenue include gravel, pipe, fuel, and other supplies purchased locally. Like property tax revenue, sales and use tax revenues are used by local cities and counties to fund a wide variety of important local services and community facilities.

Currently, the sales and use tax rate in Uintah County is 6.5 percent (4.75 percent state, 1.75 percent county/local). In 2003, taxable sales in Uintah County yielded tax revenues of approximately \$2.2 million (Uintah County Clerk Auditor's Office, 2004).

3.15 NOISE

Noise is generally described as unwanted sound. Discussions of environmental noise do not focus on pure tones because commonly heard sounds have complex frequency and pressure characteristics. Accordingly, sound measurement equipment has been designed to account for the sensitivity of human hearing to different frequencies. Correction factors for adjusting actual sound pressure levels to correspond with human hearing have been determined experimentally. For measuring noise in ordinary environments, A-Weighted correction factors are employed. The filter de-emphasizes the very low and

very high frequencies of sound in a manner similar to the response of the human ear. Therefore, the A-weighted decibel (dBA) is a good correlation to a human’s subjective reaction to noise.

The dBA measurement is on a logarithmic scale. To the average human ear, the apparent increase in “loudness” doubles for every 10 dBA increase in noise (Harris 1991). Taking a baseline noise level of 50 dBA in a daytime residential area, noise of 60 dBA would be twice as loud, 70 dBA would be four times as loud, and 80 dBA would be eight times as loud.

3.15.1 Regulatory Noise Standards

Noise standards have not been established within the GDBR by BLM, the State of Utah, or Uintah County. However, the Environmental Protection Agency (EPA) established a noise level of 55 dBA as a guideline for acceptable environmental noise (EPA 1974). This established noise level is used for a basis of evaluating noise effects when no other local, county, or state standard has been established. It is important to note that this noise level was defined by scientific consensus, was developed without concern for economic and technological feasibility, and contained a margin of safety to ensure its protective value of the public health and welfare. Furthermore, this noise level is directed at sensitive receptors (residences, schools, medical facilities, recreational areas) where people would be exposed to an average noise level over a specific period of time.

In this context, public health and welfare includes personal comfort and well-being, and the absence of mental anguish, disturbances, and annoyance as well as the absence of clinical symptoms such as hearing loss or demonstrable physiological injury. A 55 dBA noise level should not be misconstrued as a regulatory goal. Rather, the 55 dBA noise level should be recognized as a level below which there is no reason to suspect that the public health and welfare of the general population would be at risk from any of the identified effects of noise.

3.15.2 Common Noise Levels

The following presents a discussion of noise levels common to most people in small communities and rural areas. These levels are meant to represent the average noise levels over a given period (for example, a 24-hour interval or a yearly average) in various land use areas. Depending on the location and the quantity and type of noise sources, these levels can have a large variation but generally vary in the range of 3 to 5 dBA (EPA 1974). For a comparison to a familiar human activity, the average noise level experienced during normal conversation of two people five feet apart is 60 dBA. Table 3.15-1 shows examples of noise levels generated by commonly experienced sources and the relative strength of the “loudness” of noise levels compared to normal conversation.

Table 3.15-1. Common Noise Levels

Noise Source	Average Noise (dBA)	“Loudness” (compared to normal conversation)	Range of Noise (dBA)
Ambulance siren at 100 feet	100	16	95-105
Motorcycle at 25 feet	90	8	85-95
On a typical construction site	85	6	80-90
Single truck passing at 25 feet	80	4	75-85
Urban shopping center	70	2	65-75
Single car passing at 25 feet	65	1.5	60-70
Average highway noise at 100 feet	60	1	55-65

Noise Source	Average Noise (dBA)	“Loudness” (compared to normal conversation)	Range of Noise (dBA)
Normal conversation 5 feet apart	60	1	57-63
Residential area during day	50	50%	47-53
Recreational area	45	37%	40-50
Residential area at night	40	25%	37-43
Rural area during day	40	25%	37-43
Rural area at night	35	18%	32-37
Quiet whisper	30	12%	27-33
Threshold of hearing	20	6%	17-23

Source: EPA (1974), Harris (1991)

3.15.3 Existing Project Area Noise Levels

Currently, gas and oil drilling and production activities are widespread and limited in scale within and near the GDBR. No other significant noise sources are nearby. Noise levels are elevated near well pad and access road construction, drilling rigs, along access roads, and along State Highway 45, the major thoroughfare through the GDBR. However, because of the limited development, it is estimated that overall noise levels are typical of a rural area (about 40 dBA) away from natural gas development and production equipment.

3.16 HEALTH AND SAFETY

In general, existing health and safety concerns associated with oil and gas exploration and production in the GDBR include occupational hazards associated with construction, operation, and maintenance activities at natural gas well pads and associated facilities. Other health and safety issues include traffic-related accidents, manmade wildfires, potential natural gas and hydrogen sulfide leaks, and accidental spills or releases of hazardous substances.

The construction of well pads, roads, pipelines, compressors, and other oil and gas facilities and operation and maintenance of those facilities involves the use of heavy equipment, drill rigs, trucks, welding equipment, power tools, and other machinery that inherently exposes workers to risks for accidents and injuries. To date, occupational accidents elsewhere in the GDBR from existing oil and gas development have been limited in number.

Truck and other vehicle traffic using roads serving the GDBR create a risk of traffic accidents and hazards, particularly during periods of inclement weather or poor visibility. Oil and gas exploration and production inherently has the potential to cause wildfires due to the presence of flammable liquids and gasses and the use of welding equipment, vehicles, and other potential ignition sources. Accidents involving leaks of natural gas and/or hydrogen sulfide in some cases are also possible. According to the Colorado Department of Transportation statistics along the nearest major highway, U.S. Highway 40 in the vicinity of Vernal, an average of 144 traffic accidents occurred from 2002 through 2004. On the average, 33 percent of these accidents involved injuries, and 2 percent were fatal accidents.

Various hazardous materials are used in the construction, operation, and maintenance of oil and gas exploration and production projects, including, diesel fuel and gasoline, various oils and lubricants, and cleaners. In addition, natural gas production can produce liquid hydrocarbons, or condensate, which may contain compounds deemed hazardous if spilled or ingested.

Table 3.16-1. Crash History on U.S. Highway 40 from Ft. Duchesne to Vernal

Year	Total Crashes	Truck Crashes		PDO ¹ Crashes	Injury Crashes		Fatal Crashes	
		Number	%		#	%	#	%
2002	146	6	4%	97	47	32%	2	1%
2003	131	7	5%	75	52	40%	4	3%
2004	155	13	8%	110	43	28%	2	1%
Average	144	9	6%	94	47	33%	3	2%

¹Property Damage Only (PDO).

Source: UDOT, 2006. Crash Data Section. Fara Williams (UDOT)

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