3.8 Aquatic Resources

3.8.1 Regulatory Background

Regulations that involve the management and protection of aquatic species and habitat within the analysis area are implemented by CPW, USFWS, BLM, and the Forest Service. Regulations and legal requirements related to aquatic species and their habitat are listed in **Table 3.8-1**.

Table 3.8-1 Regulations for Protection of Aquatic Species

Topic	Regulation
Aquatic Species Jurisdiction	Colorado Revised Statutes 33-1-101
Aquatic Species Protection	Colorado Revised Statutes 33-1-101
Prevent Invasive Species Infestation	Colorado Revised Statutes 33-1-101, 33-2-104
Protection of Federally Listed Species	ESA of 1973
Protection of BLM Sensitive Species	BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125)
Protection of Forest Service Sensitive Species	FSM 2670
Protection of Colorado Listed Species	Colorado Revised Statutes 33-2-105

Sources: BLM 2014b; WRNF 2014a.

3.8.2 Analysis Area

The analysis area for aquatic resources coincides with the surface water resources analysis area. As shown in **Figure 3.5-1**, the geographical extent of the analysis area for aquatic species and their habitats includes the subwatersheds (HUC-12) and perennial waterbodies located within the oil and gas lease boundaries. Additional downstream reaches are included to evaluate potential offsite indirect effects from upstream leased lands, as well as the effects from water depletions. The downstream analysis area is defined as the perimeter of the subwatersheds that extend downstream of the lease boundaries. For federally listed fish species in the Colorado River, the downstream analysis area relates to the closest occurrence of the fish species including their critical habitat.

3.8.3 Regional Affected Environment

The geographical extent of the analysis area for aquatic species and their habitats includes the subwatersheds (HUC-12) (see **Figure 3.5-1**) and perennial waterbodies located within the oil and gas lease boundaries. Additional downstream reaches are included to evaluate potential offsite/indirect effects from upstream leased lands, as well as effects from water depletions. The downstream analysis area is defined as the perimeter of the subwatersheds that extend downstream of the lease boundaries. For federally listed fish species in the Colorado River, the downstream analysis area relates to the closest occurrence of the fish species including their critical habitat.

Information regarding aquatic species and their habitats within the analysis area was obtained from a review of existing published sources, BLM RMPs, Forest Service land and RMPs (forest plans), file information from BLM, Forest Service, CPW, and USFWS. Species occurrence information was obtained from CPW (2015c) and the BLM (2015h).

Overall, aquatic habitat in the region includes a mixture of rivers, streams, reservoirs, lakes, ponds wetlands, and springs. In total, approximately 40 miles of perennial streams occur within the areas associated with all leases. River and stream habitats consist of perennial, intermittent, and ephemeral waterbodies. Perennial streams contain water and habitat wetted continuously during a normal or

average year, while intermittent (sporadic or periodic flows) and ephemeral (short-lived or transitory) provide temporary habitat for aquatic species. Approximately 108 lakes or reservoirs occur within all 65 leases combined. All of these waterbodies are less than 10 acres in surface area.

Due to their recreational values, game fish species are an important focus in the management of aquatic species within the analysis area. Recreational game fish species include coldwater (trout) species in higher elevation streams and lakes (**Table 3.8-2**). Some waterbodies below approximately 6,500 feet in elevation also support cool water (northern pike, walleye, and smallmouth bass) and warmwater species (sunfish, crappies, largemouth bass, and catfish) (BLM 2014b). The cool and warmwater fish species mainly occur in some lakes, reservoirs, or ponds, and large streams such as the Colorado River and several of its tributaries. The cool and warmwater game fish species are uncommon in the analysis area, and therefore, they are not discussed further in this section. All of the game fish species are nonnative except for two lineages of Colorado River cutthroat trout (CRCT). General spawning periods and habitat for the more common game fish species (i.e., trout) within the analysis area are provided in **Table 3.8-3**. Important fish habitat in the analysis area consists of perennial waterbodies. Other native nongame fish include the mottled sculpin (*Cottus bairdi*), Paiute sculpin (*C. beldingii*), and speckled dace (*Rhinichthys osculus*).

Table 3.8-2 Game Fish Species in Analysis Area

Common Name	Scientific Name	General Habitat
Trout	Salmonidae	
Brook trout	*Salvelinus fontinalis*	Streams, lakes/reservoirs
Brown trout	*Salmo trutta*	Streams, lakes/reservoirs
CRCT	*Oncorhynchus clarkii pleuriticus*	Streams, lakes
Cutthroat trout	*Oncorhynchus clarkii*	Streams
Mountain whitefish	*Prosopium williamsoni*	Streams
Rainbow trout	*Oncorhynchus mykiss*	Streams, lakes/reservoirs

Table 3.8-3 Game Fish Spawning Periods and Habitat

Species or Group	Months												Spawning Habitat
	J	F	M	A	M	J	J	A	S	O	N	D	
Brook trout									■	■	■		Stream spawners that use gravel substrates and spring upwelling areas.
Brown trout									■	■	■		Stream spawners that use tributary streams with gravel substrates in riffle-run areas.
Cutthroat trout					■	■	■	■					Stream spawners that use tributary streams with gravel substrates in riffle areas.
Mountain whitefish										■	■	■	Stream spawners that move from pools to riffles for spawning.
Rainbow trout			■	■	■	■							Stream spawners that use gravel substrates at head of riffle or downstream portion of pool.

Sources: CDOW 2008; Sigler and Sigler 1996.

The analysis area includes special status aquatic species, which consist of federally listed and candidate species, Forest Service sensitive, and Colorado listed species (**Table 3.8-4**). Species with BLM sensitive species status also are shown in **Table 3.8-4** because water use effects include downstream areas within BLM lands. Four federally listed fish species (bonytail, Colorado pikeminnow, humpback chub, and razorback sucker) occur in river segments in the Colorado, White, and Yampa rivers, which are located downstream of the analysis area. However, they are included for the purpose of Project water use in the Upper Colorado River basin. Recent genetic and meristic studies have provided evidence of six historical lineages of cutthroat trout in the Colorado River basin and the Front Range of Colorado (AMEC 2014; Bestgen et al. 2013). Two lineages of CRCT occur within the Project analysis area. The blue lineage is native to the Green and Yampa watersheds, while the green lineage is native to the Colorado River watershed. The green lineage may require taxonomic revision and a new subspecies name. Until the taxonomy of these cutthroat trout subspecies are resolved, the USFWS has recommended that federal agencies treat the CRCT (green lineage) as if it is the federally threatened greenback cutthroat trout (*Oncorhynchus clarkia stomias*) (Rogers 2012). Other special status fish and amphibian species in the analysis area are listed in **Table 3.8-4**.

Table 3.8-4 Special Status Aquatic Species in the Analysis Area

Common Name	Scientific Name	Status[1]
Amphibians		
Boreal toad	*Bufo boreas boreas*	FS; SE; CAS
Northern leopard frog	*Rana pipiens*	BLM; FS
Fish		
Bluehead sucker	*Catostomus discobolus*	BLM; FS
Bonytail (CH)[2]	*Gila elegans*	FE; SE; BLM
Colorado pikeminnow (CH)[2]	*Ptychocheilus lucius*	FE; ST; BLM
CRCT (blue lineage)	*Oncorhynchus clarkii pleuriticus*	BLM; FS; SSC
CRCT (green lineage)[3]	*Oncorhynchus clarkii* subspecies	FT, BLM, FS, SSC
Flannelmouth sucker	*Catostomus latipinnis*	BLM; FS
Humpback chub (CH)[2]	*Gila cypha*	FE, SE; BLM
Razorback sucker (CH)[2]	*Xyrauchen texanus*	FE; SE; BLM
Roundtail chub	*Gila robusta robusta*	BLM; SSC; FS

[1] Status: FE = Federally Endangered; BLM = BLM Sensitive; CAS = Conservation Agreement Species; FS = Forest Service Sensitive; SE = Colorado Endangered; ST – Colorado Threatened; SSC = Colorado Special Concern.

[2] Critical habitat is located downstream of the analysis area.

[3] Considered threatened by the Forest Service until such time as a status review of cutthroat trout in Colorado is completed

Aquatic habitat in the analysis area used by special status aquatic species includes streams, springs, stock ponds, reservoirs and wetlands. Specific habitat conditions for waterbodies with special status aquatic species that are located within the analysis area are not described in this section, since information is not available for all species. Instead, reference is made to habitat preferences, which are provided in **Table 3.8-5** along with spawning or breeding periods.

Table 3.8-5 Habitat Preferences and Spawning Periods for Special Status Aquatic Species

Species	Habitat	Spawning/Breeding Periods
Boreal toad	Habitat used during the nonbreeding consists of forested areas and upland vegetation such as sagebrush and grassland. Boreal toads migrate from terrestrial habitats to aquatic habitats during the breeding period. Burrows are used by boreal toads and other amphibians during the summer and winter to maintain stable body temperatures and prevent water loss. (Keinath and McGee 2005).	May through August (Keinath and McGee 2005)
Northern leopard frog	Habitat consists of marshes, beaver ponds, stock ponds, streams, rivers, lakes, reservoirs, and wet meadows at elevations up to approximately 9,000 feet amsl (Smith and Keinath 2007). Northern leopard frog uses underwater areas as overwinter habitat.	March through June (Smith and Keinath 2007)
Bluehead sucker	Species inhabits various stream habitats ranging from small tributaries to large mainstem rivers. Habitat typically consists of runs or riffles with rock or gravel substrates. Juveniles utilize riffles, eddies and backwaters (Ptacek et al. 2005).	Early May through mid-August (CDOW 2008)
Bonytail	The general types of habitat include mainstem riverine areas and impoundments in the Colorado River system. Deep pools and eddies with slow to fast currents are characteristic of the riverine habitat (Kaeding et al. 1986).	June or July (Maddux et al. 1993)
Colorado pikeminnow	Habitat requirements of Colorado pikeminnow vary depending on the life stage and time of year. Young-of-the-year and juveniles prefer shallow backwaters, while adults use pools, eddies, and deep runs (Miller et al. 1982). During peak runoff in the spring and early summer, fish usually move into backwater areas of flooded riparian zones to avoid swift velocities, feed, and prepare for the upcoming spawning period.	Mid-June to mid-August (Miller et al. 1982)
CRCT (blue lineage)	This subspecies occurs in higher elevation streams and lakes in cold, clear water (Behnke 1981).	Early June through end of August (CDOW 2008)
CRCT (green lineage)	Same as CRCT (blue lineage).	Early June through end of August (CDOW 2008)
Flannelmouth sucker	Species is typically found in slower, warmer rivers where they prefer pools and deep runs but also use mouths of tributaries, riffles, and backwaters. Juveniles utilize backwaters and shoreline areas (Rees 2005a).	Early April through early July (CDOW 2008)
Humpback chub	Species mainly occur in river canyons where they utilize a variety of habitats including deep pools, eddies, upwells near boulders, and areas near steep cliff faces. Young and spawning adults are generally found in sandy runs and backwaters (USFWS 1990).	May through July (USFWS 1990)
Razorback sucker	General habitats used by adults include eddies, pools, and backwaters during the non-breeding period (July through March) (Maddux et al. 1993). Seasonal habitat use includes pools and eddies from November through April, runs and pools from July through October, runs and backwaters in May, and backwaters and flooded gravel pits during June. Juveniles prefer shallow water with minimal flow in backwaters, tributary mouths, off-channel impoundments, and lateral canals (Maddux et al. 1993).	April through mid-June (Maddux et al. 1993)
Roundtail chub	Species occurs in stream reaches with a mixture of pool and riffle habitats. Adults and juveniles typically are found in relatively deep, slow-velocity habitats that contain woody debris or other types of cover (Rees 2005b).	Mid-May through mid-July (CDOW 2008)

The population status of the two native CRCT lineages is considered to be stable or increasing due to efforts to reestablish this cutthroat subspecies in historical habitat (BLM 2014b). In 2006, a conservation agreement was signed by Colorado, Utah, and Wyoming to reverse declining population trends and maintain or increase fish numbers and miles of habitat for conservation populations (CRCT Conservation Team 2006).

Amphibian species that occur within the analysis area include the special status species, boreal toad and northern leopard frog. Other amphibians in the area include the wood frog (*Lithbates sylvaticus*), Great Basin spadefoot toad (*Spea intermontana*), Woodhouse's toad (*Anaxyrus woodhousii*), northern chorus frog (*Pseudacris triseriata*), and tiger salamander (*Ambystoma tigrinum*), and barred salamander (*Ambystoma mavortium*) (BLM 2014b; CPW 2015c). Amphibians utilize a mixture of perennial and temporary aquatic habitats such as ponds, streams, wetlands, and seasonal pools.

3.8.4 Analysis Area Affected Environment

The following information describes aquatic habitat and game fish and special status aquatic species that occur within each of the lease zones. Details on subwatersheds, perennial streams, and species occurrence are provided in **Appendix A**, **Tables A-2** through **A-5**. A summary of the parameters used to characterize the four lease zones is provided in **Table 3.8-6**.

Table 3.8-6 Parameters Used to Characterize Aquatic Habitat and Species within the Lease Zones

Parameter	Zone 1	Zone 2	Zone 3	Zone 4
Number of Subwatersheds with Perennial Streams within Zone Lease Boundary	0	7	6	1
Miles of Perennial Stream Habitat within Zone Lease Boundary	0	8	36	<1
Number of Lake/Reservoir Habitat (<10 acres in Area) within Zone Lease Boundary	0	10	74	24
Number of Perennial Streams with Game Fish Species Within Zone Lease Boundary	0	4	8	0
Number of Perennial Streams with Special Status Fish Species within Zone Lease Boundary	0	4	7	0
Number of Cutthroat Trout Conservation Populations within Zone Lease Boundary	0	3	5	0
Acres of Current Boreal Toad Habitat within Zone Lease Boundary	0	715	0	0
Acres of Potential Boreal Toad Habitat within Zone Lease Boundary	0	43	530	6
Acres of Potential Northern Leopard Frog Habitat within Lease Zone Boundary	906	2,512	8,095	111
Miles of Perennial Stream Habitat in Area Outside of the Zone Lease Boundary	39	144	195	38
Number of Perennial Streams with Game Fish Species Outside of the Zone Lease Boundary	3	6	18	1
Number of Perennial Streams with Special Status Fish Species Outside of the Zone Lease Boundary	3	6	16	1
Number of Cutthroat Trout Conservation Populations Outside of the Zone Lease Boundary	0	4	3	1

3.8.4.1 Zone 1

Of the four zones, the lowest amount of perennial habitat is present in Zone 1 because no perennial streams are located within the lease boundaries. Likewise, no game fish or special status aquatic species occur within Zone 1 and there are no lakes or reservoirs. However, there are approximately 39 miles of perennial stream habitat in the subwatersheds that extend beyond the lease boundaries. Three streams occur within these subwatersheds including North Wallace and Wallace creeks and the Colorado River (**Appendix A, Table A-2**). North Fork Wallace and Wallace creeks contain game fish species, as well as the special status species, CRCT (**Figure 3.8-1**). The lineage of the cutthroat trout populations in both streams are mixed blue and green so they are not pure Colorado River or greenback cutthroat trout populations. Special status fish species that occur in the Colorado River and Plateau Creek include bluehead sucker, flannelmouth sucker, and roundtail chub.

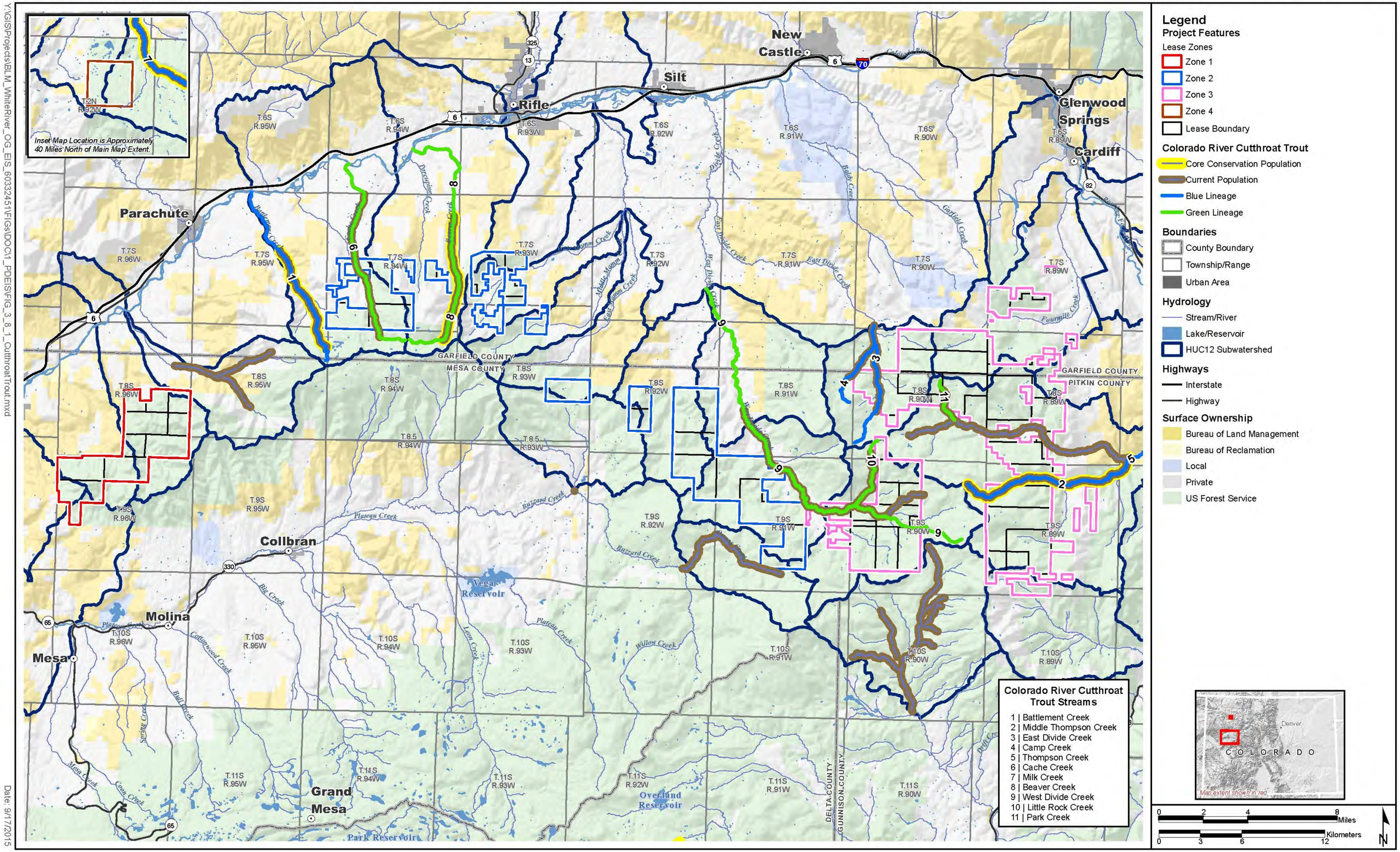
Special status amphibian habitat in Zone 1 consists of approximately 906 acres of potential habitat for northern leopard frog potential habitat (**Figure 3.8-2**). Potential habitat is defined by a 500-foot buffer along riparian areas. No boreal toad habitat is present in Zone 1. No critical habitat for federally listed fish species occurs within Zone 1. Critical habitat for four fish species is located downstream of the Zone 1 boundary in the Colorado River. The approximate distance to critical habitat is approximately 4 miles for Colorado pikeminnow and razorback sucker and 76 miles for bonytail and humpback chub (species name).

3.8.4.2 Zone 2

The boundary for Zone 2 overlaps with approximately 8 miles of perennial stream habitat within seven subwatersheds (**Appendix A, Table A-3**). The named perennial streams include West Divide, West Mamm, Middle Mamm, Beaver, Cache, Cottonwood, and Owens creeks. The largest amount of perennial stream habitat is provided by Cache Creek (2.2 miles) and West Mamm Creek (1.8 miles). Approximately 10 lakes and reservoirs occur in Zone 2. Game fish occur in four streams (upper portion of West Divide, Beaver, Cache, and Owens creeks). Cutthroat trout are present in all four streams (**Figure 3.8-1**); brook trout also occurs in West Divide Creek. The lineage of the CRCT populations vary by stream, with a green lineage in the upper portion of West Divide Creek and in Beaver, and Cache creeks, and an unknown lineage in Owens Creek. The cutthroat occurrences in Beaver and Cache creeks and the upper portion of West Divide Creek are considered conservation populations. The two cutthroat trout lineages are considered special status species. West Divide Creek also contains three additional special status fish species (bluehead sucker, flannelmouth sucker, and roundtail chub) in downstream areas.

The analysis area includes subwatersheds that extend beyond the Zone 2 leases. Approximately 144 miles of perennial stream habitat occurs in the area outside of the lease boundaries, with the largest amount of habitat provided by Beaver (11.9 miles), Middle Mamm (10.3 miles), and West Mamm (9.3 miles) creeks (**Appendix A, Table A-3**). Six streams contain game fish species, which include Beaver, Battlement, Cache, Owens, and West Divide creeks and the Colorado River. CRCT are present in all of the streams. The CRCT (green lineage) is present in the upper portion of West Divide Creek and Beaver and Cache creeks, while the CRCT (blue lineage) occurs in Battlement Creek (**Figure 3.8-1**). The CRCT lineage in Owens Creek is unknown. Other special status species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in the lower portion of West Divide Creek and the Colorado River.

Northern leopard frog and boreal toad habitat is present in Zone 2 (**Figures 3.8-2** and **3.8-3**). Although no known northern leopard frog occurrences have been reported in Zone 2, approximately 2,512 acres of potential habitat is identified for this species. The current range of boreal toad includes approximately 714 acres in Zone 2 (**Figure 3.8-3**). Boreal toad occurrence has been reported in Owens Creek. In addition, approximately 43 acres of potential boreal toad habitat are located within Zone 2 (**Figure 3.8-3**).



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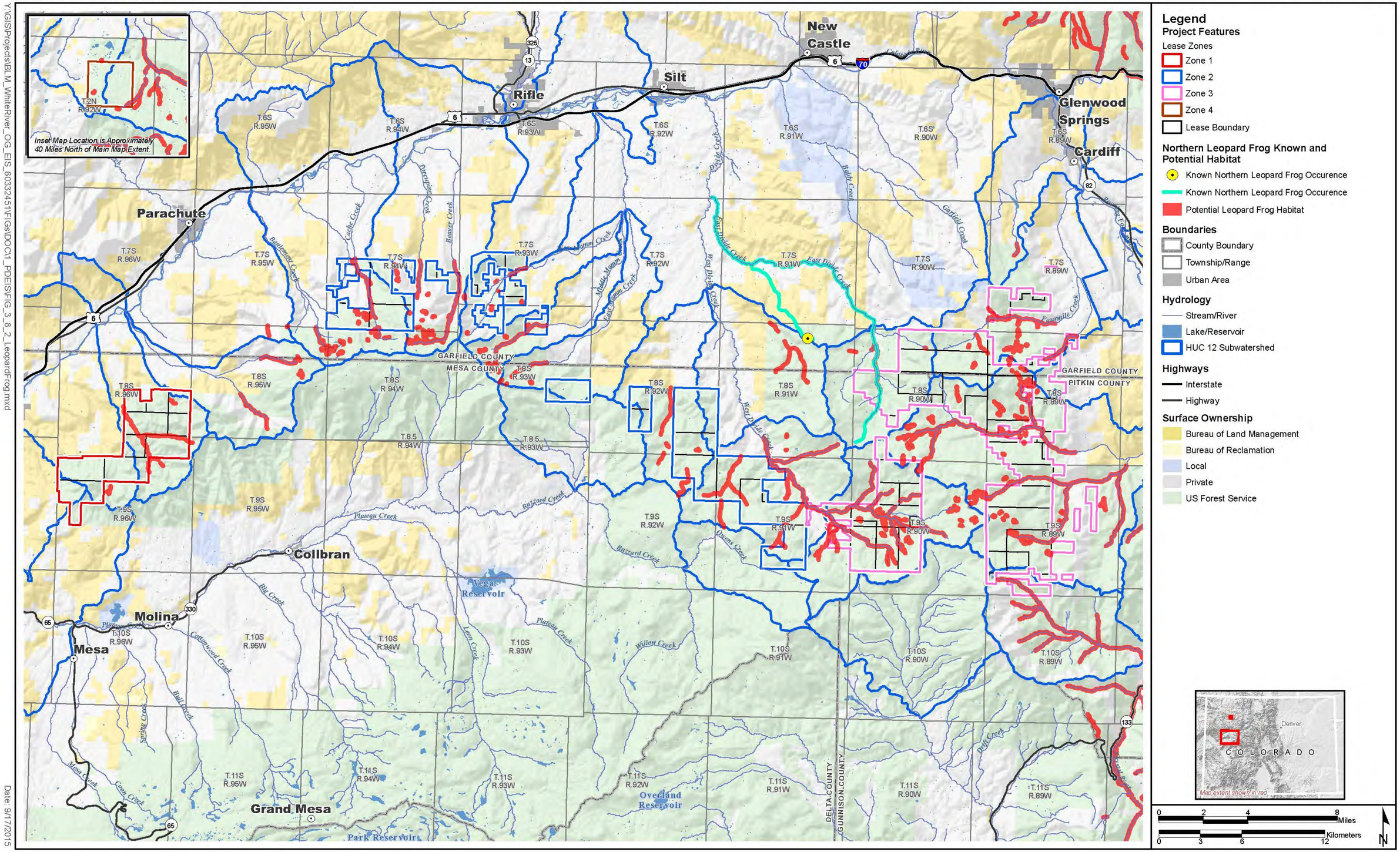
Date: 9/17/2015

Figure 3.8-1 Colorado River Cutthroat Trout - Current and Core Conservation Populations



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Date: 9/17/2015

Figure 3.8-2 Known and Potential Northern Leopard Frog Habitat

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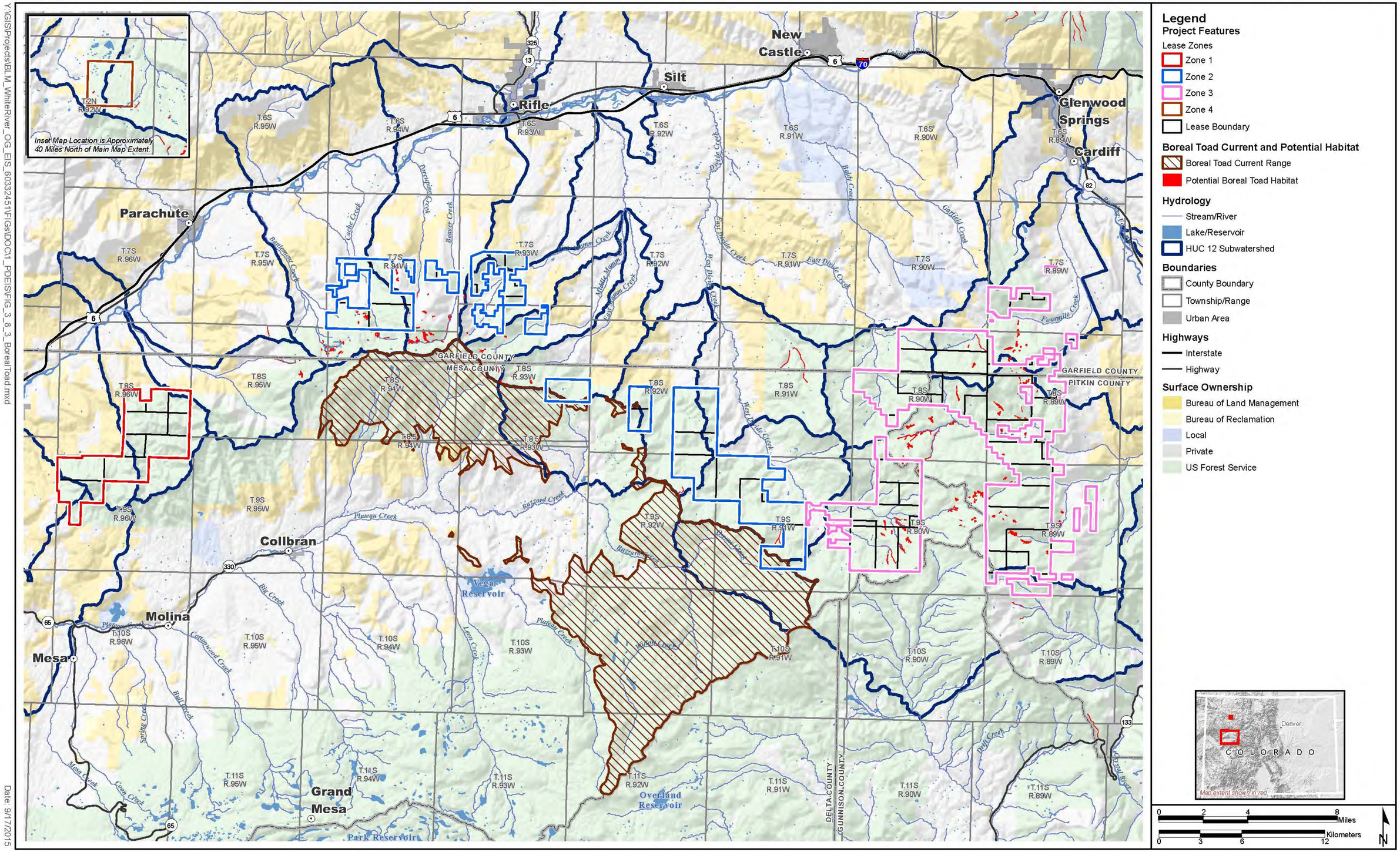

Date: 9/17/2015

Figure 3.8-3 Boreal Toal - Current and Potential Habitat

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No critical habitat for federally listed fish species occurs within Zone 2. Critical habitat for four fish species are located downstream of Zone 2 in the Colorado River. The approximate distance to critical habitat is approximately 4 miles for Colorado pikeminnow and razorback sucker and 90 miles for bonytail and humpback chub.

3.8.4.3 Zone 3

The largest amount of perennial habitat is located within Zone 3, which overlaps with approximately 36 miles of perennial streams in 6 subwatersheds (**Appendix A, Table A-4**). Of the named perennial streams in this zone, the largest amount of habitat is provided by West Divide Creek (5.1 miles), East Willow Creek (3.0 miles), Middle Thompson Creek (2.9 miles), and Fourmile Creek (2.1 miles). Approximately 74 lakes and reservoirs occur in Zone 3. Game fish species are present in eight streams, which include Camp East Divide, Fourmile, Little Rock, Middle Thompson, North Thompson, Park, and West Divide creeks. Cutthroat trout comprise the game fisheries in all of these streams except Fourmile Creek. Additional game species consist of brown and rainbow trout in North Thompson Park and Fourmile creeks. Special status species are present in seven streams including Camp, Middle Thompson, North Thompson, Park, Little Rock Park, East Divide, and West Divide creeks. CRCT (green lineage) occur in Little Rock and West Divide creeks, while blue lineage exists in Camp, East Divide, and Middle Thompson Creek. All three of these CRCT occurrences are conservation populations (**Figure 3.8-1**). Other special status species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in West Divide Creek and northern leopard frog in East Divide Creek.

The analysis area includes subwatersheds that extend beyond Zone 3. Approximately 195 miles of perennial stream habitat occurs in the area outside of the lease boundaries, with the largest amount of habitat provided by Fourmile (12.1 miles), North Thompson (10.6 miles), Prince (9.3 miles), and Clear Fork (8.8 miles) creeks. The area outside of Zone 3 includes 18 streams with game fish species (**Appendix A, Table A-4**). Cutthroat trout are present in 16 of these streams (Camp, East Divide, Fourmile, Little Rock, Middle Thompson, North Thompson, North Twin, Park, Rock, Second, South Twin, South Branch Middle Thompson, Thompson, and West Divide creeks and the Crystal and Roaring Fork rivers (**Figure 3.8-1**). Cutthroat trout conservation populations have been designated Camp, Middle Thompson, and Park creeks. The cutthroat lineages in Zone 3 are listed in **Appendix A, Table A-4**. Other special status fish species consist of bluehead sucker, flannelmouth sucker, and roundtail chub in West Divide and East Divide creeks and the Crystal and Roaring Fork rivers.

Northern leopard frog and boreal toad potential habitat is located in Zone 3. Northern leopard frog habitat is present in East Divide and June creeks. In addition, approximately 8,095 acres of potential habitat for this species are located within Zone 3 (**Figure 3.8-2**). Approximately 530 acres of potential boreal toad habitat also are located within Zone 3 (**Figure 3.8-3**).

No critical habitat for federally listed fish species occurs within Zone 3. Critical habitat for four fish species are located downstream of the Zone 3 Lease boundary in the Colorado River. The approximate distance to critical habitat is approximately 26 miles for Colorado pikeminnow and razorback sucker and 124 miles for bonytail and humpback chub.

3.8.4.4 Zone 4

Aquatic habitat is limited in Zone 4, with less than 1 mile for one stream, Martin Creek (**Appendix A, Table A-5**). No game fish or special status species occur in Martin Creek. Approximately 24 lakes and reservoirs occur in Zone 4. Approximately 38 miles of perennial stream habitat are located in the two subwatersheds that extend beyond the lease boundaries. One stream, Milk Creek, occurs within the subwatersheds that are adjacent to and outside of Zone 4. Milk Creek contains the game fish and special status species, CRCT (blue lineage), which is considered a conservation population (**Figure 3.8-1**). Milk Creek also contains other special status fish species including bluehead sucker, flannelmouth sucker, and roundtail chub.

Special status amphibian habitat in the Zone 4 Lease area consists of approximately 111 acres of potential habitat for northern leopard frog potential habitat (**Figure 3.8-2**). No Known boreal toad occurrence has been reported in Zone 4, but there are 6 acres of potential habitat (**Figure 3.8-3**).

No critical habitat for federally listed fish species occurs within Zone 4. Critical habitat for four fish species are located downstream of Zone 4 in the White River. The approximate distance to critical habitat is approximately 20 miles for Colorado pikeminnow and razorback sucker and 90 miles for bonytail and humpback chub.

3.9 Cultural Resources

3.9.1 Regulatory Background

Section 3.6.1 of the WRNF Final EIS (USFS 2014a) provides an extensive list of the laws, executive orders, regulations, and policies that comprise the regulatory framework for the protection and management of cultural resources on NFS and other federal lands. In addition to compliance with the NEPA, a brief list of the major laws governing cultural resource management includes the following:

- Antiquities Act of 1906;
- Historic Sites Act of 1935;
- National Historic Preservation Act of 1966 (NHPA) (P.L. 89-665, as amended);
- Archaeological Resources Protection Act of 1979 (P.L. 96-95, as amended);
- Native American Grave Protection and Repatriation Act (P.L. 101-601);
- American Indian Religious Freedom Act of 1978 (P.L. 96-341); and
- Religious Freedom Restoration Act of 1993 (P.L. 103-141).

3.9.1.1 Implementation of Section 106 of the National Historic Preservation Act

To describe cultural resources that may be affected by oil and gas leasing and development, Section 106 of the NHPA provides the basis for documenting and identifying what cultural resources are of primary concern to the impact analysis. The NHPA mandates that federal agencies consider the effect of an undertaking on cultural resources that are listed or are eligible for listing on the National Register of Historic Places (NRHP). Section 106 of the NHPA establishes a four-step review process by which such resources are considered. The four steps are as follows:

1. Initiate the Section 106 process by establishing the undertaking, defining the Area of Potential Effect, and consulting with the appropriate agencies;
2. Identify NRHP-eligible sites through inventory and evaluation;
3. Assess adverse effects by applying specific criteria of adverse effects; and
4. If adverse effects will occur, take appropriate steps to avoid or mitigate those effects.

Cultural resources that are listed or eligible for listing on the NRHP are referred to as “historic properties.”

The WRNF has a forest-wide goal to work in close coordination with the Southern Ute Indian Tribe, Ute Mountain Ute Tribe and Ute Indian Tribe of the Uintah and Ouray Reservation (sometimes also referred to as the Northern Ute Tribe, known as the Confederated Ute Tribes. Regulations in 36 CFR 800 (revised 2004) outline the process through which historic preservation legislation under the NHPA is administered. The 2012 National Programmatic Agreement among the BLM, Advisory Council on Historic Preservation, and National Conference of State Historic Preservation Officers regarding the manner in which the BLM meets its responsibilities under the NHPA is the basis of the BLM authority for meeting requirements of the NHPA. Day-to-day operations are based on the Colorado State Protocol Agreement (2014). Additionally, BLM Manual 8140 provides direction for protecting cultural resources from natural or human-caused deterioration and for recovering significant cultural resource data to mitigate adverse effects of proposed undertakings in accordance with the state protocol.

3.9.1.2 Eligibility Criteria for Listing Cultural Resources on the NRHP

The NRHP is a national list of cultural resources that are considered important in local, state, or national prehistory or history. Federal laws and regulations require that sites listed on or eligible for listing on the NRHP be taken into account in the planning and implementation of federal actions. Resources that have not been evaluated for the NRHP (unknown or needing data) are generally treated as potentially eligible resources until eligibility is determined. The NRHP, maintained by the NPS on behalf of the Secretary of the Interior, is the nation's inventory of historic properties. There are three main standards that a property must meet to qualify for listing on the NRHP: age, integrity, and significance. To meet the age criteria, a property generally must be at least 50 years old. To meet the integrity criteria, a property must "possess integrity of location, design, setting, materials, workmanship, feeling, and association" (36 CFR 60.4). Finally, a property must be significant according to one or more of the following criteria:

- Criterion A—Be associated with events that have made a significant contribution to the broad patterns of U.S. history; or
- Criterion B—Be associated with the lives of persons significant in U.S. history; or
- Criterion C—Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D—Have yielded, or may be likely to yield, information important in prehistory or history.

3.9.2 Analysis Area

The analysis area encompasses the maximum extent of the lease boundaries.

3.9.3 Regional Affected Environment

Cultural resources are locations of human activity, occupation, or use, and include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses. They may include locations (sites or places) of traditional, cultural, or religious importance to specified social or cultural groups. Cultural resources are concrete, material places and things that are located, classified, ranked, and managed through the system of identifying, protecting, and utilizing for public benefit. Cultural resources are identified through cultural resource inventories, architectural inventories, historic sources, and consultation with concerned ethnic groups or communities.

As noted WRNF Oil and Gas Leasing Final EIS (USFS 2014a, page 368-369), the area is mostly lacking confirmed Ute sites, but contains other heritage resources (archaeological sites) and landscapes indicative of Ute site presence. The Ute tribes that have historic affiliation with the project area include: 1) Southern Ute Indian Tribe; 2) Ute Mountain Ute Tribe; and 3) Ute Indian Tribe of the Uintah and Ouray Reservation (sometimes also referred to as the Northern Ute Tribe).

3.9.4 Analysis Area Affected Environment

The summaries of the number of cultural resource inventories, site eligibility, and site density presented in this section are based on data included in the Heritage Resources Specialist Report prepared for the WRNF Final EIS (Brogan 2014) and cultural resources spatial data provided by the WRNF.

There have been 458 cultural resource projects conducted in the analysis area covering 11,524 acres (14 percent of the analysis area), and 117 cultural resources that have been previously recorded, of which 19 are listed, or eligible for listing, on the NRHP. A breakdown in inventory coverage by lease zone is presented in **Table 3.9-1**.

Table 3.9-1 Existing Inventory Coverage Within the Analysis Area

Zone	Acres of Analysis Area	Percent of Analysis Area
1	564	6
2	2,712	11
3	7,819	18
4	429	17

The majority (40 percent) of the cultural resources projects were inventory projects. A field inventory may be of different intensities (reconnaissance, sampling, or intensive) depending on variables such as existing knowledge of the area and type and scope of land use planning or undertaking (USFS 2012). According to Forest Service guidelines (USFS 2012), a field inventory typically includes the following:

- Characterize the range of cultural resources in a geographic area.
- Locate and document cultural resources.
- Develop recommendations for further identification or survey needs.
- Address specific management issues or needs.
- Aid in developing and testing inventory plans and predictive models.
- Answer pertinent research questions.

Of the 117 recorded cultural resources in the analysis area, 99 are prehistoric, 16 are historic, 1 is multi-component containing both prehistoric and historic components, and 6 are or are potentially Traditional Cultural Properties (TCPs). According to the National Register Bulletin, Guidelines for Evaluating And Documenting Traditional Cultural Properties (Parker and King 1998), a TCP is “eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community.” It should be noted that Ute Tribal concerns expressed to Forest Service Heritage Resource Specialists often go beyond culturally modified locations or cultural material occurrences on these landscapes. Tribal concerns are often more broadly applicable to the wider spectrum of environmental resources encompassed in EISs and not simply to those concerns typically included in the cultural and historical resource sections of an EIS. The Forest Service has identified a subset of the prehistoric sites that are resource types to which the Confederated Utes Tribes often ascribe cultural and/or religious significance (but may not have been identified through consultation as TCPs). The Forest Service will conduct further consultation with the Confederated Ute Tribes to officially determine the status of these sites. A total of 18 cultural resources are recommended as eligible for listing on the NRHP, 90 have been recommended as not eligible, 8 are unevaluated, and 1 is listed on the NRHP. The overall density of cultural resources to area surveyed is approximately 0.01 site per acre, which is relatively low, with a high proportion of prehistoric sites (85 percent). **Table 3.9-2** presents a summary of the previously recorded resources for the entire analysis area.

As most intensive cultural inventories are project-driven, only a small portion of the analysis area has been systematically inventoried for cultural resources so unknown resources may be identified in previously unsurveyed areas prior to or during construction and operations. Not all archaeological sites are easily identified on the surface because some may be obscured by vegetation and others may be buried by sedimentation or geological processes.

Table 3.9-2 Summary of Previously Recorded Cultural Resources within Analysis Area

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	99	--	17	75	7	85
Historic Sites	16	1	--	15	--	14
Multi-component Sites (contains both historic and prehistoric)	1	--	--	--	1	0.5
Total Resources	**116**	**1**	**17**	**90**	**8**	**100**

3.9.4.1 Zone 1

Approximately 6 percent of the Zone 1 leases have been previously inventoried for cultural resources. There are 11 previously recorded resources within Zone 1, including 2 prehistoric archaeological sites that have been determined eligible for listing on the NRHP. There are three TCPs within Zone 1. There are nine resources that have been determined not eligible for listing on the NRHP. The overall density of cultural resources to area surveyed within Zone 1 is approximately 0.02 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (82 percent). **Table 3.9-3** presents a summary of the previously recorded resources for Zone 1.

Table 3.9-3 Previously Recorded Cultural Resources within Zone 1

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	9	--	2	7	--	82
Historic Sites	2	--	--	2	--	18
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
Total Resources	**11**	**--**	**2**	**9**	**--**	**100**

3.9.4.2 Zone 2

Approximately 11 percent of the Zone 2 leases have been previously inventoried for cultural resources. There are 12 previously recorded resources within Zone 2, including 1 historic site that is listed on the NRHP. There are 10 resources that have been determined not eligible for listing on the NRHP, and 1 that remains unevaluated. The overall density of cultural resources to area surveyed within Zone 2 is approximately 0.004 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (67 percent). **Table 3.9-4** presents a summary of the previously recorded resources for Zone 2.

Table 3.9-4 Previously Recorded Cultural Resources within Zone 2

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	8	--	--	7	1	67
Historic Sites	4	1	--	3	--	33
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
Total Resources	**12**	**1**	**--**	**10**	**1**	**100**

3.9.4.3 Zone 3

Over 18 percent of the Zone 3 leases have been previously inventoried for cultural resources. There are 92 previously recorded resources within Zone 3, including 15 prehistoric archaeological sites that are eligible for listing on the NRHP. There are three TCPs within Zone 3. There are 69 cultural resources that have been determined not eligible for listing on the NRHP and 7 that remain unevaluated. The overall density of cultural resources to area surveyed within Zone 3 is approximately 0.01 site per acre. This is a relatively low site density with a high proportion of prehistoric sites (88 percent). **Table 3.9-5** presents a summary of the previously recorded cultural resources for Zone 3.

Table 3.9-5 Previously Recorded Cultural Resources within Zone 3

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	81	--	15	60	6	88
Historic Sites	9	--	--	9	--	10
Multi-component Sites (contains both historic and prehistoric)	1	--	--	--	1	<1
Total Resources	**91**	**--**	**15**	**69**	**7**	**100**

3.9.4.4 Zone 4

Over 17 percent of the Zone 4 leases have been previously inventoried for cultural resources. There are two previously recorded resources within Zone 4 and both have been determined not eligible for listing on the NRHP. The overall density of cultural resources to area surveyed within Zone 4 is approximately 0.005 site per acre, a very low site density. **Table 3.9-6** presents a summary of the previously recorded cultural resources for Zone 4.

Table 3.9-6 Previously Recorded Cultural Resources within Zone 4

Site Types	Site Eligibility					Percent of Total Sites
	Number of Sites	Listed	Eligible	Not Eligible	Unevaluated	
Prehistoric Sites	1	--	--	1	--	50
Historic Sites	1	--	--	1	--	50
Multi-component Sites (contains both historic and prehistoric)	--	--	--	--	--	--
Total Resources	**2**	**--**	**--**	**2**	**--**	**100**

3.10 Transportation

A variety of federal, state, and local agencies administer and regulate roadways. The American Association of State Highway and Transportation Officials and the Federal Highway Administration are responsible for interstate and U.S. highways. The Colorado Department of Transportation (CDOT) is responsible for state highways and routes. County and local roads are controlled by the presiding jurisdiction (cities, counties).

The WRNF LRMP 2002 Revision, as amended (Forest Plan) provides the overall direction for managing transportation on the WRNF, including meeting national strategic goals and objectives. National strategic goals and objectives for transportation systems are guided by the CFR and the Forest Service Handbooks and Manuals. The WRNF Roads Analysis Forest Scale Report (WRNF 2003), the WRNF 2011 Travel Management Plan (WRNF 2011), and the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) provide further description and guidance for use of the existing and future transportation system on Forest Service lands.

3.10.1 Analysis Area

The analysis area for direct, indirect, and cumulative impacts consists of the affected oil and gas leases and any off-lease area that might be used to access development areas within the leases, plus the regional road network spanning multiple counties.

3.10.2 Regional Affected Environment

The region is transected by or adjacent to two federal highways, three state highways, and numerous county, BLM, and Forest Service roads. I-70 bisects the region east-west and is a four-lane federal highway. U.S. Highway 6 (US-6) generally parallels I-70 on varying sides of the interstate from Canyon Creek exit west to De Beque. Colorado State Highway 13 (SH-13) runs north from the City of Rifle to Baggs, Wyoming. Colorado SH-133 begins in Carbondale and traverses south over McClure Pass to Delta, Colorado. Colorado SH-82 runs north through Carbondale before terminating at Glenwood Springs. These roads are displayed on **Figures 3.10-1** and **Figure 3.10-2**. Also detailed on the figure are the anticipated haul roads used to access the lease zones.

There are many NFS roads within the analysis area that are designed to handle different modes of travel. Passenger car roads, characterized by USFS road maintenance Levels 3, 4, and 5, require a higher degree of user comfort therefore requiring higher levels of design and maintenance (Mobley 2014). Driving surfaces of these roads range from asphalt to aggregate to native surface with the majority being aggregate surfaced (Mobley 2014). Most NFS access roads used by gas operators are maintained at maintenance Level 3 or higher, and are aggregate surfaced.

3.10.3 Analysis Area Affected Environment

The analysis area for transportation consists of the affected oil and gas leases, plus the regional road network which spans multiple counties. The primary transportation impact would involve Garfield, Mesa, Pitkin, and Rio Blanco county roads (CRs).

3.10.3.1 Transportation

There are many types of roads that transect the transportation analysis area. I-70 is a four-lane federal highway, maintained by the Federal Highway Administration and CDOT. As shown in **Table 3.10-1**, 2013 average annual daily traffic levels ranged from 14,000 to 26,000 vehicles a day, with the higher amounts occurring near Glenwood Springs. Typically, 13 percent of this traffic was truck traffic (CDOT 2014). US-6 generally parallels I-70 on varying sides of the interstate from Canyon Creek exit west to De Beque Canyon where it is an undivided two-lane road. Nearly 7 percent of the traffic occurring on US-6 at

Milepost (MP) 93 near Rifle in 2013 was truck traffic (CDOT 2014). Colorado SH-82 is a four-lane divided road maintained by CDOT. Traffic levels increase on the highway near Glenwood Springs. Approximately 4 percent of the 2013 vehicle traffic was truck traffic (CDOT 2014). Colorado SH-82 is the second most utilized road in the analysis area. Colorado SH-133 is a two-lane undivided road maintained by CDOT. Traffic levels increase on the highway near Carbondale. A small percentage of vehicle traffic (3 percent) is truck traffic (CDOT 2014). Colorado SH-330 is a two-lane undivided road, which experiences higher traffic levels west towards Collbran. Colorado SH-13 is a two-lane undivided road maintained by CDOT. At 18 percent, Colorado SH-13 contained the highest level of truck traffic, as a percentage, within the analysis area (CDOT 2014). As detailed in **Table 3.10-1,** it is estimated that I-70 and US-6 will experience the largest regional increases in traffic by 2025. Colorado SH-82 and SH-133 will experience the least increases.

Table 3.10-1 Current and Projected Traffic Volume Near the Analysis Area

Route	2013 All Vehicles AADT [1]	2025 All Vehicles AADT (projected)	2013-2025 % Change (All Vehicles)
I-70 (MP 109, West of Glenwood Springs)	26,000	34,112	31.2
I-70 (MP 97, West Silt)	18,000	23,832	32.4
I-70 (MP 76, East of Parachute)	17,000	25,058	47.4
I-70 (MP 62, De Beque)	14,000	18,704	33.6
US-6 (MP 93, Rifle)	5,000	6,770	35.4
SH-82 (MP 2, South of Glenwood Springs)	22,000	26,884	22.2
SH-82 (MP 11, North of Carbondale)	18,000	20,700	15.0
SH-133 (MP 68, Carbondale)	11,000	12,914	17.4
SH-133 (MP 52, North of Redstone)	1,600	1,744	9.0
SH-330 (MP 5, West of Collbran)	2,700[2]	3,443	27.5
SH-13 (MP 44, Meeker)	1,700	2,230	31.2

[1] AADT = average annual daily traffic.

[2] Year 2014.

Source: CDOT 2014.

Numerous roads have been identified as potential haul roads within the analysis area to access the leases. A number of the potential haul roads to serve oil and gas operations are already being used to access existing oil and gas operations. These roads are displayed on **Figures 3.10-1** and **3.10-2**. Areas of heightened interest are detailed below. Further information on analysis area roads by zone are detailed in **Tables 3.10-2** through **3.10-5**.

- Coal Creek Road (USFS Road-307), on the eastern edge of the analysis area, is not currently used as a haul road to access oil and gas activities. Coal Creek road terminates at Colorado SH-133, and is a chip-sealed, asphalt paved on gravel bedding two-lane roadway, generally 20 feet wide. Typical traffic levels over the past 15 years have averaged 62 vehicles per day (SGM 2012).

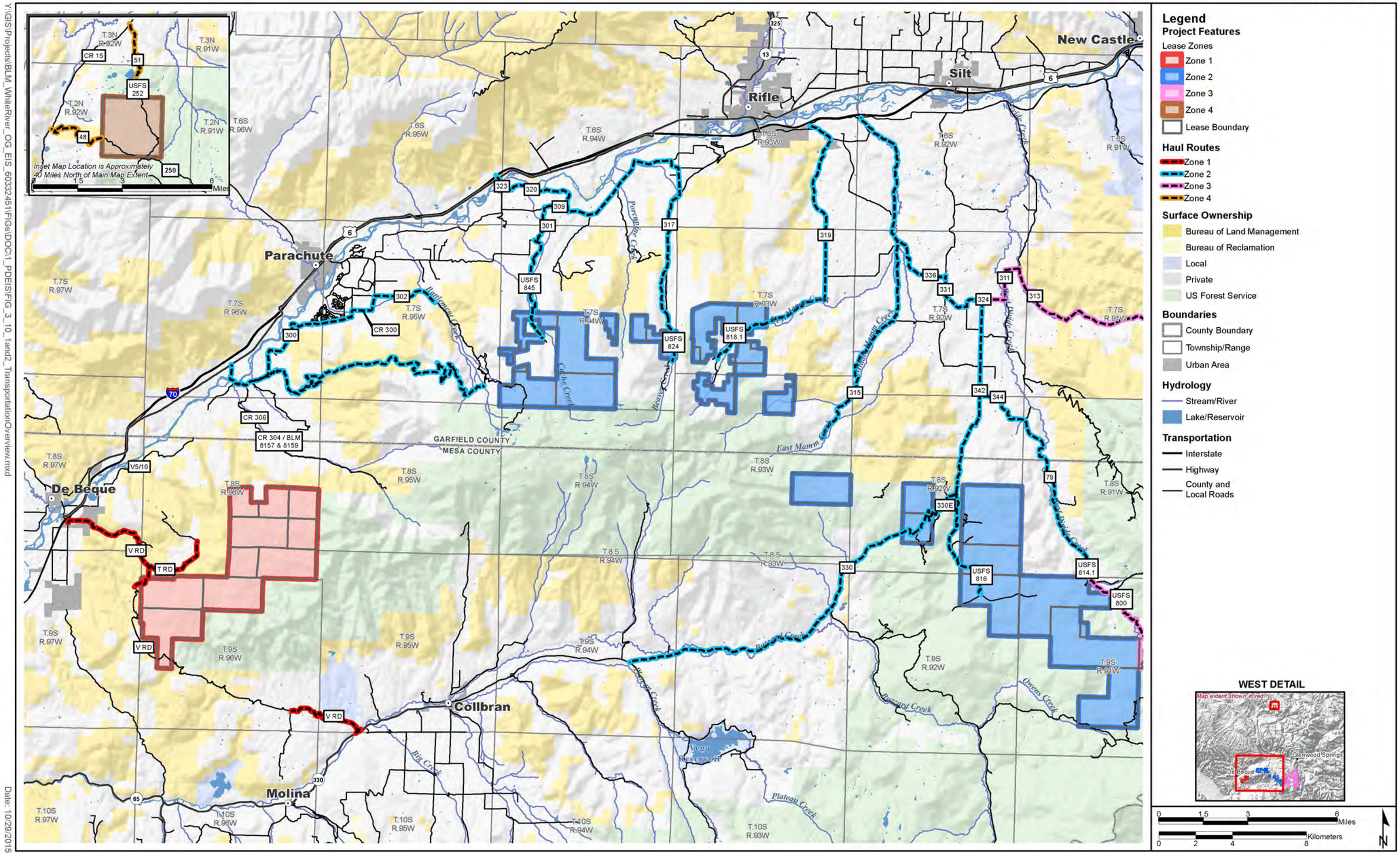

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Figure 3.10-1 Transportation Routes in the Analysis Area (West)

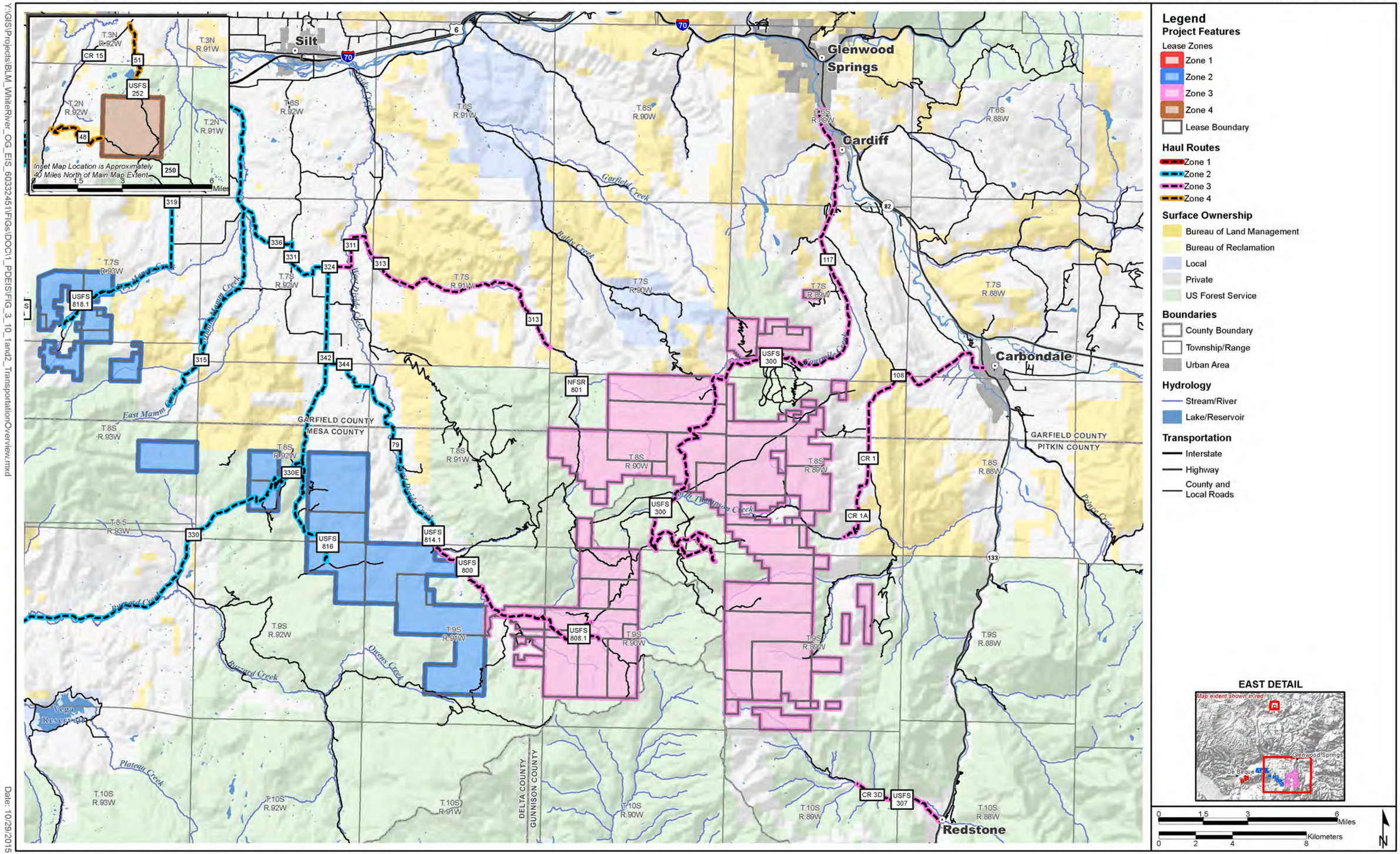

Figure 3.10-2 Transportation Routes in the Analysis Area (East)

- Thompson Creek Road (managed by Garfield County (CR-108) and Pitkin (CR-1), on the eastern edge of the analysis area, is not currently used as a haul road to access oil and gas activities. Thompson Creek Road terminates at Colorado SH-133, and is a chip-sealed, gravel and dirt two-lane roadway, generally 20 feet wide that currently serves as rural and recreational access. Typical traffic levels over the past 10 years have averaged 97 vehicles per day (SGM 2012).
- Four-Mile Road (Garfield CR-117) is located on the eastern edge of the analysis area and ends at Colorado SH-82 on the southern fringe of Glenwood Springs. Four-Mile Road is a chip-sealed two-lane county road that provides industrial, residential, rural, and recreational access to surrounding areas. Four-Mile Road also is used to access oil and gas operations on NFS lands. These operations include natural gas injection/withdrawal wells for the Wolf Creek natural gas storage field, natural gas storage field monitoring wells, and a natural gas pipeline control facility. Historically, oil and gas traffic comprises 25 percent of traffic on the WRNF portion of the road (Mobley 2015). Access to Sunlight Mountain Resort is via Four-Mile Road as well.
- Multiple roads located in the western portion of the analysis area are already used as haul roads to access existing oil and gas operations. Further information is located in **Tables 3.10-2** through **3.10-5** and portrayed in **Figures 3.10-1** and **3.10-2**.

Further details are available in the Transportation Specialist Report prepared for the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). The Transportation Specialist Report provides an enhanced overview of the nationwide and forest wide strategic goals and objectives, as well as an in-depth analysis of regional and NFS roads.

3.10.3.2 Zone 1

There are three potential haul routes within Zone 1. All of these roads are currently used as haul roads to access existing oil and gas operations. They are detailed below in **Table 3.10-2** and portrayed in **Figure 3-10-1**.

Table 3.10-2 Potential Haul Routes in Zone 1 [1]

Potential Haul Routes	Current Route Utilization [2]	Length (miles)
Mesa County Road (CR)-V	Heavily utilized south from De Beque to the junction with CR T. Use is very light or nonexistent south of this junction until several miles north of Hwy 330 where oil and gas traffic increases.	4.9
Mesa CR-T	Heavily utilized.	2.4
Garfield CR-306	Heavily utilized.	2.8

[1] Roads are detailed from west to east.

[2] Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e.

3.10.3.3 Zone 2

There are 18 potential haul routes within Zone 2, the most of any leasing zone. Many of these roads are currently used as haul roads to access existing oil and gas operations. They are detailed below in **Table 3.10-3** and portrayed in **Figures 3-10-1** and **3.10-2**.

Table 3.10-3 Potential Haul Routes in Zone 2 [1]

Potential Haul Routes	Current Route Utilization [2]	Length (miles)
Garfield CR- 300	Heavily utilized.	7.1
Garfield CR-302	Heavily utilized to Battlement Creek.	3.0
Garfield CR-304/BLM 8157 and 8159	Heavily utilized to the USFS boundary.	8.3
Garfield CR-320	Heavily utilized.	2.8
Garfield CR- 301 and CR-309/USFS-845	Heavily utilized. Use on CR 309 becomes very light to nonexistent at the USFS boundary.	1.4/4.1
Garfield CR-317	Heavily utilized	10.5
USFS-824	Heavily utilized.	1.9
USFS-818	Heavily utilized.	2.3
Garfield CR-319	Heavily utilized.	8.9
Garfield CR-315	Heavily utilized.	12.9
Garfield CR-331	Heavily utilized.	0.7
Garfield CR-342	Heavily utilized.	6.5
Mesa CR-330E	Heavily utilized.	3.6
USFS-816	Heavily utilized.	4.6
Mesa CR-330	Heavily utilized.	12.3
Garfield CR-344	Heavily utilized.	3.1
Mesa CR-79	Heavily utilized to SGI compressor station. Use is then light.	4.5
USFS-814.1	Non-existent. Restricted bridge.	0.5

[1] Roads are detailed from west to east.

[2] Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e; Mobley 2015.

3.10.3.4 Zone 3

There are six potential haul routes within Zone 3. They are detailed below in **Table 3.10-4** and portrayed in **Figure 3-10-2**. The majority of potential haul routes are currently used for residential and recreational access. Four-Mile Road is currently the only road used to access oil and gas operations.

3.10.3.5 Zone 4

There are three potential haul routes within Zone 4. They are detailed below in **Table 3.10-5** and portrayed in **Figure 3.10-1**. None of these routes are currently use to access existing oil and gas operations. The northern half of CR-51 is used to facilitate agricultural operations.

Table 3.10-4 Potential Haul Routes in Zone 3 [1]

Potential Haul Routes	Current Route Utilization [2]	Length (miles)
USFS-800	Lightly utilized.	8.7
Garfield CR-313[3]	Lightly utilized. After the Spruce Crossing Gulch drainage, utilization is very light to nonexistent.	9.2
USFS-808.1	Lightly utilized.	0.8
Garfield CR-117 (Four-Mile Road)/USFS-300 (USFS-300.4K, USFS-300.4M and USFS-321[8])	Heavily utilized in summer. – 14.1 Miles shown on figure and in use as access to well pads, 3.2 miles more to closure gate – non- existent use beyond gate with potential to access leased lands being analyzed in this document.	10.3/14.1 plus 6.8 miles for USFS spur routes
Garfield CR-108/Pitkin CR-1 and 1A (Jerome Park/Thompson Creek/ N Thompson Creek Road)	Lightly utilized.	10.4
Pitkin County CR-3D/USFS-307 (Coal Creek/Coal Basin Road)/	Lightly utilized.	3.4

[1] Roads are detailed from west to east.

[2] Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily.

[3] This route as shown on **Figure 3.10-2** would be considered an alternative haul route. The route on USFS lands is currently unsuitable for use by heavy truck traffic and is not considered a viable access route by the Forest Service.

Source: BLM 2015e; Mobley 2015.

Table 3.10-5 Potential Haul Routes in Zone 4[1]

Potential Haul Routes	Current Route Utilization [2]	Length (miles)
Rio Blanco CR-15/Moffat County CR 45	Lightly utilized.	17.8/8.8
Rio Blanco CR-48	Nonexistent.	2.7
Rio Blanco CR-51/USFS-252	Lightly utilized.	1.8/3.6

[1] Roads are detailed from west to east.

[2] Heavily utilized is characterized by daily heavy truck traffic. Light utilization is anything less than daily heavy truck traffic. Non-existent is no commercial use.

Source: BLM 2015e; Mobley 2015.

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3.11 Lands and Special Uses

3.11.1 Regulatory Background

Land use within the WRNF is guided by the WRNF LRMP 2002 Revision. Additional applicable authority and regulations related to rights-of way (ROWs) include the Mineral Leasing Act of 1920 (MLA 1920), as amended, Title V of the FLPMA of October 21, 1976, and 43 CFR 2800/2880 and 36 CFR 251.

3.11.2 Analysis Area

The analysis area encompasses the 4 lease zones (see **Figure 1-1**).

3.11.3 Regional Affected Environment

The goal of the BLM lands and realty program is to manage public lands to support resource program goals and objectives, provide for public land uses in accordance with applicable laws and regulations while protecting sensitive resources and improving public land management through land tenure adjustments. As such, the program responds to requests for ROWs, permits, leases, withdrawals, and land tenure adjustments from outside entities.

Forest Service standards regarding realty include but are not limited to retaining existing access rights where needed to meet Forest Plan goals and objectives and pursue access rights where needed to meet forest plan goals and objectives. Additionally, land adjustment activities would need to evaluate and balance the overall combination of all resource values and factors including wildlife habitat, fisheries habitat, riparian areas, wetlands, cultural resources, recreation opportunities, scenic value, watershed protection, timber resources, rangelands, public access, better federal land management, and other factors (USFS 2002a). Further information on standards and guidelines are detailed in the WRNF LRMP, 2002 Revision (USFS 2002a).

<u>Mineral Reservations and Outstanding Mineral Rights</u>

Surface land management within the leases is under the authority of the Forest Service. All mineral estate within the leases is owned by the federal government, which is administered by the BLM. There is no private surface landownership or mineral ownership within the leases.

<u>Rights-of-Way</u>

ROW corridors are typically used for major oil and gas pipelines; water transmission systems; slurry pipelines, aerial and underground utility facilities for transmission of electricity, major communication facilities, railroads, and major highway and road routes. These areas are managed for construction, operation, and maintenance of facilities associated with public utilities and transportation systems. ROW corridors are typically linear management areas that transect other management areas. Physical disturbance to existing conditions frequently are high within the ROW corridor and low outside the corridor (USFS 2002b).

The MLA (MLA 1920), as amended, (Sec. 28[a]) authorizes a federal agency to grant ROWs for pipeline purposes for the transportation of oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced. Pipeline projects that traverse several federal land management jurisdictional boundaries fall under the provisions listed in Sec. 28(c)(2) of the MLA, which authorizes the Secretary of the Interior (delegated to the BLM) to grant or renew ROWs or permits. The MLA also directs agencies to require the applicant to submit a plan of construction, operation, and rehabilitation for ROWs.

The Forest Service does not grant ROWs, but does grant special use permits. Granting ROWs is under the jurisdiction of the BLM. Further information regarding ROWs, specifically regarding stipulations, design requirements, and special use permits, including those for water pipeline ROWs, is detailed in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a, pages 375 – 376). There is currently no consistent dataset for the entire analysis area that provides the locations and types of ROWs or easements. However, these types of land use authorizations are common on public lands and may occur within the analysis area.

Valid Existing Rights

The BLM understands that individuals and entities may have established valid rights to occupy and use NFS lands under laws and authorities established by Congress. Such valid outstanding rights may exist and will be honored when it is subsequently determined that the claim to such rights meet the criteria set forth in a respective statute granting such occupancy and use (USFS 2002b). Further information regarding honoring valid existing rights and applicable legal precedent is detailed in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a, page 376).

Communication Sites

Communication sites are a special use authorization. Special use authorizations apply to all occupancy, use, or improvements on USFS lands that are not directly related to timber harvest, grazing of livestock, mining activities, or recreation. Specific laws and CFR requirements govern decisions regarding these authorizations. The FLPMA provides authority for majority of non-recreation special use authorizations on USFS lands. There is one communication site, the Sunlight Base and Repeater, in Zone 3 (**Figure 3.11-1**).

County Land Use Plans and Zoning

The entirety of Zone 1 and a portion of Zone 2 lies within the Mesa County Agricultural, Forestry, Transitional District, which is a Rural Zoning District. The AF-35, Agricultural and Forestry District is primarily intended to provide for the protection and continuation of agriculture and forestry operations, and the preservation of environmentally sensitive lands. Site-specific conditions may limit development in areas considered environmentally sensitive.

Mesa County has produced a Mineral and Energy Resources Master Plan (Mesa County 2011). Goals of the plan include balancing new and traditional technologies related to exploration, development, conservation, and the use of resources in a way that will strengthen economic growth and mitigate environmental impacts (Mesa County 2011). The plan also identifies recommended and mandatory mitigation for sensitive resources, such as visual, transportation, surface water, groundwater, odor, noise, wildfire, air, and biological resources. The Mesa County Energy Atlas, cited within the county's Mineral and Energy Resources Master Plan, shows potential regulatory constraints from roadless areas and natural moderate constraints from natural hazards/geology (Mesa County 2009).

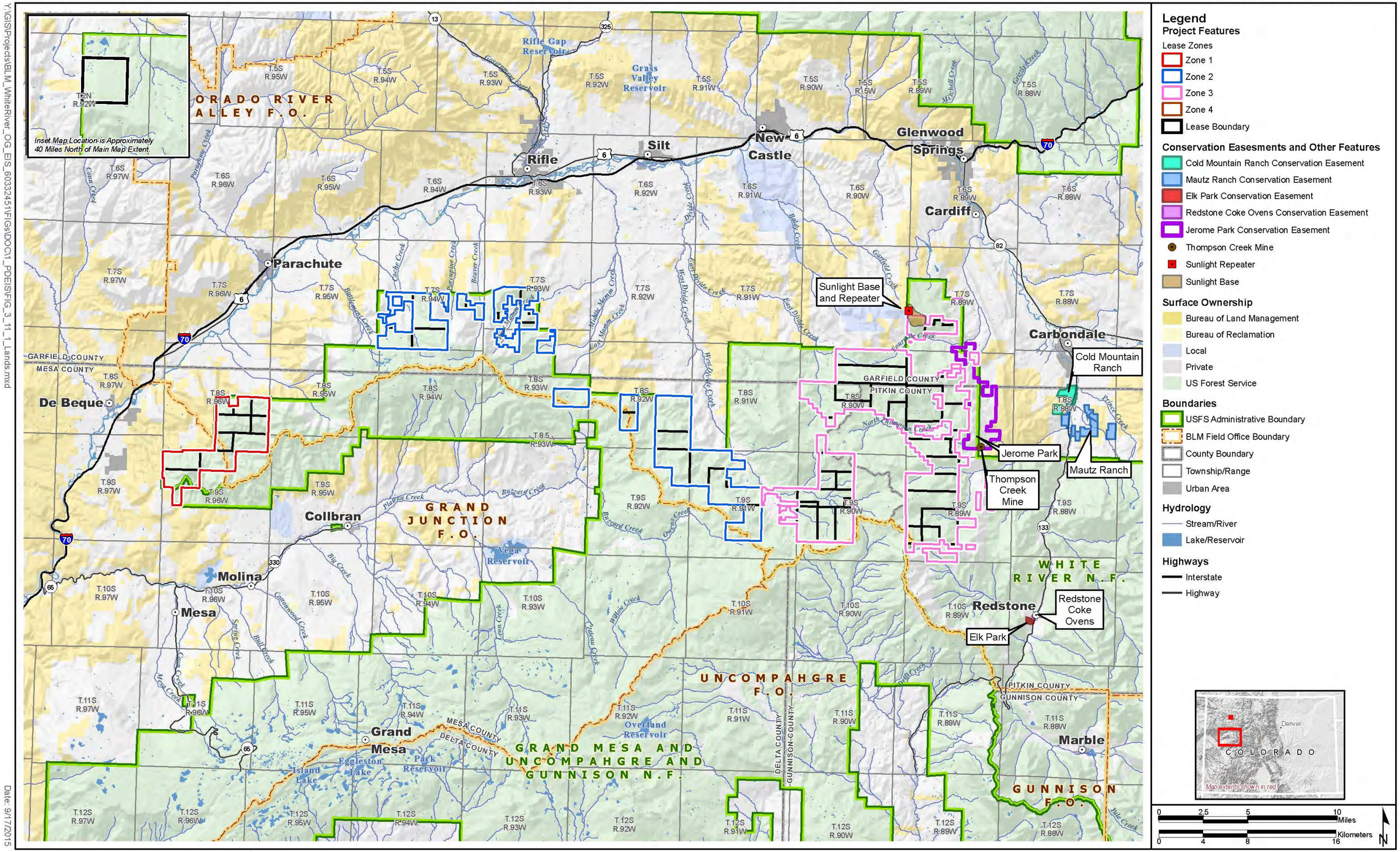

Figure 3.11.1 Special Uses in the Analysis Area

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Garfield County encompasses portions of Zones 2 and 3, which are zoned as “public.” “Public” zoning is comprised of all land owned by the U.S. Government or the State of Colorado, located in the unincorporated area of the County and not included in any other zone district. Zone District dimensions, such as lot size, setbacks, and height do not apply to public lands within the county; additionally, oil and gas drilling within areas zoned ‘public’ would be exempt from county review and standards (Garfield County 2015b). Additional adjacent lands are zoned Commercial/Limited. These lands are associated with Sunlight Mountain Resort. None of the leases transect lands zoned Commercial/Limited; however, Four-Mile Road, which is a potential haul route, runs adjacent to this designation. Two Planned Unit Developments (PUDs), Oak Meadows and Springridge Reserve, also are adjacent to Four-Mile Road. The Oak Meadows PUD has been in existence since 1977, while the preliminary plan for the Springridge Reserve PUD was approved in 2005. The Garfield County Comprehensive Plan 2030 details county mineral extraction goals, which include ensuring that mineral extraction is regulated appropriately, ensuring that mineral extraction activities mitigate their effects on the natural environment, and working with mineral extraction projects to protect the public health, safety and welfare of its citizens (Garfield County 2013a).

The majority of Zone 3 is in Pitkin County and is within zoning district Resource 30. The general intent of this zoning district is to permit low density, single family residential development, discourage sprawl, preservation of open space, preserve agricultural operations and environmental resources; and preserve the rural visual quality and character while permitting carefully sited low-density development (Pitkin County 2006). The Pitkin County Code does not detail oil and gas development limitations specific to the Thompson Divide. Within Pitkin County, the Board of County Commissioners has authority to approve, conditionally approve, or deny an application for an oil or gas facility and operation in the county; however, in cases where the county does not have the legal right to establish and enforce standards, primarily where those standards are duplicative of state or federal regulations, the Board does not enforce state or federal regulations, or county regulations which duplicate those of the federal or state government (Pitkin County 2006).

All of Zone 4 is within Rio Blanco County and zoned Agricultural. As stated in the Rio Blanco County Master Plan (Rio Blanco 2011), land use policies should keep rural open spaces intact and minimize adverse agricultural impacts. The same plan also states as a goal that the county should make certain that large-scale oil shale and/or mineral development expands operations and ultimately phases down in a manner that protects the quality of life and environmental conditions of Rio Blanco County (Rio Blanco 2011).

Other Uses

Other uses in the analysis area, including the Jerome Park Conservation Easement, Cold Mountain Ranch, Mautz Ranch, Elk Park, Redstone Coke Ovens, and Thompson Creek Mine are portrayed on **Figure 3.11-1**. These easements were designated to protect a range of resources, including recreation, agriculture, and cultural preservation. These special use areas are outside of the lease zones, but may be affected by potential haul routes and state highways, (Coal Creek Road, Thompson Creek Road, and State Route-133) or leasing development activity in adjacent lease zones.

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3.12 Special Designations

3.12.1 Regulatory Background

The following regulations guide the management of special designations within the analysis area:

- Wild and Scenic Rivers Act of 1968;
- 2012 State of Colorado Roadless Rule and the 2001 Roadless Area Conservation Rule (36 Colorado Public Rule § 294.13(b)(2));
- The National Scenic Byways Program (established under the Intermodal Surface Transportation Efficiency Act of 1991 and reauthorized in 1998 under the Transportation Equity Act for the 21st Century);
- FSM 4063; and
- USFS 2002a.

3.12.2 Analysis Area

The analysis area for special designations consists of the any special designation area intersecting the oil and gas leases or which are close enough to the leases that there is potential for them to be impacted by reasonably foreseeable development of the leases.

3.12.3 Analysis Area Affected Environment

The analysis area contains a number of special and unique resources. Planning procedures and regulations allow for these resources to be recognized and protected. Some special designations emphasize recreation use and interpretation of the environment, while others minimize uses in order to protect special values. The size of individual areas varies depending on the site-specific resource values and management emphasis (USFS 2002b).

Special designations within the region are discussed below and are identified on **Figure 3.12-1**.

3.12.3.1 Research Natural Areas

Research Natural Areas (RNAs) are located within the analysis area. RNAs serve three important functions: reference areas, biological diversity, and research (USFS 2002b). These functions are detailed below:

- Reference areas – RNAs serve as benchmarks for monitoring and evaluating the sustainability and impacts of land management practices on lands with similar ecosystems.
- Biological diversity – RNAs provide protection for biological diversity.
- Research – RNAs provide sites for research into how ecosystems function, particularly in areas in which ecological and evolutionary processes are functioning in a relatively natural state.

Forest Service Manual FSM 4063 provides specific direction regarding RNA management. Domestic livestock grazing, motorized vehicle use, new road and trail construction, timber management, ski areas, ground-disturbing mineral development, and other intensive management activities generally are restricted or prohibited (USFS 2002b). More detailed information regarding RNAs can be found in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a). There is one RNA within the analysis area, the Lower Battlement Mesa RNA (see **Figure 3.12-1**). The RNA contains a lower elevation system unique within the WRNF and GMUGNF, and contains significant populations of several rare plant species as well as bighorn sheep and other wildlife species.

3.12.3.2 Special Interest Areas

Also found near the analysis area are Special Interest Areas (SIAs), designated to recognize a broader range of values than research natural areas, including botanical, geological, historical, paleontological, scenic, or zoological resources. RNAs are considered SIAs although they typically require a higher degree of pristine character to qualify for designation because they serve as ecological baseline references (USFS 2002b). Management implementation guidelines are developed for each SIA to ensure protection of the values for which they were designated (USFS 2002a). The nearest SIA to the leasing areas is Coal Basin SIA, located less than 1,000 feet from the southern portion of Zone 3. More detailed information regarding SIAs can be found in the WRNF Oil and Gas Leasing Final EIS (USFS 2014a).

3.12.3.3 Roadless Areas

There are approximately 47,250 acres of Colorado Roadless Areas (CRAs) as defined by the 2012 Roadless Rule within the analysis area (see **Figure 3.12-1**). These areas were evaluated for potential wilderness recommendation, based on capability, availability, and need. No acreage within the lease zones have been designated as wilderness, and roadless areas not recommended for wilderness are generally available for oil and gas leasing depending on the applicable management area guidelines (USFS 2014a). Colorado issued the Colorado Roadless Rule (CRR), which was published in 2012 (FR Vol. 77, No. 128). This rule amends the 2002 Forest Plan, provides the current inventory and direction for roadless areas in the State of Colorado, and provides the final designations for CRAs for each forest. The CRR influences oil and gas exploration and development but does not affect the terms or validity of leases existing prior to the promulgation date of the final rule. This rule preserves surface development rights and limitations on surface development rights existing at the time of adoption of this rule on all oil and gas leases. The CRR applicability is still legally unresolved. Compliance is the responsibility of the Forest Service.

The Roadless Specialist Report (Haskins 2014) prepared in support of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) provides further history, regulatory detail, and management guidelines for the CRR as it pertains to oil and gas exploration.

3.12.3.4 Scenic Byways

Scenic byways promote scenic and historic cultural values along their routes. In 1988, the Forest Service established a National Forest Scenic Byways program to better serve the needs of people visiting the national forests for the purpose of enjoying scenic drives (USFS 2002b). There are two scenic byways adjacent the analysis area, the West Elk Loop Byway and the Flat Tops Byway. The West Elk Loop Byway incorporates a portion of SH-133 between Coal Creek Road and the Town of Carbondale. Total length of the byway is 205 miles. The Flat Tops Byway initiates at SH-13 in the Town of Meeker and extends east for 82 miles via CR-8. The two scenic byways are shown on **Figure 3.12-1**.

3.12.3.5 Wilderness and Wild and Scenic Rivers

All federal lands within designated wilderness areas, lands recommended for wilderness, and waters eligible under the Wild and Scenic Rivers act were made administratively unavailable for oil and gas leasing in the 2002 Forest Plan (USFS 2002a). There are no designated wilderness areas, lands recommended for wilderness, or designated wild and scenic river areas within the leases**.**

3.12.4 Special Designations within the Leases

The four lease zones encompass portions of two special designations: RNAs and CRAs as defined by the 2012 Roadless Rule. There are no SIAs within the leasing zones, although an SIA is adjacent to Lease Zone 3.

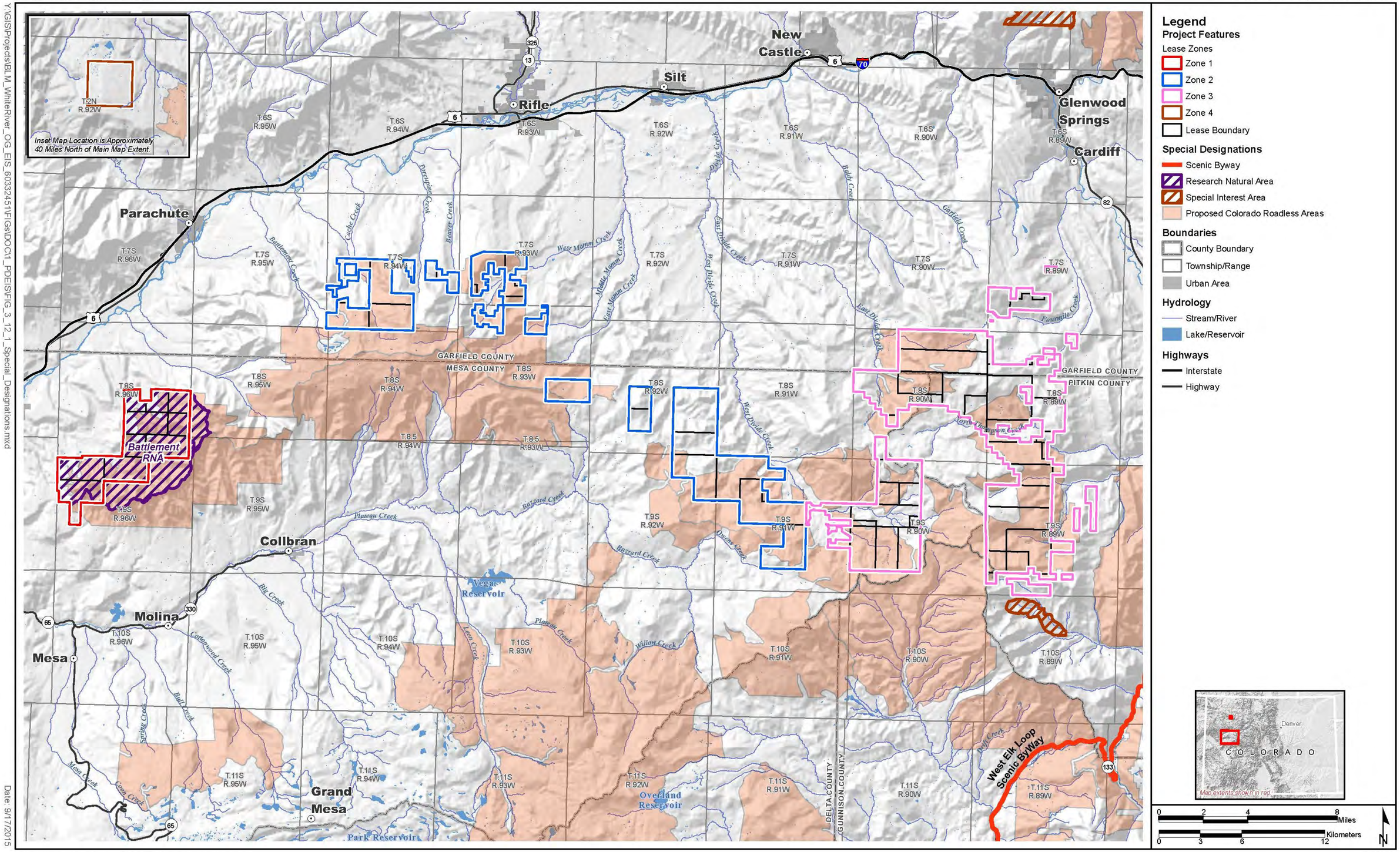

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Figure 3.12-1 Special Designations

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Table 3.12-1 shows the acreage of each of these areas within the leasing zones, as well as the total percentage that they comprise within the zones. They also are portrayed in **Figure 3.12-1**.

Table 3.12-1 Special Designations Within the Lease Areas

Resource Issue	Lease Area (acres)	Percent of Lease Area
Research Natural Areas	9,572	12
Special Interest Areas	0	0
Colorado Roadless Areas	33,130	41

3.12.4.1 Zone 1

There are approximately 9,572 acres of one RNA (the Lower Battlement Mesa RNA) within Zone 1 as shown in **Table 3.12-2**. The Lower Battlement Mesa RNA provides a representation of low-elevation ecosystem types. Large populations of several rare plant species and the lack of roads add to enhance the ecological value of the RNA (USFS 2014a). This RNA intersects 10 leases.

Approximately 97 percent of Zone 1 is comprised of CRAs, which intersect 10 leases.

Table 3.12-2 Land Uses and Designations in Zone 1

Land Uses and Designations	Acres	Percent of Zone
Lower Battlement Mesa Research Natural Area	9,572	95
Colorado Roadless Areas	7,285	72

3.12.4.2 Zone 2

There are no RNAs within Zone 2. Approximately 72 percent of Zone 2 is comprised of CRAs, which intersect 18 leases. CRA acreage is shown in **Table 3.12-3**.

Table 3.12-3 Land Uses and Designations in Zone 2

Land Uses and Designations	Acres	Percent of Zone
Research Natural Areas	0	0
Colorado Roadless Areas	15,934	64

3.12.4.3 Zone 3

There are no RNAs within Zone 3. Approximately 64 percent of Zone 2 is comprised of CRAs, which intersect 26 leases. CRA acreage is shown in **Table 3.12-4**.

Table 3.12-4 Land Uses and Designations in Zone 3

Land Uses and Designations	Acres	Percent of Zone
Research Natural Areas	0	0
Colorado Roadless Areas	24,031	56

3.12.4.4 Zone 4

There are no RNAs within Zone 4. Approximately 8 percent of Zone 4 is comprised of CRAs, which intersect 1 lease. CRA acreage is shown in **Table 3.12-5**.

Table 3.12-5 Land Uses and Designations in Zone 4

Land Uses and Designations	Acres	Percent of Zone
Research Natural Areas	0	0
Colorado Roadless Areas	0	0

3.13 Recreation

3.13.1 Regulatory Background

The 2002 USFS WRNF LRMP guides direct recreation activities on NFS lands within the analysis area. EO 13443 directs federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

3.13.2 Analysis Area

The analysis area encompasses those portions of the WRNF and a small portion of the GMUGNF within the 4 lease zones (see **Figure 1-1**).

3.13.3 Regional Affected Environment

The WRNF, established in 1891 and consisting of 2.3 million acres, is the most visited national forest in the nation, generating approximately 12 million visitors per year (USFS 2014a; Statewide Comprehensive Outdoor Recreation Plan [SCORP] 2014). The WRNF provides more than 2,500 miles of trails, 1,900 miles of NFS roads, 66 campgrounds, 12 ski areas, and eight wilderness areas (USFS 2013b). Recreational activities are primarily skiing, hiking, hunting, biking, horseback riding, all-terrain vehicle and motorcycle riding, four-wheel driving, fishing, camping, and driving for pleasure.

A large portion of the Upper Colorado River's water originates in the headwater regions of the WRNF. These headwaters also provide recreational pursuits, which include fishing, boating, and camping (USFS 2002b). Approximately 400,000 annual recreational fishing visits to the forest occur annually. The forest provides a wide variety of recreational fishing experiences from lakes that experience high visitor density to small secluded streams (USFS 2002b). Rafting opportunities also are found within the forest, through either permitted outfitters or on one's own. These water recreation activities are found along numerous streams and rivers within the analysis area, such as the Colorado and Frying Pan rivers. Additionally, numerous hiking trails cross throughout the analysis area, including trails to the summits of 10 peaks over the elevation of 14,000 feet.

There are eight counties within the WRNF. Of these eight counties, Garfield, Rio Blanco, Pitkin, and Mesa counties contain the previously issued leases. Towns within these counties, such as Parachute, Meeker, Craig, Rifle, Silt, New Castle, Glenwood Springs, Basalt, Aspen, Carbondale, and Redstone provide easy local access to recreational opportunities. These local recreational opportunities are some of the reasons that many residents live in these communities. A more detailed description of the local communities can be found in the Recreation Specialist Report prepared for the WRNF Oil and Gas Leasing Final EIS (Hopkins 2014). According to the 2014 SCORP, Colorado's population is expected to increase substantially in the coming decades, with state forecasters predicting the population exceeding 7.7 million by 2040. The majority of growth is expected to take place in the metropolitan Front Range counties, as well as Boulder, Jefferson, Summit, and Lake counties, and western slope counties, such as Eagle, Garfield, and Mesa counties. This population growth will ensure an increasing demand for recreational activities within the analysis area.

3.13.4 Analysis Area Affected Environment

The WRNF is broken into management areas that include specific direction on how to manage different land uses based on the LRMP (USFS 2002a). Each management area is defined by primary emphases and a set of elements that guides the activities taking place within it. The management areas with a recreational emphasis that transect the lease zones are depicted on **Figure 3.13-1** and described below and in **Table 3.13-1**.

Table 3.13-1 Management Areas with a Recreational Emphasis Within the Analysis Area

Zones	Management Area	Management Area Acreage	Percent of Zone
1	NA	0	0
2	3.31, Backcountry Recreation, Year-round Motorized	515	1
	3.32, Backcountry Recreation, Non-motorized with Winter Motorized	872	14
3	4.3, Dispersed Recreation	464	7
4	NA	0	0

Management Area 3.31, Backcountry Recreation, Year-round Motorized

These areas are managed to provide summer motorized recreation on roads and trails and winter motorized recreation throughout the area in a natural-appearing landscape.

Management Area 3.32, Backcountry Recreation, Non-motorized with Winter Motorized

These areas are managed to provide recreation opportunities in a natural-appearing landscape.

Management Area 4.3, Dispersed Recreation

These areas are managed to provide undeveloped recreation opportunities in natural or natural-appearing landscapes.

If a management area does not have a recreational emphasis, recreation still may take place essentially anywhere. Further description of each management area is located in the Recreation Specialist Report (Hopkins 2014) and the 2002 Final EIS for the LRMP (USFS 2002a). Sensitive areas which see elevated levels of recreational use, such as the Thompson Divide, Crystal River Valley, Sunlight Ski Area, and Thompson Creek Road area also portrayed on **Figure 3.13-1**.

For each management area, one or more recreation opportunity spectrum (ROS) objectives may apply. The ROS is a classification tool that groups NFS lands into six management class categories defined by setting and the recreational experiences and activities. These classes are urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized, and primitive. A limited description of each class category (USFS 1982) is listed below:

- Urban – Settings are dominated by human-made features and evidence of management. Sights and sounds of humans on-site are predominant. Large numbers of users can be expected. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.
- Rural – Settings are dominated by human-made features and evidence of management. Sights and sounds of humans are readily evident and interaction between users is often moderate to high. Facilities for intensified motorized use and parking are available.
- Roaded Natural – Settings are within 0.5 mile of better than primitive roads. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities.
- Semi-primitive Motorized – Settings are within 0.5 mile of primitive roads and the area is characterized by a predominantly natural or natural-appearing environment. Concentration of users is low, but there is often evidence of other users. Motorized use is permitted.

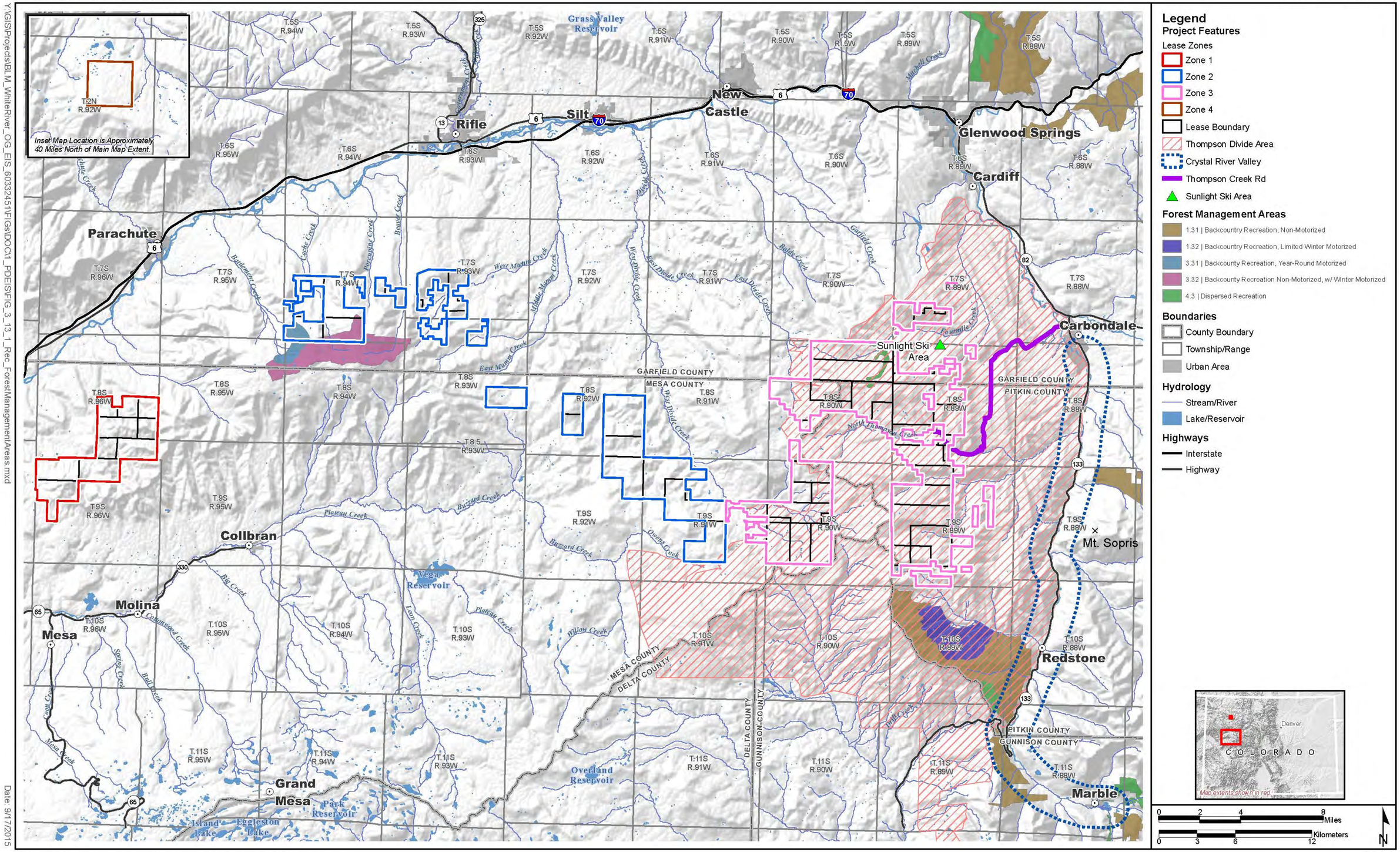

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Figure 3.13-1 Recreation and Management Areas

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- Semi-primitive Non-motorized – Settings are 0.5 to 3 miles from roads and the area is characterized by a predominantly natural or natural-appearing environment. Interaction between users is low, but there is often evidence of other users. Motorized use is not permitted.
- Primitive – Settings are at least 3 miles from roads and have no or extremely little evidence of management or human alternation. Interaction between users is very low and evidence of other users is minimal. Motorized use is not permitted.

Summer and winter ROS classifications are detailed in **Figure 3.13-2** and **3.13-3**. A more detailed explanation of ROS classifications is found in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).

The 2014 SCORP provides strategies for sustaining Colorado's outdoor recreation heritage. WRNF is within the SCORP Northwest Regional Analysis area. Skiing and snowboarding make up 10 million activity days. The nearest, Sunlight Mountain Resort, is adjacent to Zone 3. There are no ski resorts within the leasing zones. As detailed earlier, Colorado's population is expected to increase substantially in the coming decades. This population growth will ensure an increasing demand for recreational activities within the analysis area and the need for subsequent recreational planning (SCORP 2014).

Both summer and winter activities are popular within the analysis area. **Table 3.13-2** details the three most popular activity types, by percent of the Colorado population that participated, for summer and winter recreation within the SCORP Northwest Regional Analysis area (Region 1). As is detailed in the table, hiking and backpacking, as a percent of population involvement, were the most common types of summer activity, followed by walking, and tent camping. Skiing or snowboarding at a ski resort was by far the most popular winter activity, followed by snowshoeing or cross-country skiing, and backcountry skiing. There are several designated winter groomed trail systems under special use. The Spring Gulch Nordic Ski Area, with 13 miles of trails, is just adjacent to Zone 3. Downhill skiing or snowboarding does not take place within the lease zones.

Table 3.13-2 Common Recreation Activity Types Within the Analysis Area

Type of Activity	Most Common Activity/Percent of CO Population	2nd Most Common Activity/Percent of CO Population	3rd Most Common Activity/Percent of CO Population
Trail/Road Activities	Hiking/Backpacking 27.6 percent	Walking 22.8 percent	Mountain Biking 7.8 percent
Water-based Activities	Fishing 10.6 percent	Swimming 6.9 percent	Power Boating 4.2 percent
Wildlife Related Activities	Wildlife viewing 5.7 percent	Big Game hunting 5.3 percent	Upland bird and small game hunting 2.3 percent
Other Outdoor Activities	Tent Camping 15.6 percent	Picnicking 9.7 percent	Developed/RV camping 7.1 percent
Winter Activities	Skiing or snowboarding at a ski area 27.3 percent	Snowshoeing or cross-country skiing 10.1 percent	Backcountry skiing 5.8 percent

Source: SCORP 2014.

3.13.4.1 Developed Recreation

Developed recreation includes a variety of activities generally dependent on developed facilities such as campgrounds and trailheads. At developed recreation sites, facilities have been constructed to provide recreation experiences, protect resources, or otherwise manage activities. These infrastructure developments range from a complete campground with a water system, toilets, and showers, to a simple bulletin board or parking barriers at a parking lot. Trailhead and family campgrounds comprise the majority of publicly developed sites followed by boating and fishing sites. Privately developed sites are mostly comprised of recreation residences and huts. There are a total of two developed recreation areas within the leasing zones, the Beaver Creek and Cayton trailheads. These developed recreation areas are located within lease Zone 2. Further descriptions of developed recreation are located in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).

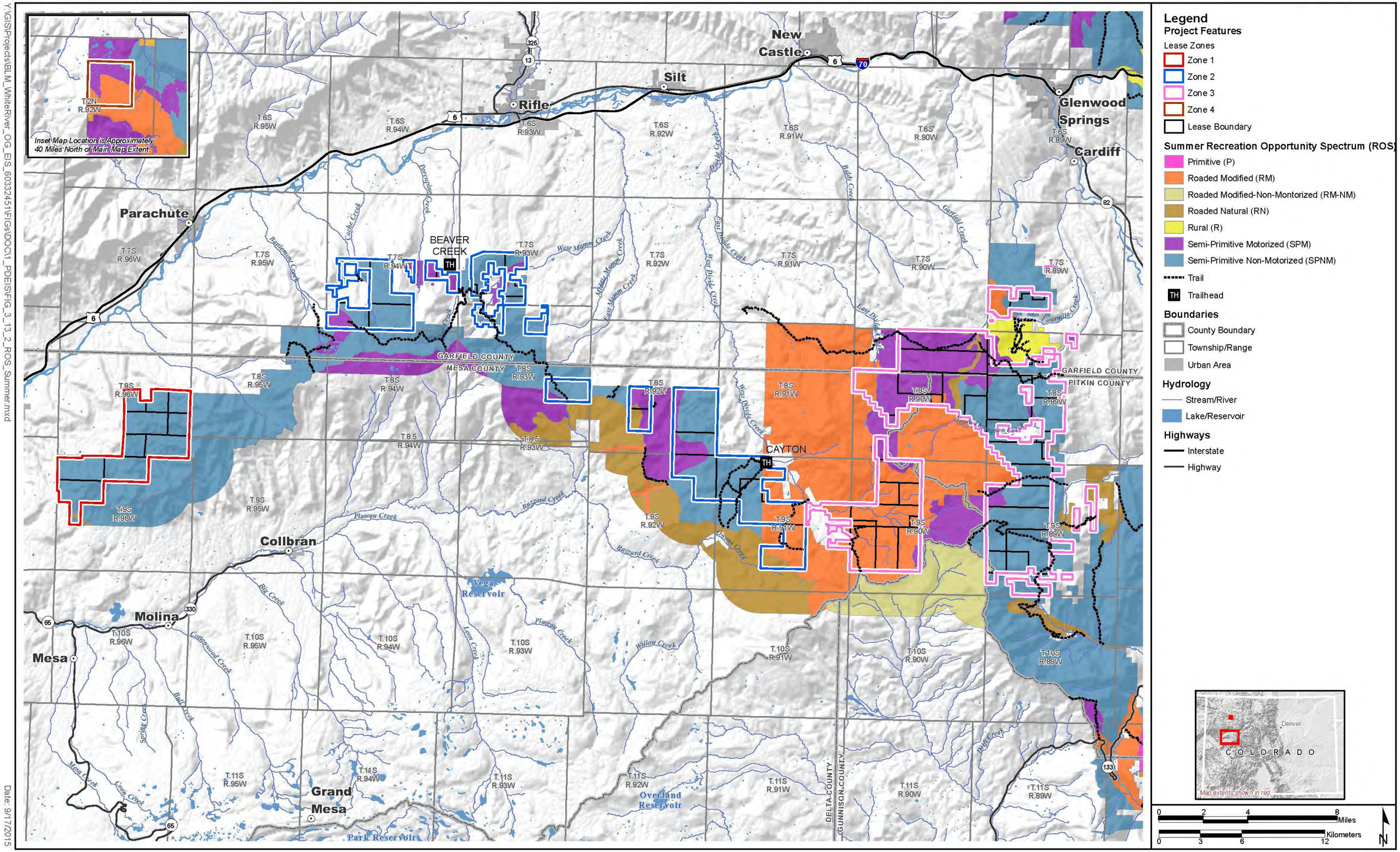
3.13.4.2 Dispersed Recreation

Dispersed recreation occurs where there are no developed facilities present and is generally defined as activities more unstructured or dispersed in nature and not facility dependent. Dispersed recreation requires few if any improvements and typically occurs in conjunction with roads or trails and is often day-use oriented. There are many dispersed recreation opportunities on the forest. Dispersed recreation consists of a wide variety of recreation activities, such as pleasure driving, hunting, wildlife and nature viewing, participating in guided or unguided tours or walks, biking, hiking, picnicking, and rafting. Winter activities include backcountry/cross-country skiing, snowshoeing, and snowmobiling. Approximately 50 percent of the total recreation use on the forest is dispersed (USFS 2002a).

Big game hunting is a common dispersed recreation activity that takes place within the analysis area. Big game hunting season is typically from mid-August through early November. The zones are located within or adjacent to GMUs 12, 23, 42, and 43. The GMUs are managed by CPW. GMUs 42 and 43 are generally located south of I-70 from De Beque to Glenwood Springs. GMUs 12 and 23 are located east and northeast of the town of Meeker. Some of the most common species hunted are elk and deer. Reportedly, the largest elk herd is located east of the town of Meeker. Bear, moose, mountain goat, and Rocky Mountain bighorn sheep hunting take place within the analysis area as well, but to a lesser extent, as does waterfowl and small game hunting.

Table 3.13-3 shows deer hunting statistics from 2009 through 2013. **Table 3.13-4** details elk hunting statistics for the same timeframe. The number of deer hunters across the GMUs has generally declined during the 2009 to 2013 timeframe, with the exception of GMU 23, which stayed fairly static. Total deer harvests across the GMUs either declined or rose and fell within a relatively narrow range. The opposite is the case for elk hunting, with the number of elk hunters rising in all the GMUs with the exception of GMU 12. In spite of the rise in the number of hunters, the total elk harvest declined in most of the GMUs over the 2009 to 2013 timeframe.

As detailed in **Table 3.13-2**, fishing is the most prolific water based activity within the region. CPW has primary responsibility for managing fish populations on the forest, and has actively stocked catchable and smaller fish throughout the forest, enhancing recreational fishing opportunities. Fishing piers, boardwalks, trails, parking areas, and informational signs have been constructed to enhance the recreational fishing experience in the region (USFS 2002a). There are 155 outfitter and guide permits throughout the forest, offering numerous services ranging from fishing to cross-country skiing and hunting (USFS 2013b; 2002a). Furthermore, as of 2013, 291 recreation special use permits were administered (USFS 2013b). More detailed information regarding outfitters, recreation special uses, and other dispersed recreation activities can be found in the WRNF 2014 Recreation Specialist Report (Hopkins 2014).



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Date: 9/17/2015

Figure 3.13-2 Summer Recreation Opportunity Spectrum Classifications in the Analysis Area

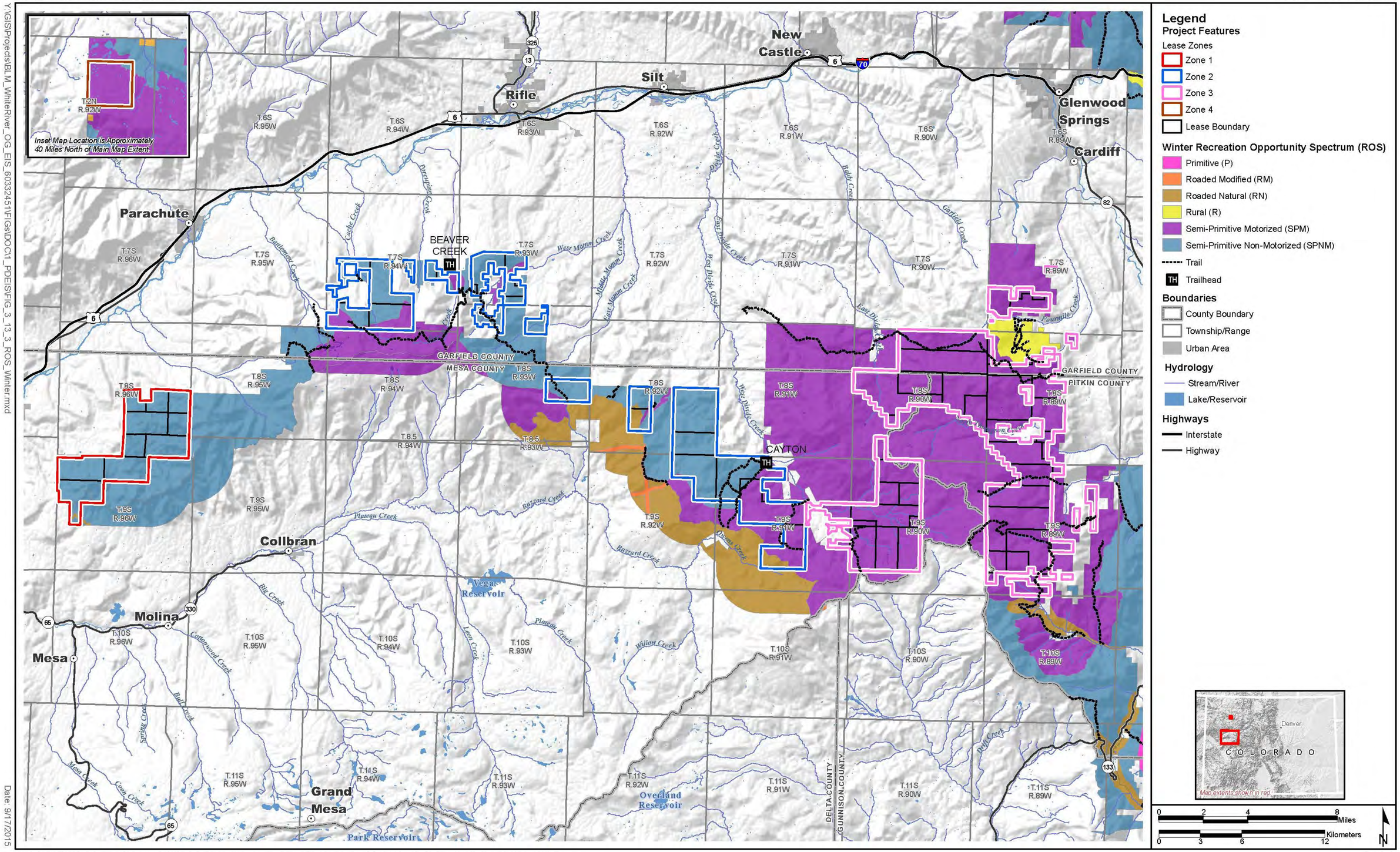

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Figure 3.13-3 Winter Recreation Opportunity Spectrum Classifications in the Analysis Area

Table 3.13-3 Deer Hunting Statistics

Game Management Unit/Year	Total Deer Harvest	Total Hunters	Total Rec. Days
GMU 42			
2013	550	1,255	5,313
2012	582	1,249	5,792
2011	728	1,620	7,192
2010	798	1,546	6,671
2009	680	1,525	6,843
GMU 43			
2013	286	739	3,763
2012	241	788	4,443
2011	279	786	3,644
2010	287	861	4,594
2009	285	862	4,391
GMU 12			
2013	318	644	2,816
2012	307	657	2,849
2011	318	726	3,647
2010	388	804	3,941
2009	386	918	4,691
GMU 23			
2013	223	680	3,384
2012	303	684	3,186
2011	282	864	4,230
2010	294	879	3,827
2009	200	708	3,649

Source: CPW 2014e.

Table 3.13-4 Elk Hunting Statistics

Game Management Unit/Year	Total Elk Harvest	Total Hunters	Total Rec. Days
GMU 42			
2013	815	3,971	19,882
2012	805	3,501	17,166
2011	667	3,038	15,169
2010	504	2,950	15,603
2009	562	2,407	12,094
GMU 43			
2013	633	3,275	16,927
2012	719	3,683	19,025
2011	797	3,582	17,539
2010	726	3,396	17,009
2009	642	3,194	15,263
GMU 12			
2013	1,776	5,583	23,010
2012	1,949	5,637	24,409
2011	1,796	5,513	23,655
2010	2,161	5,499	23,485
2009	2,134	5,889	24,980
GMU 23			
2013	773	4,228	18,673
2012	951	4,267	19,685
2011	921	4,713	21,232
2010	1,163	3,903	16,517
2009	1,024	3,854	17,498

Source: CPW 2014e.

3.13.4.3 Zone 1

Table 3.13-5 details summer and winter ROS classifications within Zone 1. The zone is dominated by the semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. There are no developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, there is no management acreage with a recreational emphasis within Zone 1.

Table 3.13-5 ROS Classifications Zone 1

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
Zone 1						
Acres of Summer ROS classifications	0/0	0/0	<1/44	0/0	99/10,037	<1/33
Acres of Winter ROS classifications	0/0	0/0	<1/44	0/0	99/10,037	<1/33

3.13.4.4 Zone 2

Table 3.13-6 details summer and winter ROS classifications within Zone 2. The zone is dominated by the summer and winter semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. This is followed by summer and winter semi-primitive motorized and roaded natural classifications. Motorized travel is allowed within these two classifications. There are two developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, 14 percent of the lease zone transects management areas that have a recreational emphasis. The two developed recreation sites are the Beaver Creek and Cayton trailheads. There are approximately 16 miles of recreational trails within this zone. The Sunlight to Powder Horn snowmobile trail from Sunlight Ski Resort to Powderhorn Ski Resort which includes approximately 120 miles of groomed and ungroomed trails transects a portion of Zone 2.

Table 3.13-6 ROS Classifications Zone 2

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
Zone 2						
Acres of Summer ROS classifications	0/0	0/0	16/4,107	18/4,400	65/16,322	<1/110
Acres of Winter ROS classifications	0/0	0/0	4/888	26/6,610	69/17,331	<1/110

3.13.4.5 Zone 3

Table 3.13-7 details summer and winter ROS classifications within Zone 3. The zone is dominated by the summer and winter semi-primitive non-motorized classification indicating that the area is predominantly natural or natural-appearing with a low concentration of users. This is followed by summer roaded natural and semi-primitive motorized classifications. Motorized travel is allowed within these two classifications. There are no developed recreation sites within this lease zone, and as is detailed in **Table 3.13-1**, 7 percent of the zone transects management areas that have a recreational emphasis. There are approximately 22 miles of recreational trails within this zone. Although there are no developed recreation sites within the lease zone, there are five trailheads (Babbish Gulch, Four Mile Complex, South Branch of Thompson Creek, Dexter Park, and Braderich Creek), and four winter trailheads (2-Fourmile Complex, Marion Gulch, and Spring Gulch Ski Area) which are adjacent to the leasing zone. Additionally, the Sunlight to Powder Horn snowmobile trail from Sunlight Ski Resort to Powderhorn Ski Resort which includes approximately 120 miles of groomed and ungroomed trails transects a portion of Zone 3.

Table 3.13-7 ROS Classifications Zone 3

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
Zone 3						
Acres of Summer ROS classifications	0/0	<1/10	29/12,537	25/10,544	46/19,600	<1/76
Acres of Winter ROS classifications	0/0	<1/10	0/0	99/42,556	<1/125	<1/76

3.13.4.6 Zone 4

Table 3.13-8 details summer and winter ROS classifications within Zone 4. The majority of the zone is comprised by the summer roaded natural classification indicating that interaction between users may be low to moderate in this area. This is followed by summer semi-primitive motorized classifications. Motorized travel is allowed within these two classifications. The summer semi-primitive non-motorized classification makes up the remainder of the zone. The zone is dominated by the winter semi-primitive motorized classification indicating that the area is predominantly natural or natural-appearing environment. There are no developed recreation sites within this zone, and as is detailed in **Table 3.13-1**, there is no management acreage with a recreational emphasis within Zone 1. There is approximately 1 mile of recreational trails within this zone.

Table 3.13-8 ROS Classifications Zone 4

ROS Classifications	Urban (percent/ acres)	Rural (percent/ acres)	Roaded Natural (percent/acres)	Semi-primitive Motorized (percent/acres)	Semi-primitive Non-motorized (percent/acres)	Primitive (percent/ acres)
Zone 4						
Acres of Summer ROS classifications	0/0	0/0	52/1,347	44/1,119	4/96	0/0
Acres of Winter ROS classifications	0/0	0/0	0/0	96/2,466	4/96	0/0

3.14 Livestock Grazing

3.14.1 Regulatory Background

The following regulations authorize and guide livestock grazing on NFS lands:

- Taylor Grazing Act of 1934
- Organic Administration Act of 1897
- Federal Land Policy and Management Act
- Public Rangelands Improvement Act of 1978
- NFMA of 1976
- Granger Thye Act of 1950
- FSM 2201

3.14.2 Analysis Area

The analysis area for livestock consists of the portion of the 19 grazing allotments overlapped by the 65 existing leases under evaluation within the four zones identified in Chapter 1.0 (**Figure 3.14-1**).

3.14.3 Regional Affected Environment

Livestock grazing operations have been active within the WRNF for almost 100 years and is regulated under a system of Forest Service grazing permits that allows for a set number of livestock to graze within an allotment for a defined period of time. The grazing permits are issued at a level that considers the overall condition and health of the rangeland.

The WRNF supports approximately 65 livestock grazing operations on 88 active allotments (USFS 2014a). As stated in the Final EIS for the WRNF 2002 LRMP (USFS 2002b), approximately 45 percent of the total forage is available for livestock grazing (USFS 2002b). USFS grazing allotments are managed in accordance with the standards and guidelines in the 2002 LRMP (USFS 2002b).

3.14.4 Analysis Area Affected Environment

Analysis area overlaps a total of 16 allotments ranging in size from approximately 4,400 acres to 95,390 acres and producing approximately 1 Animal Unit Month (AUM) per 12 acres. The allotment boundaries that overlap the analysis area and the zones are displayed on **Figure 3.14-1**.

Various rangeland improvements and infrastructure have been constructed within the analysis area. According to Forest Service GIS data, these consist mainly of fences, handing facilities (livestock trails and stock driveways), cattle guards, and out buildings.

3.14.4.1 Zone 1

One grazing allotment is overlapped by the leases in Zone 1 as shown in **Table 3.14-1**. The Wallace Creek Cattle and Horse (C&H) allotment contains some fencing and a few facilities; however, they are to the east of the allotment lease overlap.

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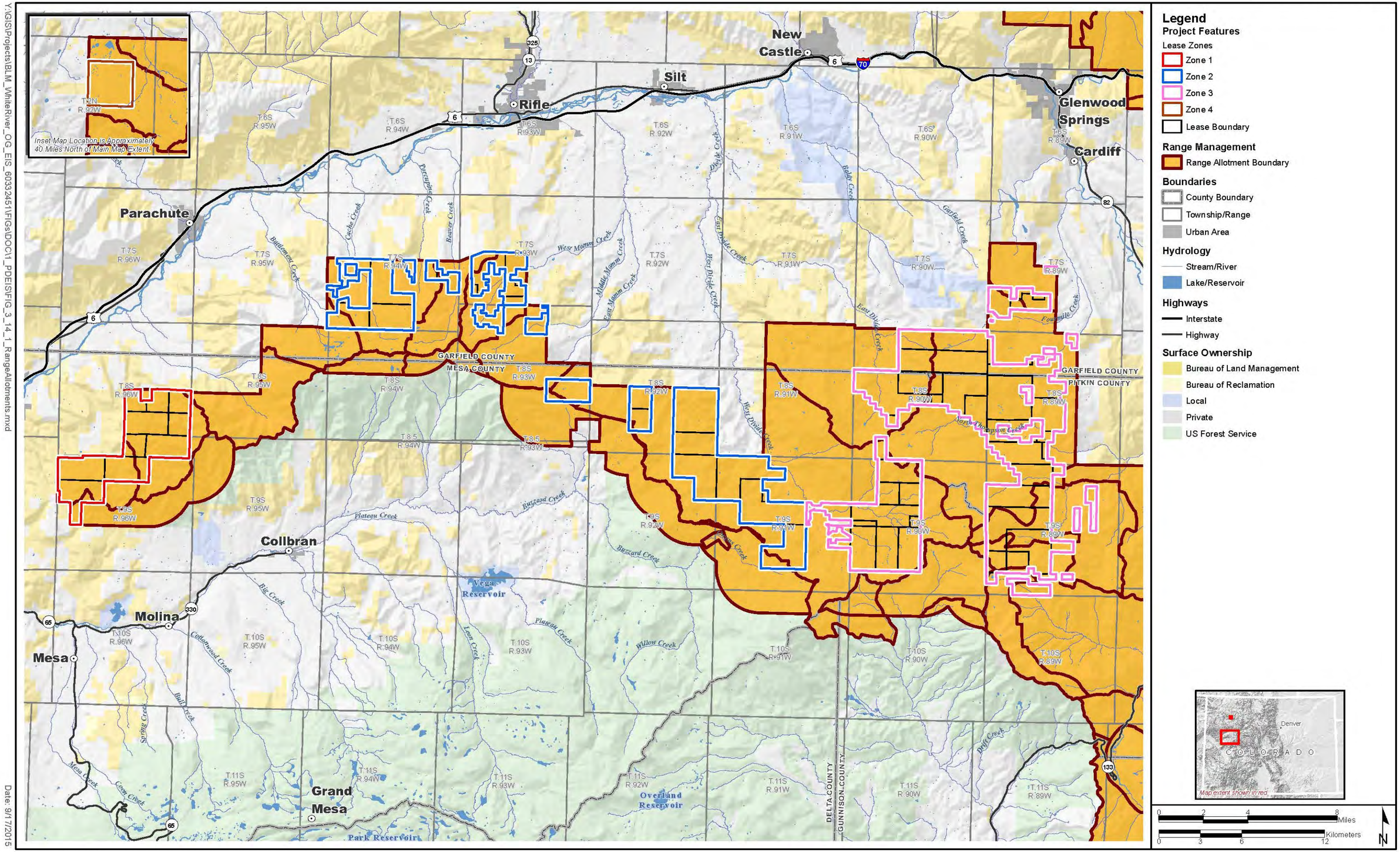

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Figure 3.14-1 Livestock Grazing Allotments

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Table 3.14-1 Grazing Allotments Overlapped by Zone 1 Leases

Allotments within the Zone 1	Allotment Total Acreage	Intersected Leases (No.)
Wallace Creek C&H	7,546	COC 066731

3.14.4.2 Zone 2

Eight grazing allotments are overlapped by the leases in Zone 2 as shown in **Table 3.14-2**. Zone 2 overlaps with portions of allotments that contain rangeland fences, handling facilities, and an outbuilding.

Table 3.14-2 Grazing Allotments Overlapped by Zone 2 Leases

Allotments within the Zone 2	Allotment Total Acreage	Intersected Leases (No.)
Battlement Creek	4,830	COC 067543
Beaver Creek C&H	4,795	COC 066920
		COC 067542
		COC 070014
		COC 075070
Buzzard	13,616	COC 066917
		COC 072157
Cache Creek C&H	10,336	COC 066920
		COC 067542
		COC 067543
		COC 067544
		COC 070014
		COC 070015
		COC 070016
Cheney Creek	4,840	COC 070013
Hunter C&H	5,994	COC 061121
		COC 067147
		COC 067150
		COC 075070
		COC 076123
Mamm Creek C&H	6,059	COC 067147
		COC 067150
		COC 070013

Table 3.14-2 Grazing Allotments Overlapped by Zone 2 Leases

Allotments within the Zone 2	Allotment Total Acreage	Intersected Leases (No.)
West Divide C&H	56,574	COC 066723
		COC 066724
		COC 066915
		COC 066916
		COC 066917
		COC 066918
		COC 070013
		COC 070361
		COC 072157

3.14.4.3 Zone 3

Seven grazing allotments are overlapped by the leases in Zone 3 as shown in **Table 3.14-3**. Zone 3 overlaps with portions of allotments that contain rangeland fences, handling facilities, and an outbuilding.

Table 3.14-3 Grazing Allotments Overlapped by Zone 3 Leases

Allotments within the Zone 3	Allotment Total Acreage	Intersected Leases (No.)
Coal Basin C&H	19,852	COC 066695
		COC 066698
		COC 066699
		COC 066700
		COC 066701
		COC 066702
East Divide C&H	19,108	COC 066706
		COC 066707
		COC 066708
		COC 066709
		COC 066710
Lake Ridge C&H	11,995	COC 066695
		COC 066696
		COC 066697
		COC 066698
		COC 066699
		COC 066701
Muddy Sheep and Goat	6,976	COC 058838
		COC 066700
		COC 066702

Table 3.14-3 Grazing Allotments Overlapped by Zone 3 Leases

Allotments within the Zone 3	Allotment Total Acreage	Intersected Leases (No.)
North Thompson/ Fourmile C&H	37,663	COC 066687
		COC 066688
		COC 066689
		COC 066690
		COC 066691
		COC 066692
		COC 066693
		COC 066694
		COC 066695
		COC 066696
		COC 066697
		COC 066698
		COC 066706
		COC 066707
		COC 066708
		COC 066709
		COC 066710
		COC 066711
		COC 066712
		COC 066908
		COC 066909
		COC 066913
Threemile C&H	4,433	COC 066687
		COC 066688
West Divide C&H	56,574	COC 058835
		COC 058836
		COC 058837
		COC 058838
		COC 058839
		COC 058840
		COC 058841
		COC 066709
		COC 066913

3.14.4.4 Zone 4

One grazing allotment is overlapped by the lease in Zone 4 as shown in **Table 3.14-4**. There are no rangeland improvements overlapped by Zone 4.

Table 3.14-4 Grazing Allotments Overlapped by Zone 4 Leases

Allotments within the Zone 4	Allotment Total Acreage	Intersected Leases (No.)
Lantern Ridge Sheep and Goat	8,858	COC 066948

3.15 Scenic Resources

This section describes the affected environment based on the potential construction, operation, and maintenance of oil and gas facilities within the existing leases in the analysis area. Scenic resources are defined as "Attributes, characteristics, and features of landscapes that provide varying responses from, and varying degrees of benefits to, humans" (USFS 1996).

3.15.1 Regulatory Background

The NEPA and NFMA, described briefly in Chapter 1.0, all establish federal policies that require consideration of impacts of federal actions on the human environment, aesthetics, and the quality of the surroundings, including scenic values.

The NFMA Part 219.21(f) requires: "The visual resource shall be inventoried and evaluated as an integrated part of evaluating alternatives in the forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation. Management prescriptions for definitive land areas of the forest shall include visual quality objectives."

FSM 2300, Recreation, Wilderness, and Related Resource Management, Chapter 2380 – Landscape Management, requires the inventory, evaluation, management, and, where necessary, restoration of scenery as a fully integrated part of the ecosystems of NFS lands and of the land and resource management and planning process. This manual specifies a requirement to "conduct and document a scenery assessment for all activities that may affect scenic resources and that require analysis under NEPA." It also requires the "application of the principles of landscape aesthetics, scenery management, and environmental design in project-level planning."

The Forest Service Scenery Management System (SMS) integrates scenery components into overall ecosystem management. The components include landscape character, scenic attractiveness, user concern, visibility, distance zones, and existing scenic integrity (intactness). They are considered by management in land use planning (in the LRMP) through the designation of scenic integrity objectives (SIOs) for all Forest Service land areas. This management approach includes consideration of the effects of changes in the landscape and incorporation of people's values in decision-making about those changes (USFS 1996). The term scenic integrity indicates the degree of intactness of the landscape character or, conversely, the degree of visible disruption of the landscape character. A landscape with very minimal visual disruption is considered to have high scenic integrity (USFS 1996). In general, the LRMP prepared for a national forest guides all natural resource management activities and establishes management standards and guidelines for scenery. The LRMP outlines SIOs that prescribe the level of visible change allowable within forest boundaries. SIOs are determined based on scenic attractiveness, visibility, distance zones, concern level, and existing scenic integrity, and are managed to ensure that changes and development fit with existing type, form, line, color, and texture (USFS 1996). The five potential SIOs are Very High (unaltered), High (appears unaltered), Moderate (appears slightly altered), Low (moderately altered), and Very Low (highly altered). Consistency with SIOs is determined by comparison of the objective or integrity level of the applicable SIO with the effects or alteration caused by prospective changes in the landscape. The leases are contained within jurisdictions of the WRNF and, to a small extent, the GMUGNF (approximately 2 percent of the lease area). The GMUGNF and WRNF LRMPs establish SIOs for NFS lands within the analysis area.

3.15.2 Analysis Area

The analysis area is contained within the lease boundaries, shown in **Figure 3.15-1**. The map shows the lease boundaries, terrain, rivers and streams, and county and local roads as the context for the SIO consistency analyses.

Landscape character is identified and described by the combination of the scenic attributes that make each landscape unique. The landscape characteristics of a region often add significantly to an individual's and community's "sense of place" by providing a memorable and identifiable image. The characteristic landscape of the analysis area is contained within a wide variety of topographic, vegetative, geologic, hydrologic, and land use characteristics of two physiographic provinces: Colorado Plateaus Physiographic Province and Southern Rocky Mountains Physiographic Province (Fenneman 1931), described in Section 3.3.1.1. Vegetation cover types are described in Section 3.6.2.

Major river and topographic features in the area include the Colorado River, Crystal River, and Roaring Fork River and their drainages, Battlement Mesa on the west to Grass Mesa, Holms Mesa, Hunter Mesa, Thompson Divide, and Mount Sopris on the east. Please refer to Section 3.6, Vegetation, for detailed information on vegetation types and characteristics in the analysis area. The forms, lines, colors, and textures are mostly consistent with the natural scenery of the landscape, but are contrasted with ranches, residences, and existing oil and gas development. Other existing activity affecting the characteristic landscape in the analysis area includes sparsely distributed range improvements and unimproved roads associated with livestock grazing and range management.

Recreational activities, including driving, biking, hiking, skiing, golf, fishing, hunting, photography, and picnicking, depend on the settings and scenic views that the Forest Service is required to manage. The main public access roads in the analysis area include I-70, US-6, SH-13/789, SH-82, and SH-133.

The northern lease area is located northeast of Meeker. The northern lease area is intersected by a single road, Yellow Jacket Pass/CR-42. There is surface water in the northern area that includes Aldrich Lakes, DD and E Wise Reservoir, Konopik Reservoir, Lunney Reservoir, and Wyman Reservoir.

Communities in vicinity of the southern area include De Beque on the west to Sunlight Ski Area and Carbondale on the east. Major lakes and reservoirs in the vicinity of the southern area include Island Lake and Mosquito Lake, and Battlement Reservoirs, Baugh Reservoir, Curtin Reservoir, Debeque Reservoir, Hawkhurst Reservoir, Hughes Reservoir, McCurry Reservoir, Piute Reservoir, Sunnyside Reservoir, and Watson Reservoir. The southern areas are intersected by multiple year-round and summer travel routes.

SMS inventories were conducted by the Forest Service to determine the scenic values of the GMUGNF and WRNF. The components of Forest Service SMS inventories include Scenic Attractiveness, Landscape Visibility, Existing Scenic Integrity (ESI) levels, and SIOs.

Although the GMUGNF and WRNF utilize the same approach for determining the inventory of scenic resources, the SMS inventory for the GMUGNF was never completed; within the GMUGNF, the only data available are SIO classifications. The scenic inventories remain incomplete for Scenic Attractiveness and Landscape Visibility classifications (USFS 2006b). The total area of GMUGNF lands covers approximately 1,680 acres, or 2 percent, of the lease area.

Tables 3.15-1 through **3.15-4** in the following sections summarize the acreages and percent of the analysis area categorized by SMS.

3.15.3 Scenic Attractiveness

Based on Forest Service guidance (USFS 1996), Scenic Attractiveness classes are developed on NFS lands to determine the relative scenic value of lands within a particular Landscape Character. The three Scenic Attractiveness classes are Class A, Distinctive; Class B, Typical; Class C, Indistinctive. The landscape elements of landform, vegetation, rocks, cultural features, and water features are described in terms of their line, form, color, texture, and composition for each of these classes. The classes and their

breakdown are generally displayed in a chart format and a map delineating the Scenic Attractiveness classes is prepared for the area of interest.

Figure 3.15-2 and **Table 3.15-1** illustrate and quantify the Scenic Attractiveness classifications in the analysis area.

Table 3.15-1 Forest Service Scenic Inventory: Scenic Attractiveness

	Class A		Class B		Class C	
	Acres	**%**	**Acres**	**%**	**Acres**	**%**
Scenic Attractiveness	4,817	6	73,843	92	0	0
Total Acres	**80,380**					

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for Scenic Attractiveness. Acreage totals for the Scenic Attractiveness classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF land with no available data.

3.15.4 Landscape Visibility

The Landscape Visibility Analysis (see **Table 3.15-2** and **Figure 3.15-3**) serves as the Forest Service guide to perceptions of attractiveness, helps identify special places, and helps to define the meaning people give to the subject landscape (USFS 1996). This constituent analysis leads to a determination of the relative importance of aesthetics to the public; this importance is expressed as a Concern Level. Sites, travelways, special places, and other areas are assigned a Concern Level value of 1, 2, or 3 to reflect the relative High, Medium, or Low importance of aesthetics. Seen Areas and Distance Zones are integrated with Concern Levels 1, 2, or 3 areas to determine the relative sensitivity of scenes based on their distance from an observer. These zones are identified as:

- Foreground (up to 0.5 mile from the viewer);
- Middleground (up to 4 miles from the foreground); and
- Background (4 miles from the viewer to the horizon).

Table 3.15-2 Forest Service Scenic Inventory: Landscape Visibility

WRNF Concern Level 1					
Foreground		**Middleground**		**Background**	
Acres	**%**	**Acres**	**%**	**Acres**	**%**
8,821	11	26,714	33	22,530	28
WRNF Concern Level 2					
Foreground		**Middleground**		**Background**	
Acres	**%**	**Acres**	**%**	**Acres**	**%**
9,336	12	6,025	8	1,046	1
WRNF Concern Level 3					
Foreground		**Middleground**		**Background**	
Acres	**%**	**Acres**	**%**	**Acres**	**%**
238	<1	154	<1	2	<1
Total Acres	**80,380**				

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for Landscape Visibility. Acreage totals for the Landscape Visibility classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching, seldom seen (not assigned) areas (approximately 5% of the lease area), and the additional GMUGNF land with no available data.

There are Level 1 (High importance) user concerns in the headwaters of (west to east) Battlement Creek, Beaver Creek/Log Mesa, Middle Mamin Creek, East Road Gulch, East Divide Creek, Van Mountain, Haystack Mountain, Flat Top Mountain, Park Creek, Middle Thompson Park, Four Mile Creek, Freeman Creek, and Marion Gulch.

3.15.5 Existing Scenic Integrity

ESI is evaluated and mapped based on the degree of intactness and wholeness of the landscape character; conversely, Scenic Integrity is a measure of the degree of visible disruption of the landscape character. A landscape with very minimal visual disruption is considered to have High Scenic Integrity. Those landscapes having increasingly discordant relationships among scenic attributes are viewed as having diminished Scenic Integrity. Scenic Integrity is expressed and mapped in terms of Very High, High, Moderate, Low, Very Low, and Unacceptably Low. The analysis area has Very High Scenic Integrity in the areas of Alkali Creek, Housetop Mountain, Porcupine Creek, and Stony Ridge. There is High Scenic Integrity in the areas surrounding Aldrich Lakes, Castle Peak, Horsethief Mountain, and Three Points Mountain. The remaining portions of the analysis area are mapped as Moderate Scenic Integrity. There are 6,314 acres of Very High ESI, 4,943 acres of High ESI, 67,347 acres of Moderate ESI, 6 acres of Low ESI, and 56 acres of Very Low ESI inside the analysis area leases. ESI analysis data for the lease areas is unavailable from GMUGNF. **Table 3.15-3** and **Figure 3.15-4** quantify and illustrate the ESI in the analysis area.

Table 3.15-3 Forest Service Scenic Inventory: Existing Scenic Integrity

	Very High		High		Moderate		Low		Very Low	
	Acres	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Existing Scenic Integrity	6,314	8	4,943	6	67,347	84	6	<1	56	<1
Total Acres	**80,380**									

Note: The lease area also includes portions of the GMUGNF (approximately 2% of the lease area) that was not inventoried for ESI. Acreage totals for the ESI classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF land with no available data.

3.15.6 Scenic Integrity Objectives (Forest Service)

Forest Service resource allocation decisions have resulted in assignment of SIOs for all land areas within the leases (**Figure 3. 15-5**). **Table 3.15-4** quantifies the SIOs in the analysis area. The assignment of SIOs is based on the management decisions made in the Forest Service planning processes, which must take into consideration the value of visual resources and management priorities for land uses. During the Forest Service LRMP process, inventory class boundaries can be adjusted as necessary to reflect resource allocation decisions made in the LRMP. Management objectives established for each Forest Service SIO (USFS 1996) is summarized in **Table 3.15-5**. There are Very High SIOs on the southern slopes (GMUGNF area only) of Horsethief Mountain. There are High SIO parcels in the Alkali Creek, Bull Basin, Castle Peak, Horsethief Mountain, Housetop Mountain, and Little Alkali Creek areas. There are Moderate SIO parcels are assigned in the Aldrich Lakes/Wise Reservoir, Battlement Creek, Doghead Mountain, Glade Creek, Houston Mountain, Log Mesa, Middle Mamm Creek, North Mamm Peak, Porcupine Creek, Stony Ridge, Uranium Peak and West Mamm Creek areas. All remaining lease areas are assigned Low and Very Low SIOs. There are 330 acres of Very High SIO, 9,804 acres of High SIO, 7,845 acres of Moderate SIO, 62,047 acres of Low SIO, and 10 acres of Very Low SIO within the leases.

Table 3.15-4 LRMP Scenic Integrity Objectives

	Very High		High		Moderate		Low		Very Low	
	Acres	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Scenic Integrity Objectives[1]	330	<1	9,804	12	7,845	10	62,047	77	10	<1

[1] Although not a part of the SMS, the data provided by the GMUGNF has 125 acres (less 1 percent of the analysis area) within the GMUGNF classified as High/Moderate SIO. The High/Moderate SIO classification is assigned in the Owens Creek, Basin Creek, and Clear Fork areas.

Note: Acreage totals for the scenic integrity objective classes do not equal the total lease area of 80,380 acres due to inconsistencies with dataset edge matching and the additional GMUGNF acreage classified as High/Moderate.

Table 3.15-5 LRMP Forest Service Scenic Integrity Objectives

Very High	Very High scenic integrity refers to landscapes where the valued landscape character "is" intact with only minute if any deviations. The existing landscape character and sense of place is expressed at the highest possible level.
High	High scenic integrity refers to landscapes where the valued landscape character "appears" intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely and at such scale that they are not evident.
Moderate	Moderate scenic integrity refers to landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed.
Low	Low scenic integrity refers to landscapes where the valued landscape character "appears moderately altered." Deviations begin to dominate the valued landscape character being viewed but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed. They should not only appear as valued character outside the landscape being viewed, but also compatible or complimentary to the character within.
Very Low	Very low scenic integrity refers to landscapes where the valued land "appears heavily altered." Deviations may strongly dominate the valued landscape character. They may not borrow from valued attributes such as size, shape, edge effect and pattern of natural openings, vegetative type changes or architectural styles within or outside landscape being viewed. However deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

Source: USFS 1996.

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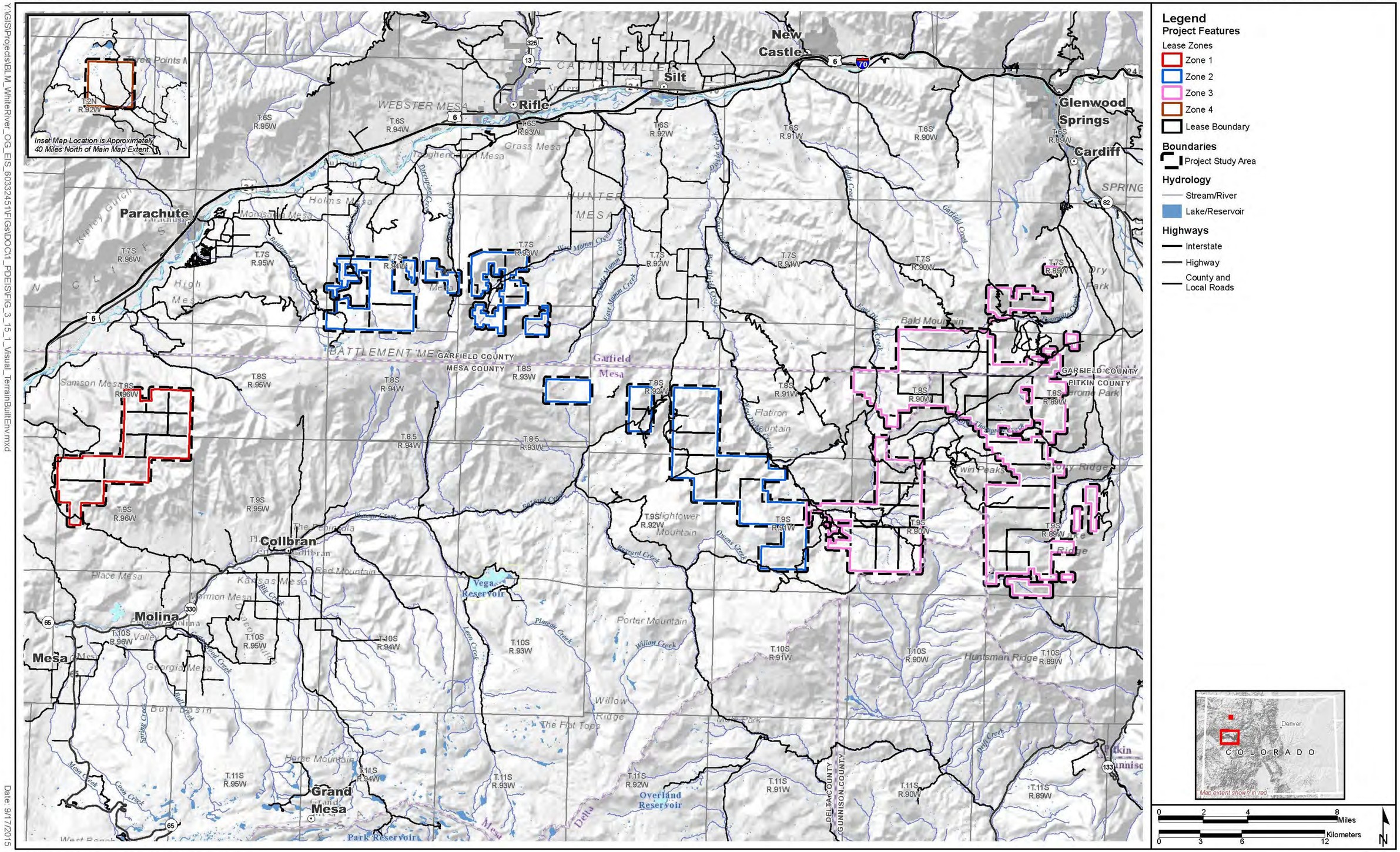

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Figure 3.15-1 Lease Analysis Areas

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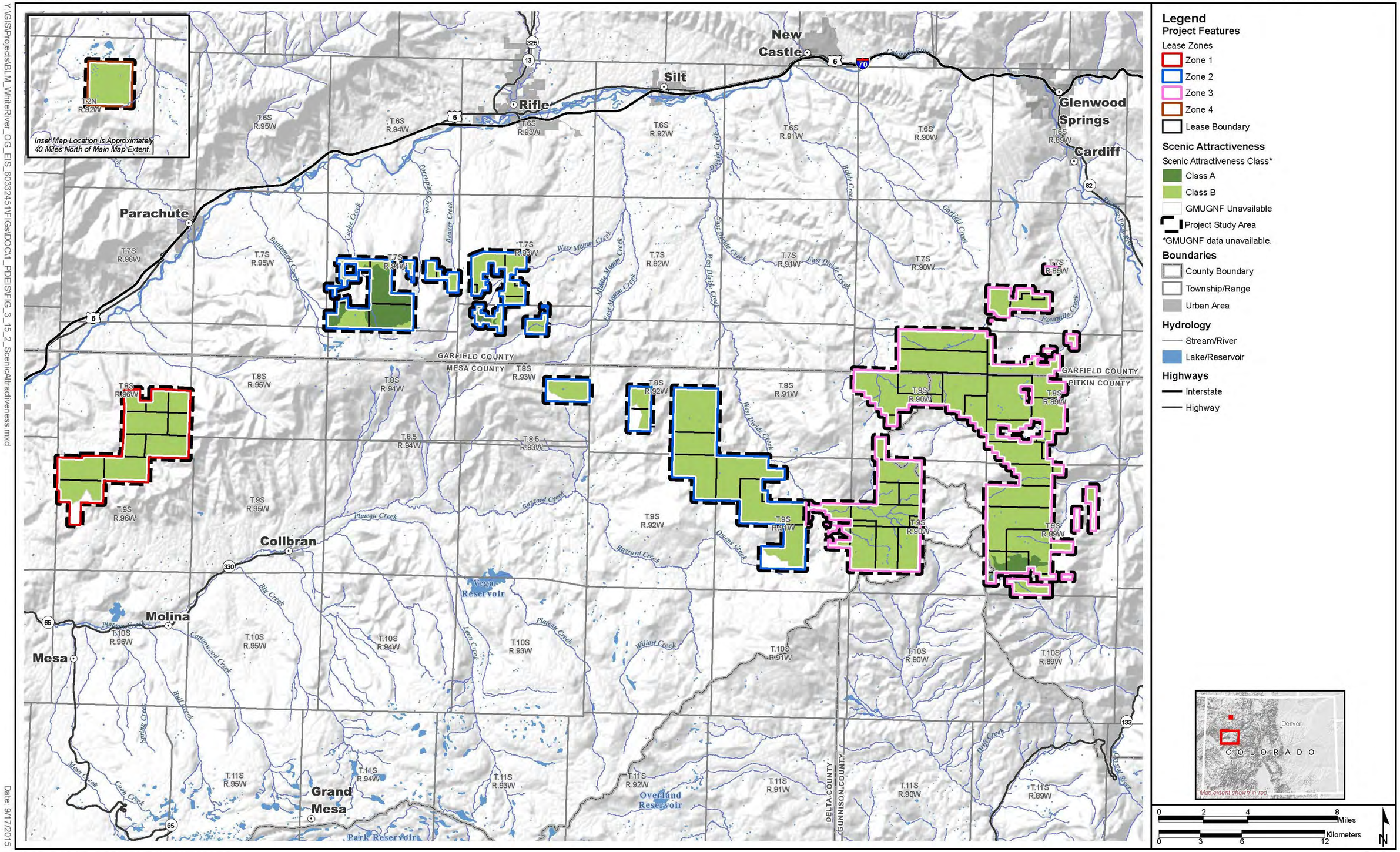

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Figure 3.15-2 Scenic Attractiveness

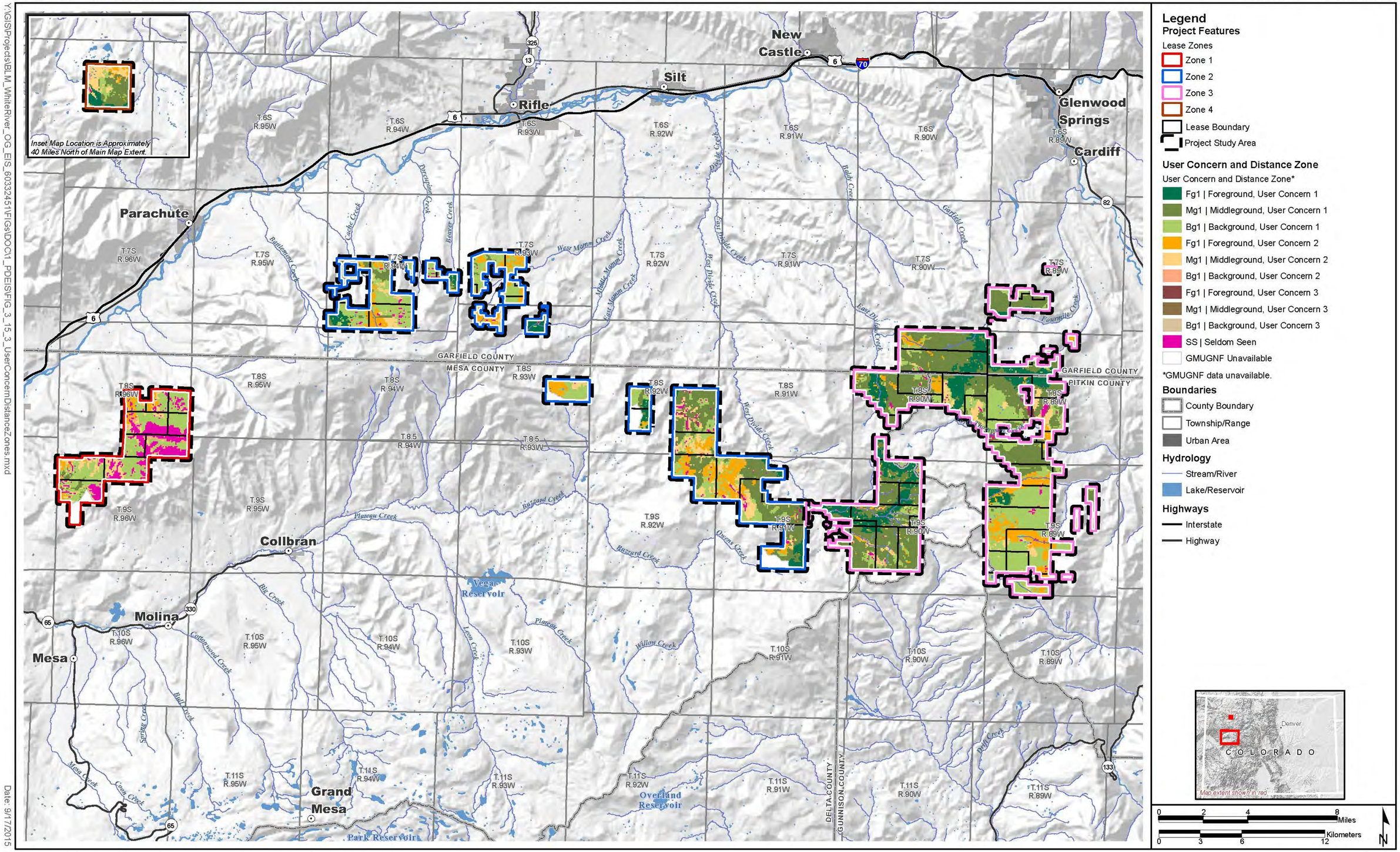

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Figure 3.15-3 User Concern, Seen Areas, and Distance Zones

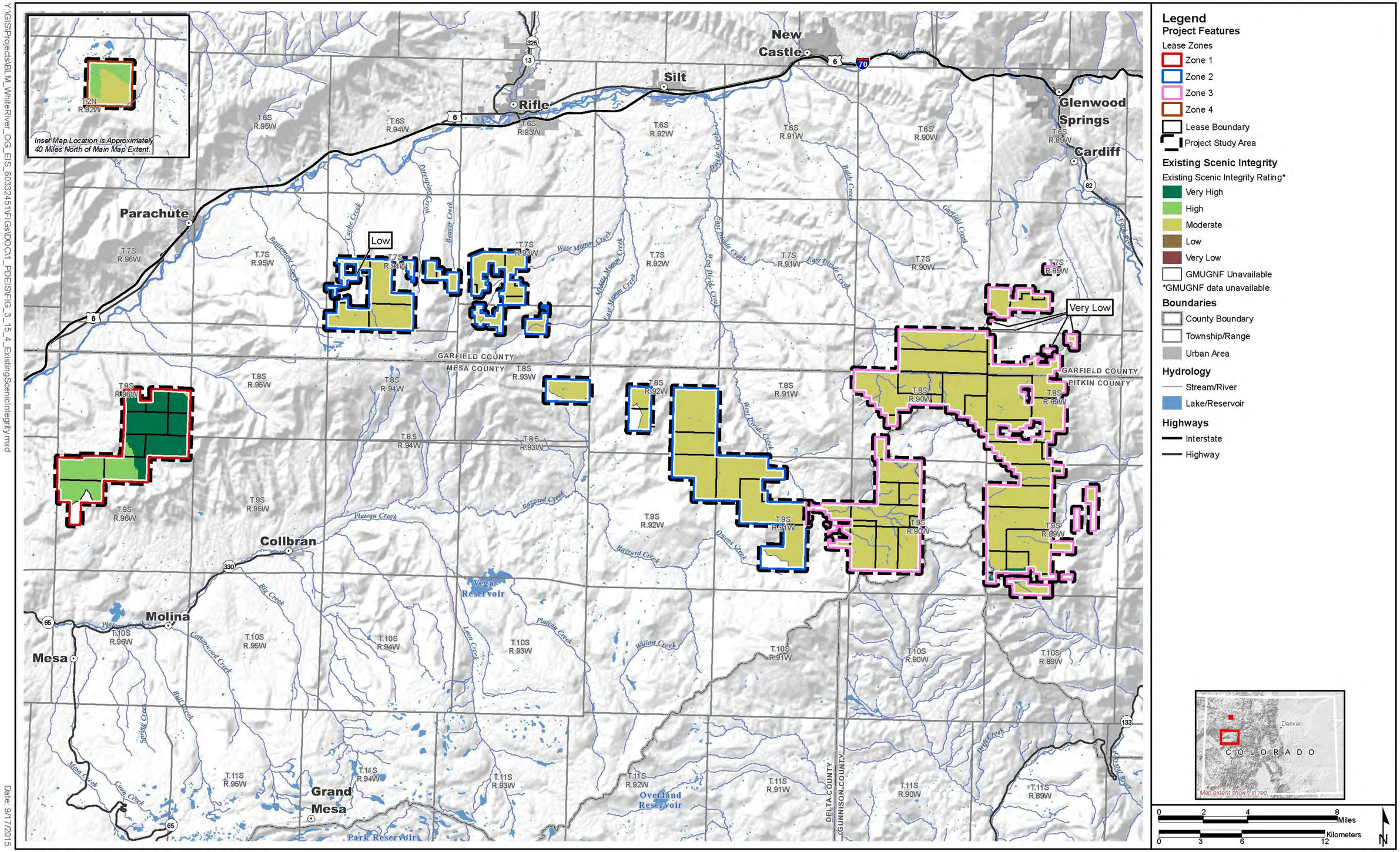

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Figure 3.15-4 Existing Scenic Integrity

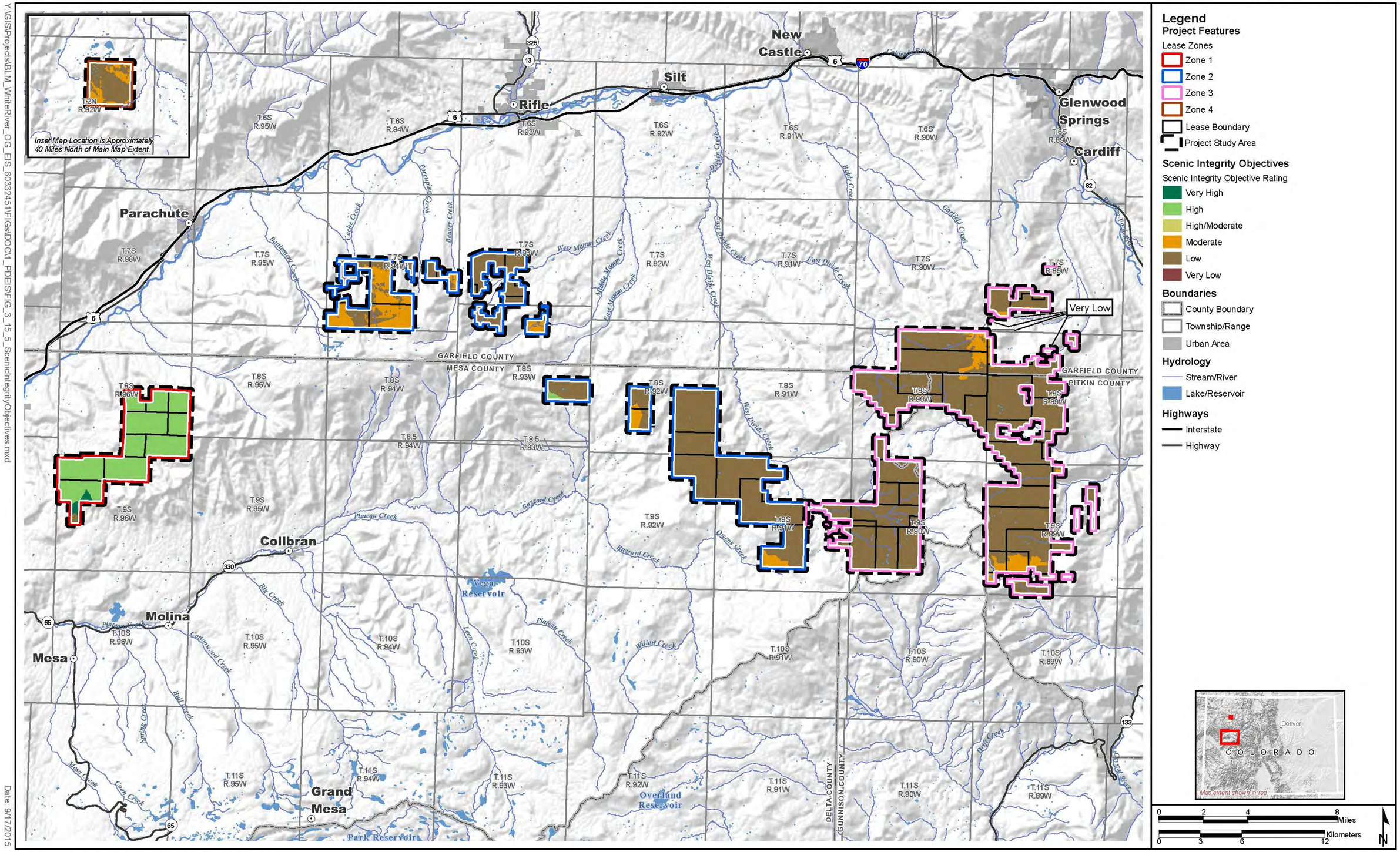

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Figure 3.15-5 Scenic Integrity Objectives

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3.16 Hazardous Materials and Human Health and Safety

The affected environment considers the presence of hazardous materials and solid waste that may affect air, water, soil, biological resources, and human health. Hazardous materials can represent potential risks to both human health and to the environment when not managed properly. Other considerations for human health and safety are hazards that that not only present risks to oil field workers, but to the public at large. The analysis area for human health and safety is shown in **Figure 1-1**.

3.16.1 Hazardous Materials and Solid Waste

3.16.1.1 Regulatory Background

Hazardous materials are defined in various ways under a number of regulatory programs. The term *hazardous materials* include the following materials that may be utilized or disposed of in conjunction with fluid minerals drilling and completion operations.

- Substances covered under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200). The types of materials that may be used in drilling and completion activities and that would be subject to these regulations would include almost all of the materials covered by the regulations identified below.
- Hazardous materials as defined under the U.S. Department of Transportation (USDOT) regulations in 49 CFR Parts 171.8 and 172.101.
- Hazardous substances as defined by the Comprehensive Environmental Response, Compensation, and Liability Act as listed in 40 CFR Table 302.4.
- Hazardous wastes as defined in the Resource Conservation and Recovery Act (RCRA) Subtitle C regulations (40 CFR Parts 260-299).
- Hazardous substances and extremely hazardous substances subject to reporting requirements (Threshold Planning Quantities) under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act (SARA), which include petroleum or products derived from petroleum including crude oil, condensate, methane, gasoline, diesel, propane and a wide variety of chemicals and materials that are used in drilling and production.
- Petroleum products defined as “oil” in the Oil Pollution Act of 1990. The types of materials used in drilling and completions activities that would be subject to these requirements include fuels, lubricants, hydraulic oil, and transmission fluids.

Hazardous materials as defined by USDOT would include fuels and other chemical products. These materials are often transported to work sites in accordance with applicable USDOT rules and regulations. In conjunction with the definitions noted above, the following lists provide information regarding management requirements during transportation, storage, and use of particular hazardous chemicals, substances, or materials.

- SARA Title III List of Lists (USEPA 2012b) also known as the Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the CAA.
- USDOT listing of hazardous materials in 49 CFR 172.101.

Non-hazardous solid waste is regulated under Subtitle D of RCRA and hazardous waste is regulated under Subtitle C. In Colorado, solid waste is regulated by the CDPHE under a USEPA-delegated RCRA program.

3.16.2 Analysis Area

The analysis area for hazardous materials and solid waste consists of the individual lease tracts and routes that would be used for the transportation of hazardous materials.

3.16.2.1 Oil and Gas-related Hazardous Materials

A large variety of hazardous materials are used or stored in oil and gas drilling and production. Chemicals and materials that may be used for this project are listed in **Table 3.16-1**. Potentially hazardous substances used in the development or operation of wells are kept in limited quantities on drill pads and at production facilities for short periods of time. Some of the chemicals or materials listed in **Table 3.16-1** are found on the EPCRA List of Lists or defined as hazardous materials by USDOT.

Table 3.16-1 Potentially Hazardous Materials Used or Stored in Typical Oil and Gas Well Drilling, Completion, and Production Operations

Drilling and Completion Operations	
Material	
Diesel	Engine lubricants
Gasoline	Biocides
Drilling fluid additives	Solvents
Caustics	Paint and thinners
Well completion and treatment fluid and additives (to include hydraulic fracturing chemicals)	Pipe thread sealer
Silica sand	Explosives (for perforating)
Corrosion inhibitors	Compressed gases
Cement	Lead-acid batteries
Cement additives	Ethylene glycol
Hydraulic fluids	Weight materials (e.g., barite)
Production Operations[1]	
Material	
Crude oil, condensate, natural gas liquids, natural gas, CO_2, hydrogen sulfide (H_2S)	Methanol (line freezing prevention, gas wells)
Well workover treatment chemicals	Water treatment chemicals
Emulsion breakers (oil wells)	Catalysts (natural gas processing, sulfur recovery)
Corrosion inhibitors	Caustics (gas treatment)
Triethylene glycol (natural gas dehydration)	Paint and thinners
Biocides	Lead-acid batteries
Diesel and gasoline	Herbicides
Amines (natural gas processing)	Defoamers

[1] Includes field gas processing and gathering pipelines.

Sources: AECOM 2012; Government Accountability Office 2012; Interstate Oil and Gas Compact Commission 1999; USFS and BLM 2003.

The federal National Response System is the federal government's mechanism for tracking discharges of hazardous substances and wastes into the environment. The National Response System functions through a network of interagency and inter-government relationships formally established and described in the National Oil and Hazardous Substances Pollution Contingency Plan.

Under EPCRA, operators are required to report the presence of chemicals or substances on-site if those materials are considered hazardous by OSHA and exceed threshold planning quantities (TPQs). Chemicals subject to reporting under Title III of the SARA in quantities more than 10,000 pounds may be used or stored at well pads or facilities. There are substances that are defined as Extremely Hazardous Substances that may have TPQs that are much lower than 10,000 pounds. Types of chemicals or materials that may be trigger reporting requirements include the following (Government Accountability Office 2012; Interstate Oil and Gas Compact Commission 1999):

- Cement and associated additives;
- Silica;
- Shale control additives;
- Drilling mud and associated additives;
- Deflocculants;
- Lubricants;
- Alkalinity and pH control material;
- Produced hydrocarbons; and
- Fuels.

The above list contains just a few examples of the thousands of chemicals subject to EPCRA reporting requirements (USEPA 2014). It is important to note that produced hydrocarbons are considered hazardous materials subject to EPCRA reporting and that in seemingly small amounts would exceed the TPQ for those materials. For instance, the threshold amount for crude oil or condensate is about 33 barrels (Elliott 2013), a quantity that could be easily exceeded at many typical oil and gas field sites. A release of a reportable quantity of a hazardous substance must be reported to the COGGC, CDPHE and possibly to the USEPA depending on the circumstances and the substance involved. Operators would develop and maintain Spill Prevention, Control, and Countermeasure plans as part of overall emergency response plans for well pad and production facilities in the project area, as required by regulation, to prevent and contain accidental releases.

3.16.2.2 Solid Waste

Solid waste comprises a broad range of materials that include garbage, refuse, sludge, non-hazardous industrial waste, municipal wastes, and hazardous waste (USEPA 2011a). Solid waste as defined includes solids, liquids, and contained gaseous materials. Hazardous waste are those materials that either exhibit certain characteristics (as defined by laboratory analysis), are generated from specific industrial processes, or are chemical compounds that if abandoned or discarded, could pose a threat to human health and the environment.

The USEPA has specifically exempted certain waste materials generated in oil and natural gas exploration and production (E&P) from regulation as hazardous waste (USEPA 1993, 1988). To classify as exempt E&P waste, these materials must be intrinsic or uniquely associated with the production of oil and natural gas. Examples of exempt E&P waste include, but are not limited to, produced water, drilling mud, hydraulic fracturing flow back fluids, and treatment chemicals (e.g., acids) that have been used in the well. Although specifically exempted from regulation as hazardous waste, these materials are solid

waste and must be disposed in a ways that are protective of human health and the environment. Although specific E&P waste are exempted from RCRA Subpart C, it does not mean that the waste can be discarded in a haphazard manner or disposed onsite. Disposition of exempt waste is regulated by the COGCC, the BLM, or the CDPHE depending upon the particular waste and the manner of disposition.

RCRA non-exempt waste would include materials such as spent solvents, discarded lubricants, and paints. These and other non-exempt wastes would be classified according to the process that generated the waste and are handled and disposed or recycled in accordance with applicable rules and regulations. Proposed project activities may generate non-exempt waste that may be hazardous, but would be generated in limited quantities and would have to be disposed of according to hazardous waste rules.

3.16.3 Human Health and Safety

The individuals most likely to be affected by health and safety concerns are workers associated with oil and gas operations as well as rural residents and recreational enthusiasts. Public uses in the analysis area include stock raising, recreational activities, and motorists traveling on local roads and highways.

3.16.3.1 Regulatory Background

Depending on the specific location, a number of public health and safety regulations may be applicable to various portions of the Project. OSHA (U.S. Department of Labor) has jurisdiction over most occupational health and safety issues within each state the Project crosses. Industrial construction and routine workplace operations are governed by the OSHA of 1970, particularly 29 CFR 1910 (general industry standards) and 29 CFR 1926 (construction industry standards). While there are no federal noise regulations, federal agencies, states, municipalities and local governments may adopt laws and regulations that impose a maximum noise limit or mitigation requirement within their jurisdiction. These ordinances are often enforced by police or an agency.

3.16.3.2 Local Human Health and Safety Concerns

Numerous additional areas have been identified by government agencies and the public as health and safety concerns related to the potential of oil and gas development. These concerns include exposure to chemical pollutants from air and water transport, as well as the potential pollution of surface waters (including potable water sources), as well as air and soil pollution.

The potential for accidental releases of hazardous fluids and contamination of drinking water and soils from drilling and hydraulic fracturing operations are a major public concern. Effects to soils and surface water would depend on the volume and toxicity of the spilled materials or fluids. Spills with low levels of hydrocarbons would have minimal long-term impacts to soils and water, whereas spills of higher levels of hydrocarbons would have more serious impacts (BLM 2014b). A number of local communities have identified oil and gas development as a potential risk to drinking water sources, and have contributed to cooperative management approaches with oil and gas operators (BLM 2014b). Sections 3.4 and 3.5, Soils and Water, respectively, further detail the affected environment of soils and water resources.

Another area of health and safety concern is the potential for air pollution and the subsequent potential for health problems from oil and gas development. Chemicals, some hazardous, are used and produced by oil and gas exploration and production. Hazardous air pollutants from wells and associated sources, can potentially pose health hazards (BLM 2014b). Local governments, in response to air quality concerns, have enacted ongoing ambient air monitoring, local emissions inventories, health risk assessments, and special collaborative projects (BLM 2014b; Garfield County 2013b). Section 3.2 Air Quality, further details the affected environment of air quality.

3.16.3.3 Oil and Gas Exploration, Development, and Production Operations

Health and safety concerns within the analysis area are associated primarily with occupational hazards from oil and gas exploration, development, and operations and potential hazards related to vehicle accidents, contact with objects and equipment, fires and explosions, falls, and overexertion. Natural gas gathering, compression, stabilization, and transmission operations also currently take place in the analysis area. Operators working within the analysis area are governed by the Colorado OSHA program, which has adopted the general construction rules and regulations of the federal OSHA program. These include special rules for oil and gas development and operations. Most natural gas transmission and gathering operations are regulated by the USDOT Office of Pipeline Safety. The Office of Pipeline Safety regulations require stringent system maintenance programs, emergency response planning, risk management planning, and individual personnel operations and maintenance training for regulated pipeline systems.

Of particular concern for worker and public safety is H_2S gas that can occur naturally with oil and gas or occurs as a result of bacterial contamination of oil and gas production wells. H_2S may be produced in sufficient quantities that can pose health and safety concerns beyond drill sites and production and processing facilities. Currently, no wells within the CRVFO qualify under federal regulations as hydrogen sulfide wells under Onshore Oil and Gas Order #6, Hydrogen Sulfide Operation, 43 CFR 3160 (BLM 2014b).

<u>Naturally Occurring Radioactive Materials</u>

Radioactive materials can be classified under two broad headings: man-made and naturally occurring radioactive materials (NORM). The geologic formations that contain oil and gas deposits also contain naturally occurring radionuclides including uranium (and its decay products), thorium (and decay products), radium (and decay products), and lead-210. Each year, hundreds of millions of metric tons of NORM waste are generated from a wide variety of processes, including oil and gas production. During oil and gas development, radionuclides, along with other minerals, precipitate (separate and settle) out forming various wastes at the surface including mineral scales inside pipes, sludges, contaminated equipment or components or produced waters. Because the extraction process concentrates the naturally occurring radionuclides and exposes them to the surface environment and human contact, these wastes are classified as Technologically Enhanced naturally occurring radioactive materials (TENORM) and may have radionuclide concentrations that are orders of magnitude higher than in the parent materials. (USEPA 2015g). Because TENORM-contaminated wastes in oil and gas production operations were not properly recognized in the past, disposal of these wastes may have resulted in environmental contamination in and around production and disposal facilities. Surface disposal of radioactive sludge/scale, and produced water (as practiced in the past) may lead to groundwater and surface water contamination.

An estimated 30 percent of domestic oil and gas wells produce some TENORM. In surveys of production wells in 13 states, the percent reporting high concentrations of radionuclides in the wells ranged from 90 percent in Mississippi to none or only a few in Colorado, South Dakota, and Wyoming (USEPA 2015g). Earlier studies noted that TENORMs resulting from produced water and oil-field equipment within the analysis area is at background or marginally detectable (USGS 1999). As a result, TENORM from oil and gas production is thought to be low in the analysis area. However, as noted in Section 3.3, Geology and Minerals, uranium ore has been mined in portions of Garfield County north of the Colorado River and outside of the existing leases and there are numerous uranium occurrences in T2N, R92W, where the Zone 4 lease is located.

3.16.3.4 Vehicle Safety Issues

Existing health and safety concerns within the analysis area include occupational hazards associated with the operation of vehicles on improved and unimproved roads, winter driving conditions, and

potential collisions with livestock and big game. **Table 3.16-2** conveys the accident rates by specific highway segments where data was available. The segment selected for SH-82 had the lowest injury accident rates for any of the other selected highway segments. Conversely, some of the highest injury accident rates occurred along the selected segment of SH-13 near Meeker. The single highest fatality rate was documented along the selected segment US-6 in 2010. The data did not detail livestock or wildlife collision statistics.

Table 3.16-2 Accident Rates By Highway

Year	Road MP	Section Length	MVMT [2]	Accident Rates [1]			
				PDO[3]	Injury	Fatal	Total
US-6							
2012	98.7	3.6	6.6	0.91	0.15	0.0	1.1
2011	98.7	2.7	5.0	1.82	0.0	0.0	1.82
2010	98.7	2.7	5.0	2.02	0.20	20.20	2.42
2009	98.7	2.7	5.0	0.4	0.4	0.0	0.81
SH-13							
2012	53.9	9.5	5.89	0.85	0.17	0.0	1.02
2011	53.9	9.5	5.87	1.70	0.34	0.0	2.05
2010	53.9	9.5	6.22	1.45	0.0	0.0	1.45
2009	53.9	9.5	6.22	3.68	0.33	0.0	4.01
I-70							
2012	65.4	3.7	19.2	0.52	0.05	0.0	0.57
2011	65.4	3.7	19.1	0.78	0.05	5.23	0.89
2010	65.4	3.7	19.1	0.68	0.32	5.25	1.05
2009	65.4	3.7	26.1	0.50	0.19	0.00	0.69
I-70							
2012	113.5	8.3	54.4	0.92	0.17	0.0	1.09
2011	113.5	4.5	42.8	0.65	0.05	0.0	0.70
2010	113.5	4.5	50.9	0.41	0.02	1.96	0.45
2009	113.5	4.5	50.5	0.95	0.10	0.0	1.05
SH-82							
2012	6.5	1.5	11.45	0.61	0.0	0.0	0.61
2011	6.5	1.5	11.42	1.22	0.09	0.0	1.31
2010	6.5	1.5	11.96	0.67	0.0	0.0	0.67
2009	7.9	3.8	31.76	0.95	0.09	0.0	1.04
SH-133							
2012	65.9	9.0	10.5	1.43	0.38	0.0	1.81
2011	65.9	9.0	10.6	0.47	0.19	0.0	0.66
2010	65.9	9.1	12.3	0.73	0.08	0.0	0.82
2009	65.9	9.1	12.3	1.06	0.33	8.16	1.47

[1] PDO and Injury rates in Million Vehicle Miles Traveled. Fatal Rate in 100 Million Vehicle Miles Traveled.
[2] MVMT – Million Vehicle Miles Traveled.
[3] PDO = Property Damage Only.
Source: CDOT 2013.

3.16.3.5 Noise

Noise is defined as any sound that is undesired, extraneous or interferes with one's hearing. Noise is considered a human health concern as it can interfere with speech communication and hearing or is otherwise considered annoying. The term "unwanted" can be subjective in nature and can vary greatly among individuals. An individual's response to noise is influenced by the type of noise, perceived importance of the noise, appropriateness in the setting, time of day, type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is measured in decibels on the A-weighted scale (dBA) and is based on a logarithmic scale to account for the wide range of audible sound intensities. Under the logarithmic scale for sound (and noise), a 10-dBA increase would increase sound intensity by 10 times; a 20-dBA increase would increase sound intensity by 100 times. As a result, methods have been developed for weighting the sound frequency spectrum to approximate the response of the human ear. The dBA scale is widely used for environmental noise assessments because of its relative convenience and accuracy in correlating with people's judgments of what constitutes noise. Typical A-weighted sound and noise levels associated with common activities or situations are shown in **Figure 3.16-1**.

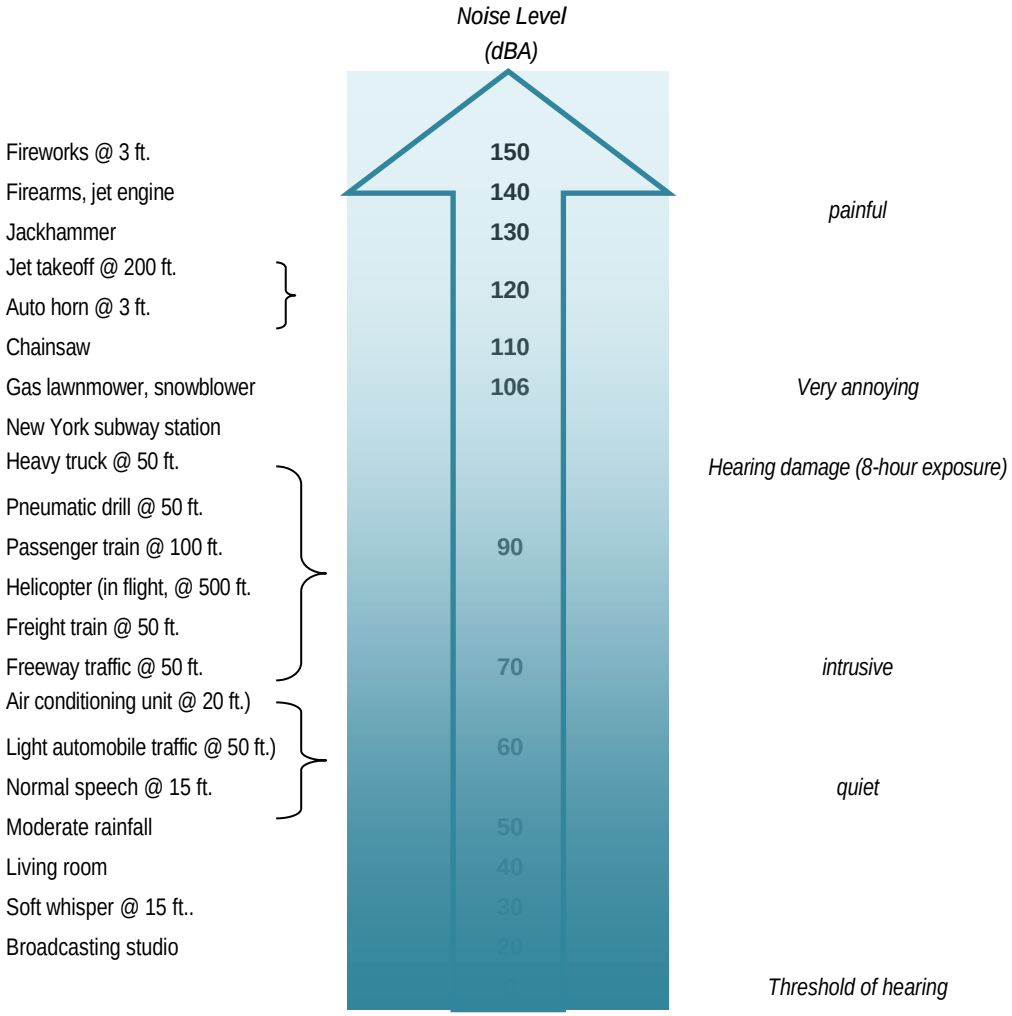
Noise level from a point source such as concentrated construction activity will decrease by 6 dBA for every doubling of the distance away from the source, assuming there are no reflections or reverberations (Truax 1999). This concept is known as geometric spreading. When comparing similar sounds (e.g., changes in traffic noise levels) a 3-dBA change in sound-pressure level is considered detectable by the human ear in most situations. A 5-dBA change is readily noticeable by most people and a 10-dBA change is perceived to be a doubling (or halving) of sound or noise.

Ambient noise, or background noise, is defined as the total noise from nearby and distant sources, that is relatively steady and homogeneous, with no particular source identifiable within it (GE Energy 2005; National Wind Coordinating Committee 2002). Ambient noise levels within the lease area have not been measured; however, as rural background noise in wilderness and rural areas typically is 40 dBA (USEPA 1978), noise levels are likely to be low in portions of leases that are within inventoried roadless areas and the research natural area (see Section 3.12, Special Designations), if they also are not near existing oil and gas development (described in Chapter 1.0), mining operations (see **Figure 3.3-8**) or haul routes (see **Figures 3.10-1** and **3.10-2**). Noise levels near existing oil and gas development, mining operations or haul routes are likely to be higher due to machinery, human activities, or vehicle movement. While some proposed transportation routes go through communities (such as Glenwood Springs), in general, sensitive receptors within the leasing area are limited to residents in scattered rural locations near haul routes.

3.16.3.6 Emergency Services

<u>Zone 1</u>

Law enforcement and emergency response near Zone 1 are provided by the Mesa County Sheriff's Department. Emergency response activities are coordinated through Mesa County's Sheriff's Office of Emergency Management (Mesa County 2015). Local fire protection and emergency medical service is provided through the De Beque Fire District, where emergency medical services accounts for the majority of call responses. The De Beque Fire District also provides structural firefighting, hazardous materials operations level response, and wildland fire fighting (De Beque Fire Protection District 2015). Law enforcement in De Beque is provided by the De Beque Marshall Department (Town of De Beque 2015).



Source: Council on Environmental Quality 1970.

Figure 3.16-1 Typical A-weighted Sound Levels

Zones 2 and 3

Law enforcement and emergency response near Zones 2 and 3 are provided by the Garfield County Sheriff's Department. Additionally, there are six fire protection districts serving the county. Locations near Zone 2 include Rifle, Silt, and Parachute. Ambulance service also is available out of Basalt, Parachute, Rifle, Silt, and New Castle (Garfield County 2015b). The municipalities of Rifle and Parachute also provide their own law enforcement departments (The City of Rifle 2015; Town of Parachute 2015). Garfield County fire districts located near Zone 3 include Glenwood Springs and Carbondale. Ambulance service near Zone 3 is located in the towns of Glenwood Springs and Carbondale (Garfield County 2015b). The municipalities of Carbondale and Glenwood Springs near Zone 3 also provide their own law enforcement departments (Carbondale 2015; Glenwood Springs 2015).

Zone 4

Law enforcement and emergency response near Zone 4 are provided by the Rio Blanco County Sheriff's Department, based in the Town of Meeker (Rio Blanco County 2015). The Meeker Volunteer Fire and Rescue provides local fire protection and ambulance service (Meeker Volunteer Fire and Rescue 2015). The municipality of Meeker also provides law enforcement services (Meeker Colorado 2015).

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3.17 Socioeconomics

3.17.1 Regulatory Background

Social and economic conditions are not subject to direct regulation or management, although NEPA requires they be addressed. Social and economic conditions also are commonly recognized and addressed as a concern in a wide variety of federal, state, and local planning and management processes.

The consideration of social and economic conditions in land use management planning processes conducted by the BLM and the Forest Service for the public lands under their respective management are guided by the following:

- BLM, Land Use Planning Handbook, H-1601-1
- Forest Service, Land Management Handbook, FSH 1909.12

The following county land use plans provide guidance related to transportation, housing, land use and land development issues on non-federal lands, as well as goals and objectives related to area character and sources of income:

- Garfield County Comprehensive Plan (2013a)
- Mesa County Land Use Plan (2013)
- Mesa County Mineral and Energy Resources Master Plan (2011)
- Grand Valley 2040 Regional Transportation Plan Update (2014)
- Pitkin County Comprehensive Plan (2003) and 11 Rural Area plans
- Rio Blanco Master Plan (2011)

Regulations related to Environmental Justice are discussed in Section 3.18.

3.17.2 Analysis Area

The analysis area for the socioeconomic analysis consists of Garfield, Mesa, Pitkin, and Rio Blanco counties. The analysis focuses on the four counties as important governing jurisdictions and the main representative units of sub-regional economies. The counties also are important governmental entities responsible for planning and providing public facilities and services.

3.17.3 Regional Affected Environment

The analysis also evaluates the socioeconomic impacts for the local communities surrounding the leases that would be expected to have the strongest socioeconomic relationships with the project activities and project area resources. The local analysis area for the socioeconomic analysis consists of the cities and communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, and Carbondale located in Garfield County. In addition, the small community of De Beque in Mesa County also is included in the local impact analysis. While other cities also could be affected by the project they either have only limited potential relationship with the project (e.g., Meeker in Rio Blanco County) or are larger and more economically diversified cities (e.g., Grand Junction and Aspen) whose economic impacts are considered within the county-level analysis. Due to the nature of some impacts and data limitations, not all socioeconomic impacts can be identified and evaluated at a local level.

3.17.3.1 Population

Table 3.17-1 shows the regional and county population growth since 2000. Between 2000 and 2013, the region's total population increased by approximately 45,600 residents, at a growth rate of 1.9 percent per year that was higher than Colorado's statewide average 1.6 percent rate of annual growth. The majority of the regional population growth was the result of in-migration (Economic Profile System–Human Dimension Toolkit [EPS-HDT] 2015). The in-migration was largely due to the Western Colorado River Valley's residential and commercial construction boom from the region's recreation industry growth, increased oil and gas activity, and development of the I-70 corridor. Together, these also have spurred increasingly inter-dependent economic relationships between the four counties, with substantial inter-county commuting by workers residing in the analysis area (BBC Research and Consulting [BBC] 2007).

Table 3.17-1 Population in Four-County Region (2000-2013)

Area	2000	2013	2000-2013 Growth	Annual Growth Rate (Est.)
Colorado	4,338,801	5,264,890	926,089	1.6%
Four-County Region	183,624	229,263	45,639	1.9%
Garfield County	44,240	57,298	13,058	2.3%
Mesa County	117,651	147,811	30,160	2.0%
Pitkin County	15,764	17,376	1,612	0.8%
Rio Blanco County	5,969	6,778	809	1.0%

Source: Colorado Department of Local Affairs, State Demography Office 2015a.

Between 2000 and 2013, Garfield County had the region's highest population growth rate as its population grew annually by an average of 2.3 percent and added over 13,000 new residents. Garfield County's growth exceeded Colorado's annual 1.6 percent growth rate by nearly 44 percent. The County experienced rapid growth in recent years due to the growth in resort and recreation development in the Roaring Fork Valley; and the relatively abundant supply of affordable housing, which made the County a popular alternative for Pitkin and Eagle Counties' work force and the new oil and gas workers drawn to the Colorado River Valley (BBC 2007). During that same period Mesa County had the largest total population increase as it added over 30,100 new residents at a rate of 2.0 percent annually.

Table 3.17-2 shows the population growth for the communities near the lease area between 2000 and 2013. Altogether, at least 9,360 new residents were added to the local communities' population—representing more than 37.5 percent increase from its 2000 population levels. The growth within these communities accounted for nearly 72 percent of Garfield County's total population growth. The spread of recreation development "down valley" pushed growth from Carbondale and Glenwood Springs, to New Castle, Silt, and Rifle, and as such the major share of the growth occurred in these three towns (BBC 2007).

Table 3.17-3 shows the counties projected future population growth over the next 25 years. All the counties' populations are projected to continue increasing at rates equal to or greater than Colorado's statewide population growth rate.

Table 3.17-2 Population in Local Communities (2000-2013)

Area	2000	2013	2000-2013 Growth	Annual Growth Rate (Est.)
Garfield County				
Carbondale	5,277	6,514	1,237	1.8%
Glenwood Springs	7,884	9,849	1,965	1.9%
New Castle	2,073	4,563	2,490	9.2%
Parachute	1,007	1,095	88	0.7%
Rifle	6,907	9,279	2,372	2.6%
Silt	1,780	2,988	1,208	5.2%
Mesa County				
De Beque	473	492	19	0.3%
Total Local Communities	**25,401**	**34,780**	**9,379**	**2.8%**

Source: Colorado Department of Local Affairs, State Demography Office 2015b.

Table 3.17-3 Population Projections for the Four-County Region (2015-2040)

Area	Population Projections				2015-2040 Growth	Annual Growth Rate (Est.)
	2015	2020	2030	2040		
Colorado	5,439,290	5,924,692	6,915,379	7,752,887	2,313,597	1.7%
Four-County Region	234,432	258,843	317,277	372,196	137,764	2.4%
Garfield County	58,961	66,558	87,300	108,000	49,039	3.3%
Mesa County	150,987	165,695	197,574	226,773	75,786	2.0%
Rio Blanco County	6,826	7,400	8,925	9,767	2,941	1.7%
Pitkin County	17,658	19,190	23,478	27,656	9,998	2.3%

Source: Colorado Department of Local Affairs, State Demography Office 2014a.

3.17.3.2 Housing

In recent years, housing availability and affordability has become an important issue in the four-county region. Although there has been some increase in housing availability following the recent economic downturn, it remains an issue of public concern (USFS 2014a).

Table 3.17-4 provides household and housing data for the four-county region. Vacancy rates in the region are generally highest in communities with the least quantity of affordable housing. In 2013, Pitkin County's had a 37 percent housing vacancy rate and is one of the least affordable housing markets in the four-county region. Pitkin also has the highest median mortgage costs and gross rents (EPS-HDT 2015). A large percent of Pitkin's vacant housing units are from seasonal or recreational use of homes. Adjusting for Pitkin County's recreational housing market, the adjusted vacancy rate for the County would be closer to 25 percent, which is still relatively high when compared to the vacancy rates in neighboring counties (Loughery et al. 2014).

Table 3.17-4 Housing Characteristics and Vacancy Rates for the Four-County Region (2013)

Area	Households		Housing		
	Total	Persons per Household	Total	Vacant	Vacancy Rate
Colorado	2,066,166	2.5	2,254,905	188,739	8%
Four-County Region	89,892	2.5	104,007	14,115	14%
Garfield County	20,709	2.7	23,489	2,780	12%
Mesa County	58,241	2.5	64,111	5,870	9%
Pitkin County	8,258	2.1	13,054	4,796	37%
Rio Blanco County	2,684	2.4	3,353	669	20%

Source: Colorado Department of Local Affairs, State Demography Office 2015c.

As previously discussed, rapid residential development occurred in Garfield and Mesa counties between 2000 and 2013, and these Counties' housing inventories increased by 34 percent and 31 percent, respectively (Colorado Department of Local Affairs, State Demography Office 2015c). Concurrently, these counties also had a large influx of new residents within the past decade, and consequently they continue to have low vacancy rates. **Table 3.17-5** provides the household and housing data for the individual key communities. Of these, Parachute and De Beque have the highest vacancy rates (31 and 18 percent, respectively).

Table 3.17-5 Housing Characteristics and Vacancy Rates for Key Communities (2013)

Area	Households		Housing		
	Total	Persons per Household	Total	Vacant	Vacancy Rate
Garfield County					
Carbondale	2,282	2.8	2,479	197	8%
Glenwood Springs	3,872	2.5	4,176	304	7%
New Castle	1,587	2.9	1,719	132	8%
Parachute	374	2.9	539	165	31%
Rifle	3,259	2.8	3,635	376	10%
Silt	1,006	3.0	1,088	82	8%
Mesa County					
De Beque	185	2.7	225	40	18%

Source: Colorado Department of Local Affairs, State Demography Office 2015c.

3.17.3.3 Commuting Patterns

Many residents of the four-county region commute to work in another county which is an indication of the counties' economic interdependence. Countywide commuting patterns are shown in **Table 3.17-6**. Approximately 24 percent of Garfield County's employed residents work outside the county, the majority (67 percent) of which commute to work in Pitkin County or Eagle County (21 percent). Mesa County has the lowest rate of out-of-county commuting as approximately only 6 percent of its employed residents travel outside of Mesa for work. Most of these commuters (63 percent) travel to jobs in Garfield County (American Association of State Highway and Transportation [AASHTO] 2010).

Table 3.17-6 Commuting Patterns in Four-County Region (2010)

Area	Place of Work	
	In County of Residence	Outside County of Residence
Four-County Region	89%	11%
Garfield County	77%	24%
Mesa County	94%	6%
Pitkin County	91%	9%
Rio Blanco County	87%	13%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: AASHTO 2010.

Most of Garfield County's local communities have commuting rates comparable to or less than the County average except for Carbondale which has a 49 percent out-of-county commuting rate. The small community of De Beque in Mesa County also has a higher commuting rate, as 38 percent of its work force travel daily out of the County to work (AASHTO 2010).

3.17.3.4 Employment

Labor force and employment data for the region is provided in **Table 3.17-7**. In 2014, the four-county region's unemployment rate was 5.8 percent and slightly higher than the statewide unemployment rate of 5.0 percent. While labor force and employment growth rates for both Garfield and Mesa counties were substantially higher than the statewide average between 2000 and 2014, Pitkin County had slower growth rates and Rio Blanco County's rates were negative.

Table 3.17-7 Labor Force and Unemployment Rates for the Four-County Region (2000-2014)

Area	Labor Force			Employed			Unemployment Rate	
	2000	2014	% Change (2000-14)	2000	2014	% Change (2000-14)	2000	2014
Colorado	2,359,515	2,817,334	19%	2,294,408	2,675,947	17%	2.8%	5.0%
Four-County Region	96,801	119,097	23%	93,802	112,212	20%	3.1%	5.8%
Garfield County	24,755	31,505	27%	24,087	29,871	24%	2.7%	5.2%
Mesa County	58,884	73,608	25%	56,921	69,068	21%	3.3%	6.2%
Pitkin County	9,925	11,030	11%	9,651	10,491	9%	2.8%	4.9%
Rio Blanco County	3,237	2,954	-9%	3,143	2,782	-12%	2.9%	5.8%

Source: Colorado Department of Labor and Employment 2015a; 2000.

Pitkin County's low job growth was largely due to the relocation of certain industries, such as construction, to other more affordable down valley areas such as Garfield County (Aspen Community Vision 2008). In addition, many Pitkin County workers reside in neighboring counties with more affordable housing and lower living costs. As a result, the spending by local residents has increasingly moved "down valley" over the past decade.

Tables 3.17-8 and **3.17-9** show industry sector employment by county and for the local communities. The largest employing industry sectors in the seven key towns and cities are construction, retail trade, and services (accommodation and food, education, healthcare and social assistance). The retail trade and the services sectors also are the largest employing industry sectors in the four-county region as a whole. Between 1970 and 2000, there has been a regional shift from the retail sector to the services sector as the region's recreation sector has becoming increasingly important (BLM 2011).

Mineral Extraction

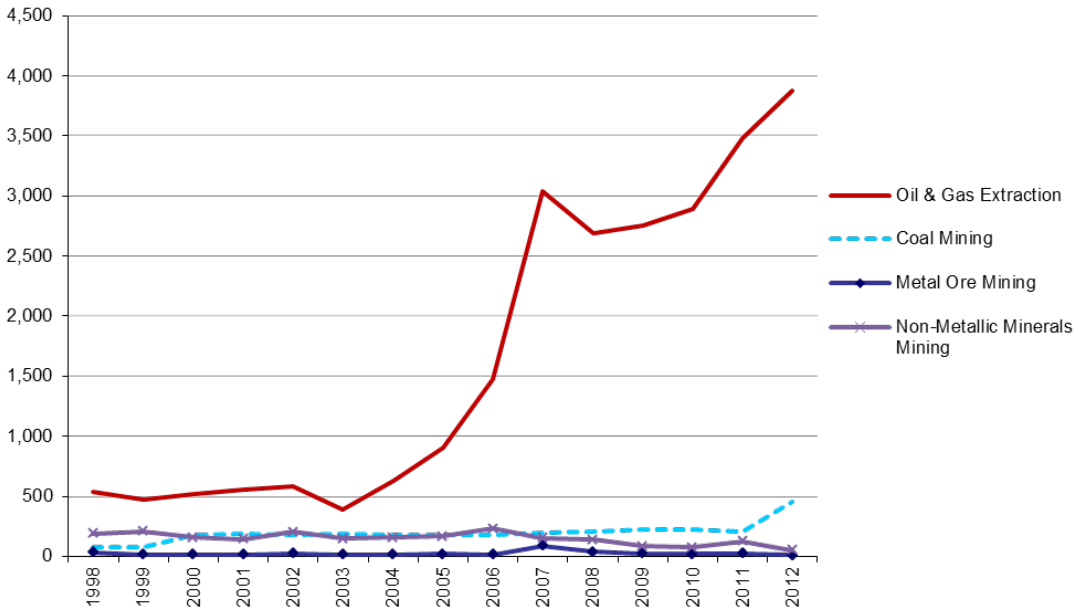
Table 3.17-10 shows mineral extraction sector employment by industry. In 2013, the mineral extraction sector employed an estimated total of 7,235 people that accounted for 4.8 percent of the four-county region's total employment. The sector constitutes a similar proportion of Garfield and Mesa counties' total employment. However, while extraction industries provided over 18 percent of Rio Blanco County's jobs, they provided a negligible proportion (less than 0.2 percent) of Pitkin County's employment. The oil and gas extraction industry and its support activities constitute nearly all (95 percent) of the mineral extraction sector's employment in the four-county region.

Over the last decade, the mineral extraction sector's proportion of regional employment has increased substantially. As recently as 2004, the mineral extraction sector provided only 1 percent of region's total employment. However by 2012, mineral extraction sector employment grew to more than 5 percent of the region's jobs (**Table 3.17-8**). As shown in **Figure 3.17-1**, the oil and gas extraction business sector accounted for the majority of the mineral extraction sector's job growth as employment within the other business sectors was relatively unchanged.

Recreation and Tourism

The recreation and tourism sector (also commonly referred to as the travel and tourism sector) is predominately a subset of the service industry sector. Travel and tourism employment includes the business sectors retail trade, transit, entertainment and recreation, and food and lodging sectors. Together these business sectors employ more than 40,000 workers in the region. However about one-third of these jobs serve local residents. The sales to visitors (i.e., non-local individuals) comprise the remaining two-thirds and are known as the recreation and tourism sector. There are inherent challenges in determining the proportion of economic activity and employment properly attributed to visitor spending versus that spent by local residents.

Table 3.17-11 shows the estimated travel and tourism sector employment by major business type. In 2013, the region's tourism sector is estimated to have provided nearly 26,000 jobs—equivalent to more than 17 percent of the region's total employment. The tourism industry sector is Pitkin County's largest employer, accounting for 30 percent of Pitkin County's jobs. Moreover, Pitkin County's tourism sector accounts for almost half of all the region's travel and tourism jobs. This is due to the popularity of its extensive developed recreation resources and opportunities in particular its successful winter sports and the resorts in Aspen. However, Pitkin County also faces high seasonal unemployment in the off-season months of May and June (EPS-HDT 2015).



Source: EPS-HDT 2015.

Figure 3.17-1 Job Growth in Mining sectors in Four-County Region (1998-2012)

Table 3.17-8 Employment by Industry Sector for the Four-County Region (2013)

Industry Sector	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
Total Employment	**38,766**		**84,033**		**22,176**		**4,835**		**149,810**	
Agriculture	872	2	2,167	3	113	1	338	7	3,489	2
Mineral Extraction	2,633	7	3,682	4	44	0	876	18	7,235	5
Construction	4,173	11	5,207	6	947	4	426	9	10,753	7
Manufacturing	394	1	3,098	4	119	1	40	1	3,651	2
Trade	4,452	12	12,154	15	1,976	9	353	7	18,934	13
TIPU[1]	3,161	8	3,521	4	349	2	151	3	7,182	5
Service	18,113	47	45,064	54	16,737	76	1,600	33	81,514	54
Government	4,970	13	9,139	11	1,891	9	1,052	22	17,052	11

[1] Transportation, Information, Power and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Table 3.17-9 Employment by Industry Sector for the Local Communities (2013)

Industry Sector	Garfield County						Mesa County
	Carbondale	Glenwood Springs	New Castle	Parachute	Rifle	Silt	De Beque
Total Employment	**3,443**	**5,604**	**2,274**	**487**	**4,779**	**1,308**	**144**
Agriculture and Mineral Extraction	82	76	28	23	214	81	17
Construction	586	795	372	77	797	158	22
Manufacturing	78	73	44	17	270	25	6
Trade	356	1,001	443	61	797	292	27
TIPU[1]	154	306	102	31	376	135	11
Service	2,038	3,152	1,208	255	2,120	514	56
Government	149	201	77	23	205	103	5

[1] Transportation, Information, Power and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: EPS-HDT 2015.

Table 3.17-10 Mineral Extraction Employment (2013)

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Employment	38,766		84,033		22,176		4,835		149,810	
Mineral Extraction	**2,633**		**3,682**		**44**		**876**		**7,235**	
Oil & Gas Extraction	971	37%	791	22%	33	75%	245	28%	2,040	28%
Drilling Oil & Gas Wells	862	33%	492	13%	4	9%	105	12%	1,463	20%
Support Activities - Oil and Gas	742	28%	2,281	62%	1	2%	319	36%	3,343	46%
Mining (Except Oil & Gas)	57	2%	95	3%	0	0%	204	23%	356	5%
Support Activities - Mining	1	0%	23	1%	7	16%	2	0%	33	1%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Table 3.17-11 Travel and Tourism Employment in Four-County Region

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Employment	38,766		84,033		22,176		4,835		149,810	
Travel & Tourism Related	**6,622**		**11,831**		**7,070**		**433**		**25,956**	
Retail Trade	714	7%	2,126	18%	618	9%	73	17%	3,531	14%
Entertainment & Recreation	850	13%	1,789	15%	2,338	39%	73	17%	5,100	20%
Food & Lodging	2,997	35%	7,178	61%	3,914	48%	287	66%	14,376	55%
Transport & Related[1]	2,060	45%	738	6%	200	4%	0	0%	2,998	12%

[1] Includes scenic and sightseeing transportation and support activities for transportation, and travel arrangement and reservation services.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Recreational opportunities in the WRNF are wide-ranging. Skiing, snowmobiling and snowshoeing are the primary recreation uses during the winter season. During the rest of the year recreation uses within WRNF includes backpacking, hiking, camping, boating, biking, stand-up paddle boarding and hunting (USFS 2013b).

In 2012, there were an estimated 12,287,000 total visits to the WRNF. Downhill and cross-country skiing and hiking/walking are the most popular recreational activities in the WRNF as reported by the National Visitor Use Monitoring results (USFS 2008). Over half the visitors reported skiing as their primary activity during their National Forest visit, which was followed by hiking/walking (23.5 percent). In comparison, only 0.8 percent and 0.4 percent of visitors reported hunting and fishing respectively as their primary recreational activity during their National Forest visit (USFS 2015f).

As discussed in Section 3.13 (Recreation), developed recreation is very limited within the lease area. There are only two developed recreation sites identified within the lease zones (Beaver Creek and Cayton trailheads) and a total of 39 miles of recreational trails within all four zones with majority located in Zones 2 and 3. An estimated 14 percent of Lease Zone 2 and 7 percent of Zone 3 transect

management areas accessed by dispersed recreation users. Overall, the zones are in predominantly natural or natural appearing conditions with a relatively low-concentration of recreational users.

Big game hunting is an important dispersed recreation activity in the WRNF. Most hunting occurs primarily south of the I-70 from De Beque to Glenwood Springs and east and northeast of Meeker. Big game hunting season also is typically from mid-August through early November. Within the analysis area, the GMUs 12, 23, 42, and 43 are where a majority of the existing leasing zones are located or adjacent to. On average, 20,000 big game hunting licenses are issued annually for GMUs 12, 23, 42, and 43. Hunters typically spend on average 4.6 days per season hunting, and consequently there are approximately 92,000 recreational days per year within the four GMU units for hunting. The majority (75 percent) of hunting use is estimated to be by non-locals that contribute positively to the region's tourism sector by bringing new spending and income (USFS 2010d). Recreational hunting by local resident may be expected to have a more limited economic impact to the regional economy since most of their hunting-related spending may predominantly result in reallocation of spending with little if any net new income added to the region's economy.

Over the last decade, several location or activity specific analyses have estimated the economic contribution of specific recreational activities to the regional economies, some of which are presented in **Table 3.17-12**. Hunting and fishing jobs are a subset of values in **Table 3.17-11.** As hunting and fishing only represent a small percent of total recreational activity that occurs on the WRNF, the employment contribution of these activities also would be expected to similarly represent a limited proportion of the region's tourism and service sectors.

Table 3.17-12 Recreation Sector's Contribution to Employment

Report	Year	Analysis Area	Recreation Activity	Jobs Created
BBC (2008). *Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado.*	2008	Colorado (by county)	Hunting and fishing	Garfield County: 579 Mesa County: 813 Pitkin County: 327 Rio Blanco County: 305 **Four-County Region: 2,024**
Southwick Associates. (2013). *Economic Contribution of Outdoor Recreation in Colorado.*	2013	Colorado (by county)	Hunting	Garfield County: 322 Mesa County: 484 Pitkin County: 70 Rio Blanco County: 191 **Four-County Region**: **1,067**
BBC (2013). *Economic Contribution of Thompson Divide to Western Colorado.*	2013	Thompson Divide Area	Hunting, fishing and other recreation (camping, trails etc.)	Hunting, recreation and fishing generate 72, 138 and 20 jobs respectively.
USFS. (2014a). *WRNF Oil and Gas Leasing Final EIS* and Hopkin, K. (2014). *Recreation Specialist Report. White River National Forest Oil and Gas Leasing EIS.*	2014	WRNF	Hunting and fishing	For every 1,000 non-local hunting and fishing visits, 1.4 jobs are created. For every 1,000 local hunting and fishing visits, 0.2 jobs are created.

Analysis by BBC Research in 2008 estimated that within entire the four-county region recreational fishing generates twice the economic impacts[1] as hunting. It also estimated that recreational fishing supported approximately 1,300 jobs and hunting another 700 jobs (BBC 2008). More recent analysis by Southwick Associates estimated that hunting created 1,067 jobs in the region (Southwick Associates 2013). It also indicated that the region's recreational fishing use likely generated similar economic impacts, which would suggest an estimated total of approximately 2,100 recreational hunting- and fishing-related jobs in the region. This value is similar to BBC Research's 2008 employment estimate of approximately 2,000 (BBC 2008).

Hunting, fishing, and other dispersed recreation activities (including hiking and camping) solely within the Thompson Divide area have been estimated to generate a total of 230 jobs in the region (BBC 2013), of which 72 are estimated to be hunting-related. All of the Zone 3 leases are located within the Thompson Divide area.

The Forest Service 2014 Final EIS for Future Leasing on the WRNF estimated that for every 1,000 local hunting and fishing visits, 0.2 jobs are created and for every 1,000 non-local visits, 1.4 jobs are created (USFS 2014a). The National Visitor Use Monitoring data estimated approximately 150,000 hunting and fishing visits to the WRNF in 2012 and of these approximately 94,000 were elk and deer hunting use. Of the total visits, 25 percent of visitors were from the area within 25 miles of the forest (USFS 2008). As such, based on the Forest Service estimates, hunting and fishing generated approximately 160 jobs in the WRNF.

Agriculture

The agriculture sector includes typical crop production and livestock operations as well as forestry, fishing and hunting businesses. **Table 3.17-13** shows the employment by major agricultural industry for the region and each of the four counties. The agricultural sector accounts for nearly 5 percent of four-county region employment (**Table 3.17-8**) and in 2013 it provided approximately 3,500 jobs. However, the sector's importance varies significantly between counties. In Rio Blanco County, the agriculture sector provides 7 percent of the county's jobs with beef cattle ranching being the county's largest agricultural employer. By contrast, agricultural jobs represent only about 0.5 percent of the Pitkin's employment.

Table 3.17-13 Agriculture Sector Employment in the Four-County Region (2013)

Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Employment	38,766		84,033		22,176		4,835		149,810	
Agriculture Sector	**872**		**2,167**		**113**		**338**		**3,489**	
Crop Farming	300	34%	996	46%	27	24%	126	37%	1,449	42%
Beef Cattle Ranching/Farming	258	30%	394	18%	15	13%	147	44%	815	23%
Other Animal Production[1]	126	14%	449	21%	37	33%	42	12%	654	19%
Support Activities - Agriculture	177	20%	307	14%	31	27%	23	7%	538	15%
Other[2]	10	1%	20	1%	2	2%	0	0%	33	1%

[1] Includes dairy operations, poultry and egg production and all other animal production (e.g., pig and sheep).

[2] Includes Forestry and timber production, commercial logging and fishing. Also includes commercial hunting/trapping (it also may be considered to be a recreational activity).

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

[1] Economic impacts refer to quantifiable benefits to the economy, measured in jobs, labor income and economic output.

Crop farming is the region's largest agricultural employer and provides the most agricultural jobs in all the counties except Rio Blanco. The beef cattle ranching industry is the second largest agricultural employer in the region with many ranching operations grazing their herds on public lands leased from the Federal government.

Grazing is an important economic activity within the WRNF and Thompson Divide areas. Active grazing allotments provide over 19,000 AUMs annually within the Thompson Divide. Based on this, it was estimated that grazing on Thompson Divide supports 64 jobs (BBC 2013).

Livestock grazing within the WRNF is regulated under a system of federal grazing permits or allotments. As discussed in Section 3.14 (Livestock Grazing), the entire WRNF provides grazing for approximately 65 livestock operations on 88 active allotments. It also is estimated that approximately 45 percent of the WRNF total forage is available for livestock grazing use (USFS 2014a). A total of 19 grazing allotments overlap the leasing zones, and cover 26 percent of the analysis area**.**

The WRNF's current permitted level of grazing is 64,863 cattle head months[2] (HMs) and 118,514 sheep HMs. This is the maximum number of HMs that could be accommodated under ideal forage conditions. Actual grazing use varies due to factors such as drought, financial limitations on operators, market conditions and implementation of grazing practices to improve range conditions. Between 2004 and 2008, grazing use in the WRNF averaged 60,043 Cattle HMs and 102,339 Sheep HMs (USFS 2014a). The analysis area contains only a portion of total permitted allotments in the WRNF and consequently only a comparable fraction of the 160,000 HMs are located in the analysis area. As discussed in Section 3.14 (Livestock Grazing), the four leasing zones overlap a total of 17 allotments with an average carrying capacity of 12 AUMs per acre. The analysis area's total grazing capacity is estimated to be 23,300 AUMs, which represents approximately 30 percent of WRNF's estimated total 80,000 AUMs grazing capacity. However, the analysis area's AUM estimates represent its grazing use potential. Specific grazing use of these allotments is unknown and consequently, it is difficult to estimate the specific economic contribution of their grazing use.

3.17.3.5 Income

Labor earnings are the largest source of income for residents, with labor earnings accounting for 59.6 percent of total personal income in 2012 in the four-county region (**Table 3.17-14**). Garfield, Mesa, and Rio Blanco counties had similar compositions of personal income (average of less than $28,000/year), with labor earnings being the largest source of personal income accounting for approximately 60 percent of more of its residents' personal income. Pitkin County's total personal income is more equally divided between labor and non-labor income[3].

[2] A cattle HM or AUM is the amount of forage required by an animal unit for 1 month, and is defined as a mature (1,000-pound) cow or the equivalent (e.g., a cow-calf pair), based on an average consumption rate of 26 pounds of forage dry matter per day.

[3] Non-Labor Income includes: income from investments, payments associated with aging, and payments associated with economic hardship.

Table 3.17-14 Total Personal Income in the Four-County Region (2012)

Income	Garfield County	Mesa County	Pitkin County	Rio Blanco County	Four-County Region
Total Personal Income (in Millions)	$2,396.9	$5,580.1	$1,473.0	$296.9	$9,747.0
Labor Earnings	65%	59%	52%	68%	60%
Non-Labor Income	35%	41%	48%	32%	40%
Average Per Capita Income	$27,034	$27,133	$52,654	$28,033	$42,515

Note: Labor and non-labor income may not add up exactly to 100% due to social security, cross-county commutes, and other factors.

Source: EPS-HDT 2015.

As shown in **Table 3.17-15**, the service industry is the largest contributor to total labor earnings in the four-county region, and is similarly the largest contributor in Garfield, Mesa, and Pitkin counties. In Pitkin County, the service industry is particularly important, due to its significant tourism and recreation sector, and the industry contributes 76 percent of total labor income in the county. In Garfield and Mesa counties, the service sector accounts for 36 percent and 44 percent, respectively, of the total labor income. Mineral extraction, construction, trade and government sectors are the other important contributors for both Garfield and Mesa counties. Mineral extraction industries in Rio Blanco County provides almost a third of Rio Blanco County's labor income, with government, construction and service sectors providing more than 10 percent each.

In all the counties, oil and gas extraction average wages have consistently remained higher than those in other sectors. In 2013 the mineral extraction sector's average wage was nearly twice the region's average wage rate. In comparison, the travel and tourism sector's average wage was nearly half the region's average wage rate (EPS-HDT 2015). The oil and gas sector's comparatively high wage rates results in its larger proportional contribution to the region's labor income.

3.17.3.6 Output

Economic output provides a measure comparable to the county level gross domestic product for each industry sector. Output is measured differently for each industry sector to determine its appropriate contribution to the economy. For manufacturers, gross sales are adjusted for the change in inventory (to account for inputs used in production). Similarly, retail and wholesale trade businesses' output is determined by gross margin (i.e., adjusted for their inventory costs) and not gross sales. However, the service sector's output is represented by gross sales, as its value is predominantly based on labor.

Table 3.17-16 presents the total output in the region by sector. The service sector accounts for the majority of total output in the four-county region. While more than 75 percent of Pitkin County's total output comes from its service sector, it contributes less than 30 percent to Rio Blanco County's total output.

Table 3.17-15 Total Labor Income in the Four-County Region by Industry (2013)

Sector / Industry	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Labor Income	%	Labor Income	%	Labor Income	%	Labor Income	%	Labor Income	%
Total ($ millions)	$1,750	100	$3,068	100	$2,817	100	$205.4	100	$5,713	100
Agriculture	$16	1	$16	1	$12	0	$3	1	$28	1
Mineral Extraction	$224	13	$242	8	$13	1	$66	32	$516	9
Construction	$255	15	$222	7	$193	7	$32	16	$490	9
Manufacturing	$21	1	$149	5	$27	1	$1	1	$179	3
TIPU[1]	$162	9	$169	6	$65	2	$10	5	$347	6
Trade	$176	10	$384	13	$212	8	$9	4	$627	11
Service	$633	36	$1,339	44	$2,130	76	$31	15	$2,534	44
Government	$263	15	$546	18	$166	6	$53	26	$990	17

[1] Transportation, Information, Power, and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Table 3.17-16 Sector Output in Four-County Region (2013)

Sector	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
	Output	%	Output	%	Output	%	Output	%	Output	%
Total (in $millions)	**$5,352**		**$11,235**		**$2,818**		**$860**		**$20,264**	
Agriculture	$49	1	$178	2	$12	0	$51	6	$290	1
Mineral Extraction	$643	12	$834	7	$13	1	$285	33	$1,775	9
Construction	$733	14	$878	8	$193	7	$85	10	$1,889	9
Manufacturing	$142	3	$934	8	$27	1	$9	1	$1,115	6
TIPU[1]	$593	11	$643	6	$65	2	$69	8	$1,369	7
Trade	$481	9	$1,215	11	$212	8	$38	4	$1,946	10
Service	$2,376	44	$5,789	52	$2,130	76	$257	30	$10,553	52
Government	$334	6	$761	7	$166	6	$65	8	$1,326	7

[1] Transportation, Information, Power, and Utilities sector.

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Oil and Gas Extraction

Table 3.17-17 presents total output from the mineral extraction sector in the four-county region. In Rio Blanco, the mineral extraction sector accounts for 33 percent of County's total output (**Table 3.17-16**), by far the highest percentage of all the counties in the region. Mineral extraction makes a negligible contribution to Pitkin County's economy, which has been traditionally more dependent on tourism and recreation businesses as represented by its large service industry sector.

Table 3.17-17 Mineral Extraction Sector Output by Industry (2013)

Sector / Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in $millions)	$5,352		$11,235		$2,818		$860		$20,264	
Mineral Extraction	**$643**		**$834**		**$12.9**		**$285**		**$1,775**	
Oil & Gas Extraction	$273	42%	$216	26%	$10.8	84%	$69.9	25%	$570	32%
Drilling Oil & Gas Wells	$224	35%	$132	16%	$1.2	9%	$26.3	9%	$383	22%
Support Activities - Oil and Gas	$129	20%	$415	50%	$0.1	1%	$54.5	19%	$599	34%
Mining (Except Oil & Gas)	$16.6	3%	$66	8%	$0	0%	$134	47%	$217	12%
Support Activities - Mining	$0.1	0%	$3	1%	$0.7	5%	$0.4	0%	$4.2	0%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

Recreation and Tourism

Table 3.17-18 presents the total output in the four-county region related to the travel and tourism sector. As discussed above, this is primarily a subset of the service industry sector. The recreation and tourism sector in Pitkin County generates approximately 25 percent of the County's total output, with entertainment and recreation, and food and lodging as the two largest contributing business sectors. For all counties, food and lodging constitutes the largest share of their respective outputs.

Table 3.17-18 Travel and Tourism Sector Output by Industry (2013)

Sector / Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in $millions)	$5,352		$11,235		$2,818		$860		$20,264	
Travel & Tourism	**$548**		**$716**		**$667**		**$36.6**		**$1,967**	
Retail Trade	$39.5	7%	$118	17%	$59.1	9%	$9.6	26%	$226	12%
Entertainment & Recreation	$70.4	13%	$104	15%	$260	39%	$6.8	19%	$441	22%
Food & Lodging	$192	35%	$404	57%	$320	48%	$20.2	55%	$936	48%
Transport and related services	$246	45%	$89.5	13%	$28.1	4%	$0	0%	$364	19%

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

According to the National Visitor Use Monitoring data, 79 percent of the WRNF's 12.3 million visitors primarily engage in downhill skiing and hiking/walking. Correspondingly, these recreational activities also would have the largest contributions to the travel and tourism sector output in the four-county region. Annual total spending[4] associated with all WRNF visits was $1,947 million (in 2014 dollars), with downhill skiing visits accounting for $1,388 million (in 2014 dollars[5]) (USFS 2008). As such, downhill skiing alone accounts for 70 percent of total spending from WRNF recreational use.

In comparison, WRNF hunting- and fishing-related recreational use is estimated to generate annual regional travel-related expenditures[6] of approximately $1.8 million and $5.4 million (in 2014 dollars[7]), respectively (USFS 2010d). Wildlife viewing recreation within WRNF is estimated to contribute $4.0 million in travel spending (in 2014 dollars) (USFS 2010d). The analysis area is only a portion of the WRNF, and thus its recreation use will contribute only a portion of total forest-wide travel-related expenditures.

Over the last decade, several studies have estimated the economic contribution of recreational activities to the regional economies, some of which are presented in the **Table 3.17-19**. The total economic impact from recreation is the sum of direct and indirect expenditures related to the recreational activities.

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[4] Spending includes spending on forest and within 50 miles of the forest boundary. Spending categories include lodging, restaurant, groceries, gas and oil, other transportation, admissions and fees etc.

[5] Dollar values from the report were converted to current (2014) dollar values for easier comparison across years, different reports and sections.

[6] These estimates are only for travel-related expenditures, and exclude expenditures on non-travel items such as equipment (e.g., hunting supplies) and entertainment (USFS 2010d).

[7] Dollar values from the report were converted to current (2014) dollar values for easier comparison across years, different reports and sections.

Table 3.17-19 Total Economic Impact from Recreation

Report	Year	Analysis area	Recreation Activity	Total Economic Impact
BBC (2008). *Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado.*	2008	Colorado (by county)	Hunting and fishing	Garfield County: $54.4 mil. Mesa County: $76.1 mil. Pitkin County: $24.8 mil. Rio Blanco County: $30 mil. **Four-County Region**: **$185.3 mil**
Southwick Associates (2013). *Economic Contribution of Outdoor Recreation in Colorado.*	2013	Colorado (by county)	Hunting	Garfield County: $22.6 mil. Mesa: $33.7 mil. Pitkin: $6.0 mil. Rio Blanco: $13.7 mil. **Four-County Region**: **$76.0 mil.**
BBC (2013). *Economic Contribution of Thompson Divide to Western Colorado.*	2013	Thompson Divide Area	Hunting, fishing and other recreation (camping, trails etc.)	Hunting, recreation, and fishing generate $6.8 mil., $12.6 mil., and $1.5 mil., respectively.

Agriculture

Table 3.17-20 presents the total output in the four-county region related to the agriculture sector. For all counties, beef cattle ranching is the most significant agriculture related business sector, constituting the largest share to their respective local outputs. In particular, it accounts for more than half of total agricultural output in Garfield and Rio Blanco counties.

Table 3.17-20 Agriculture Sector Output by Industry (2013)

Sector/Industries	Garfield County		Mesa County		Pitkin County		Rio Blanco County		Four-County Region	
Total Output (in $millions)	$5,352		$11,235		$2,818		$860		$20,264	
Agriculture Sector	**$49.0**		**$178**		**$12.0**		**$51.4**		**$290**	
Crop Farming	$12.1	25%	$61.1	34%	$2.9	24%	$11.3	22%	$87.4	30%
Beef Cattle Ranching/Farming	$26.5	54%	$62.7	35%	$4.1	34%	$35.3	67%	$128.6	44%
Other Animal Production [1]	$4.8	10%	$40.5	23%	$3.7	31%	$3.7	7%	$52.7	18%
Support Activities - Agriculture	$5.1	10%	$12.6	7%	$1.2	10%	$1.1	2%	$20.0	7%
Other [2]	$0.4	1%	$1.2	1%	$0.1	1%	$0.9	2%	$2.6	1%

[1] Includes dairy operations, poultry and egg production and all other animal production (e.g., pig and sheep).

[2] Includes forestry and timber production as well as commercial logging, fishing and hunting (which also may be considered a recreational activity).

Note: Due to rounding, sum of percentages do not always add up to 100 percent.

Source: IMPLAN 2015.

3.17.3.7 Oil and Gas Production

Statewide and Regional Production

Colorado has substantial mineral deposits and considerable ongoing mineral extraction activity. The State's average oil and natural gas production between 2008 and 2012 was $10 billion per year. Colorado's natural gas production is ranked seventh in the U.S. State natural gas sales averaged almost 1.6 Mcf per year between 2009 and 2014 (COGCC 2015e; USEIA 2015a).

Table 3.17-21 shows the region's oil and gas production values. These values are based on the assessed property tax values (Leeds 2014a). Natural gas accounted for 78 percent of oil and gas revenues for the four-county region in 2012, and region accounted for 50 percent of total natural gas sold in Colorado (COGCC 2015f). As shown in **Figure 3.17-2,** most production occurs in the western portion of the region, with only limited oil and gas drilling in the eastern section and no active wells currently operating in Pitkin County.

Table 3.17-21 Regional Oil and Natural Gas Production Values (2012) (in $ millions)

Area	Oil	Natural Gas	Total [1]
Colorado	$3,697.7	$4,754.0	$8,451.3
Four County Region	$638.1	$2,367.5	$3,005.6
Garfield County	$186.3	$1,963.4	$2,149.7
Mesa County	$8.5	$133.7	$142.1
Pitkin County	$0	$0	$0
Rio Blanco County	$443.3	$270.5	$713.8

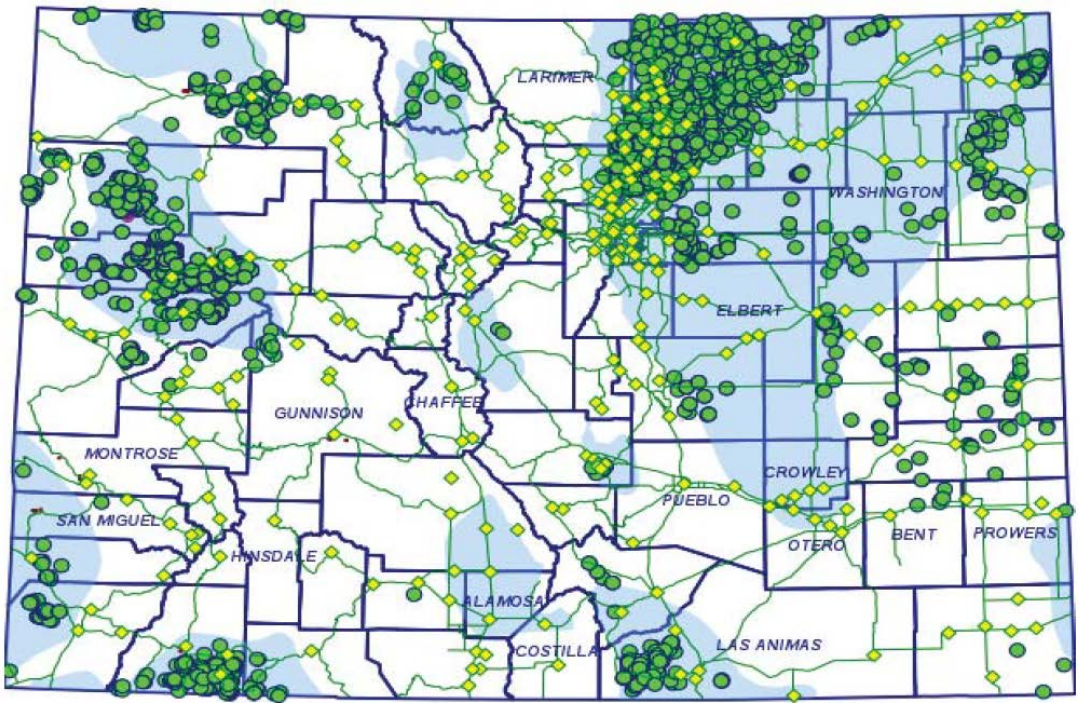
[1] Total does not include additional CO_2 sales revenue of $353 million. No CO_2 production expected in the four-county region.

Source: Leeds 2014a.

The socioeconomic analysis assesses the total oil and gas tax impacts to the four-county region. However, the lease area's wells are expected to produce almost exclusively natural gas. The analysis also assumes that the proportion of natural gas production wells to total active wells is equal to their relative taxable production values (79 percent). It is consequently estimated that there are approximately 11,785 natural gas wells in the four-county region.

Table 3.17-22 shows the estimated annual oil and gas production for the four-county region. In 2014 the average natural gas well in the four-county region produced an estimated 60 million cubic feet per year. Applied over an expected 20-year average operational lifespan with a constant production curve, a typical directional well would be expected to produce a total of 1.2 billion cubic feet of natural gas (assuming a constant production rate). Horizontal wells in the region are similarly expected to produce 6.4 billion cubic feet of natural gas based on a 20-year lifespan and constant production levels.

Other analysts have questioned the economic feasibility of future natural gas production in the Thompson Divide (Wright 2014). The socioeconomic impact analysis for this EIS is not focused on the evaluation of the economic feasibility of specific wells or oil and gas production in the analysis area. Instead it evaluates the future socioeconomic impacts that would be expected under different future lease alternatives assuming future full development of the approved leases.



Source: COGCC 2015d.

Figure 3.17-2 Recent Colorado Oil and Gas Well Permits (April 2015)

Table 3.17-22 Annual Oil and Gas Production and Active Wells

Area	Natural Gas Sales (2014) (Mcf)	Natural Gas Sales (2012) (Mcf)	Oil Sales (2012) (barrels)	Active Oil and Gas Wells (March 2015)
Colorado	1,572,439,283	1,657,526,831	48,694,918	53,400
Four-County Region	709,442,729	829,578,021	7,715,082	14,961
Garfield County	596,115,652	691,491,442	2,805,406	10,975
Mesa County	33,466,673	45,011,451	64,372	1,065
Pitkin County	0	0	0	0
Rio Blanco County	79,860,404	93,075,128	4,845,304	2,921

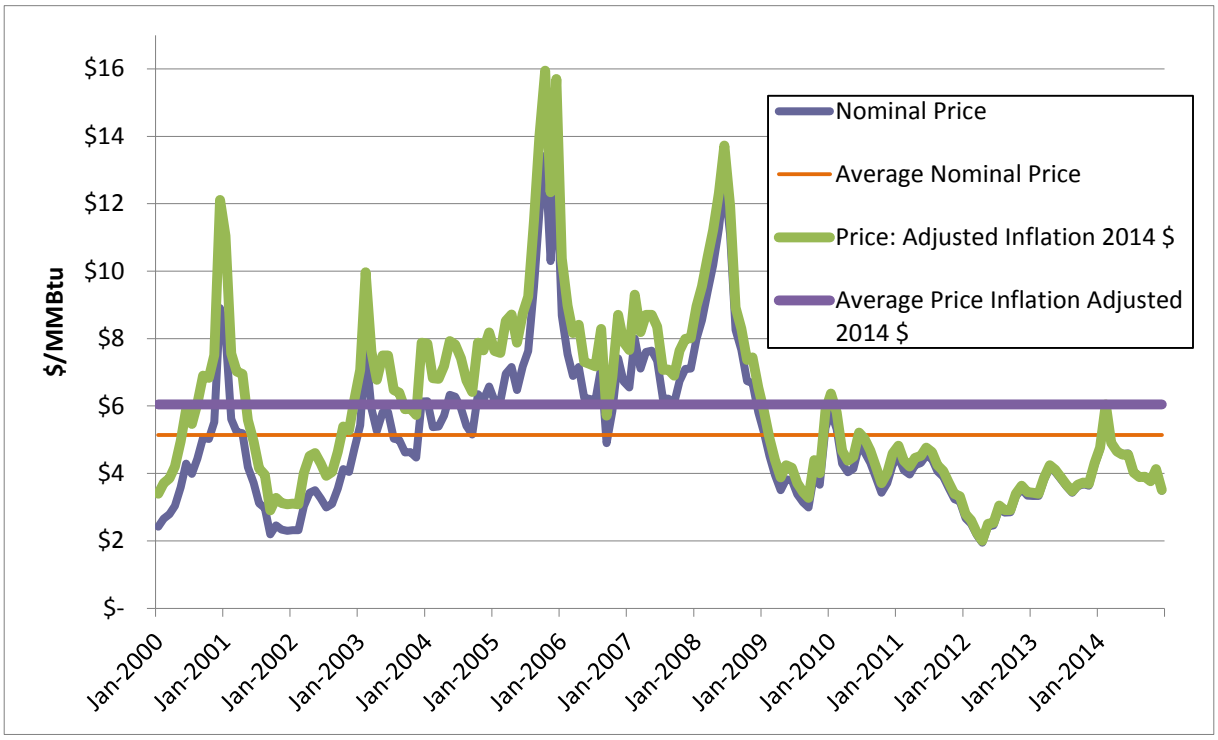
Source: COGCC 2015a-c.

Current Oil and Gas Production within the Analysis Area

There are currently 75 producing wells within the lease boundaries. Another 914 producing wells are located within a 2-mile vicinity of the lease boundaries. The current leased wells support a total of 15 full-time equivalent employees and generate approximately $1.3 million in annual public revenues for the four-county governments. The lease area is projected to support future development of up to 444 new producing wells (see Section 1.1.4). The Forest Service Reasonably Foreseeable Development Scenario also projects the likely future development of up to 1,014 new wells in the area (USFS 2014a).

Estimated Value of Oil and Gas Production

Colorado's oil and gas industry had an average total value of $10 billion per year between 2008 and 2012 of which about $7 billion was obtain from natural gas production (Leeds 2014a). As shown in **Figure 3.17-3**, there has been significant volatility in natural gas prices nationally since 2000. As a result of nationwide production increases and other factors, natural gas prices peaked in 2008 at nearly $13/MMBtu; and have since decreased dramatically (USEIA 2015a). Between 2000 and 2014, the Henry Hub average nominal natural gas price was $5.14/MMBtu. Adjusted for inflation using the Consumer Price Index (CPI), natural gas prices averaged approximately $6.05 in 2014 dollars between 2000 and 2014 (BLS 2015).



Source: USEIA 2015a.

Figure 3.17-3 Henry Hub Natural Gas Prices

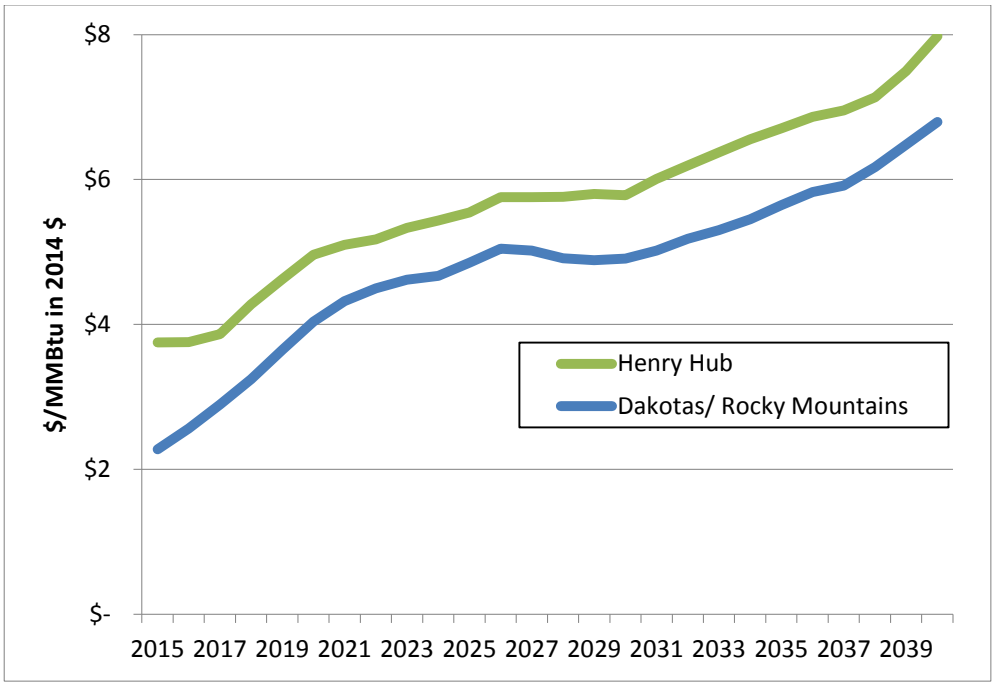
Past Colorado wellhead prices have not always correlated with Henry Hub prices primarily due to variations in natural gas transportation costs and supply conditions. The Leeds 2013 report (citing Colorado Geological Survey) provided an average of $2.87 per Mcf in Colorado in 2012, with oil priced at $87.33 per barrel. These values were used to estimate the total sales values shown in **Table 3.17-23**.

Recent expansion of the Colorado natural gas pipeline system has resulted in greater consistency with Henry Hub prices. Nonetheless, future variability in Colorado natural gas prices can continue to be expected (USEIA 2014a). As shown in **Figure 3.17-4**, natural gas prices in the Dakotas/Rocky Mountains are forecasted to increase in real terms through 2040 with a projected average price between 2017 and 2036 of $4.70/MMBtu in 2014 dollars (USEIA 2014a).

Table 3.17-23 Oil and Gas Sales for 2012 ($ Millions)

Area	Natural Gas Sales (2012)	Oil Sales (2012)	Total Sales (2012)	Natural Gas Percent Total Sales
Colorado	$4,764.5	$4,252.3	$9,016.8	51
Four-County Region	$2,384.6	$673.7	$3,058.3	78
Garfield County	$1,987.7	$245.0	$2,232.6	89
Mesa County	$129.4	$5.6	$135.0	96
Pitkin County	$0.0	$0.0	$0.0	0
Rio Blanco County	$267.5	$423.1	$690.7	39

Source: Leeds 2014.



Source: USEIA 2014a.

Figure 3.17-4 EIA Forecasted Henry Hub vs. Dakotas/ Rocky Mountains Natural Gas Prices

3.17.3.8 Public Revenue

Government revenues from oil and gas activities within its jurisdiction will depend primarily on well production quantities. **Table 3.17-24** shows the state and county oil- and gas-related tax revenues for the region in 2012. Sales and use taxes typically account for a significant proportion of county and local government revenues. For counties with significant oil and gas extraction activity, oil- and gas-related tax and fee payments can represent a major percentage of their general fund revenues. In 2012, Rio Blanco and Garfield counties received oil and gas revenues equivalent to 56 and 45 percent, respectively. of their general fund expenses.

Table 3.17-24 General Fund Expenses and Oil and Gas Revenues for the Four-County Region (2012) ($ Millions)

Area	General Fund Expenses	County Oil and Gas Revenues
Colorado	$7,163.2	$1,600.0
Four-County Region	$272.0	$66.4
Garfield County	$98.3	$44.7
Mesa County	$106.4	$10.3
Pitkin County	$47.2	$0.0
Rio Blanco County	$20.1	$11.3

Source: Garfield County 2012, Leeds County 2014a; Mesa County 2012, Pitkin County 2012, Rio Blanco County 2012.

Several different government agencies collect fees and taxes from oil and gas operations in Colorado and distribute the collected revenues according to different formulas. Detailed discussion, as well as how oil and gas revenues fund other public entities such as school districts, towns and the COGCC is provided below. The Federal Government also pays "Payments in Lieu of Taxes" (PILT) to local governments to help offset their losses in property tax revenues for non-taxable Federal lands. Sales and income taxes related to oil and gas activities also may generate indirect revenues for the state, county and local governments. However, the magnitude of these public revenues will be limited to a small proportion of the workers' added labor income and spending on taxable goods.

Federal Mineral Lease Revenues

The Office of Natural Resource Revenue collects federal mineral lease (FML) revenues from oil and gas leases of Federal Government lands. These revenues include rental of the mineral rights, bonus bids, and royalties once a site begins to produce oil and gas. The revenue is then redistributed to the state from where the mineral leases production occurred with the Federal Government keeping 51 percent and the States getting 49 percent. The state then distributes a portion of their revenue to local government agencies within the county from where the resource was produced. **Table 3.17-25** shows a summary of the FML revenues received by the region's county governments in 2012.

Table 3.17-25 Federal Mineral Lease Revenues for the Four-County Region (2012) ($ Millions)

Area	FML Revenues
Colorado	$72.4
Four-County Region (ex. Local agencies) [1]	$8.8
Garfield	$3.8
Mesa	$1.9
Pitkin	$0.0
Rio Blanco	$3.1
Local Communities [2]	$3.5

[1] Regional Total only includes county governments.

[2] Includes nearby school and special districts as well as the communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, Carbondale, and De Beque.

Source: Leeds 2014a.

An entity interested in producing oil and gas from federal land must first lease the mineral rights. While annual rent is $1.50/acre (increasing to $2/acre after the first 5 years); many parcels are bid for competitively in a federal auction. Interested parties can then offer bonus bids of at least $2/acre to compete for specific mineral lease rights. In some case, bonus bids for specific parcels have been more than $10,000/acre. In an August 14, 2008 auction, the average bonus was $2,084/acre (BLM 2008c).

The federal lease then gives its lessee 10 years to begin production although a lease can be generally extended if the lessee can prove its well will be capable of future oil and gas production. Once a well begins to produce, the lessee will begin making royalty payments to the Federal Government. The magnitude of its royalty payments are based on its production quantities. The current Onshore Federal Royalty Rate for oil and gas production is typically equivalent to 12.5 percent of its total mineral production value (BLM 2014a).

States distribute their lease revenues based on broad Federal guidelines. Generally priority is given to areas socially or economically impacted by mineral development. FML revenues are typically used for planning, construction or maintenance of public facilities. FML revenues also can be used to fund public service operations. FML revenues also are often retained in reserve funds for later use as future emergency budget funding during economic shortfalls.

Colorado's Department of Land Affairs (DOLA) administers the distribution of both its FML and State severance tax receipts (described below). Forty percent of the State's FML revenues are transferred to the county and municipal governments either by direct distribution (50 percent) or through DOLA grants and loans. The allocations are based on statewide share of where the FML was generated, population, road miles and location of employees.

The other 60 percent not distributed to county and municipal governments is paid out to the school districts, the Colorado public school fund, Colorado Water Conservation Board, or other State Reserve funds. School districts receive funding partly based on their enrollment. As a rough estimate, 2.45 percent of the total mineral production value is transferred to the county and the municipal governments in its jurisdiction, with another 3.7 percent benefiting Colorado State Government and Schools.

Property Taxes

The local counties, cities, and school districts can directly tax oil and gas production within their jurisdiction through mill levy property taxes. Mill levy property tax rates vary between jurisdictions. Property tax payments are credited against severance taxes (discussed in section below) at a rate of up to 87.5 percent.

Colorado's total oil and gas related property tax revenues in 2012 were $372.8 million and increased to $383.3 million in 2013 (Leeds 2014b). The tax revenue totals include both an annual assessment as well as time of sale "ad valorem" property taxes. **Table 3.17-26** summarizes the 2012 property taxes revenues for the four-county region.

Federal lands do not pay County property taxes. However, the Federal Government pays PILT to local governments to help offset losses in property taxes from non-taxable Federal lands. PILT helps pay for firefighting, police protection, construction of public schools and roads, and search-and-rescue operations. PILT allocations are calculated based the Federal land acreage, population, Congressional funding levels for the program, and consideration of other Federal Government contributions. For example, PILT payments are generally reduced in jurisdictions with increased FML revenues. 2012 PILT values for the four-county region are shown in **Table 3.17-27**.

Table 3.17-26 Property Tax Revenues from Oil and Gas for the Four-County Region (2012) ($ Millions)

County	Estimated Mill Levies [1]	Oil and Gas Property Taxes
Four-County Region (ex. Local agencies) [2]	47	$53.0
Garfield	46	$38.8
Mesa	61	$6.6
Pitkin [3]	38	$0
Rio Blanco	42	$7.6
Local Communities [4]	-	$64.0

[1] Includes city, school and special districts.

[2] Regional total only includes county governments.

[3] Pitkin County currently has no natural gas production. Pitkin's future property tax rate is assumed to be the same as Rio Blanco County.

[4] Includes nearby school and special districts as well as all cities and towns in the Four-County Region. However, cities and towns accounted for only $105,000 combined

Source: Leeds 2014a,b.

Table 3.17-27 PILT Revenues for the Four-County Region (2012)

Area	PILT Receipts ($ millions)	Total Acres (millions)
Colorado	$27.7	23.7
Four-County Area	$3.9	3.8
Garfield County	$0.4	1.2
Mesa County	$1.6	1.6
Pitkin County	$1.2	0.7
Rio Blanco County	$0.7	0.3
Local Communities [1]	$0.0	0.0

[1] Includes nearby school and special districts as well as all cities and towns in the Four-County Region.

Source: USDI 2013.

Severance Tax

Colorado levies severance taxes on natural gas operations producing more than 90 Mcf/day. Smaller natural gas wells are exempted from paying severance tax (DOLA 2014b; Leeds 2014b). The severance taxes for larger wells are assessed on a sliding scale: from a minimum of 2 percent for wells with a gross income (after royalties) less than $25,000 to a maximum rate of 5 percent severance for wells with annual gross incomes over $300,000. Due to the exemptions, severance taxes are generally only obtained from wells with an annual gross income greater than $300,000 (DOLA 2014b).

In 2013 Colorado derived 1.3 percent of its total State revenues from severance tax payments although in other years severance taxes have accounted for up to 3.2 percent of State revenues (DOLA 2013). However, these taxes are only obtained from jurisdictions that have a mill levy property tax of 58 or less (Colorado's tax code allows operators to deduct up to 87.5 percent of their property tax).

These severance tax revenues are distributed by DOLA with 50 percent paid out to local governments through direct transfer (30 percent) and grants (70 percent). Each jurisdiction's allocation depends on several considerations: employee residence, mineral permits, mineral production, population, and road miles. **Table 3.17-28** summarizes direct transfer county severance tax revenues within the analysis area.

Table 3.17-28 Severance Tax Revenues from Oil and Gas for the Four-County Region (2012) ($ millions)

Area	2012 Severance
Colorado	$75.2
Four-County Region	$4.6
Garfield	$2.1
Mesa	$1.8
Pitkin	$0.0
Rio Blanco	$0.6
Local Communities [1]	$1.6

[1] Includes nearby school and special districts as well as the communities of Parachute, Rifle, Silt, New Castle, Glenwood Springs, Carbondale, and De Beque.

Source: Colorado Department of Local Affairs 2012b.

Many natural gas operations in Garfield and Rio Blanco Counties pay both county property and State severance taxes. Natural gas production in Mesa County pays little to no severance tax revenues to the State as its mill levy rates are greater than 58 mils (Leeds 2014b). However, Mesa County does receive a percentage of State's total severance tax revenues. In fact, Mesa receives almost as much severance tax revenues as Garfield due to the allocation process described above.

Colorado Oil and Gas Conservation Commission Taxes

Oil and gas companies are required to pay a conservation levy (currently 0.07 percent of sales value less exemptions) to the COGCC for its oversight expenses and environmental response fund. In 2012, statewide COGCC tax revenues were $4.7 million, down from $7.1 million in 2011 (Leeds 2014a).

3.17.3.9 Community Character and Social Values

Western Colorado offers its residents a rural and remote character, outdoor recreation opportunities, natural beauty, and scenic quality of its public lands. Many area residents value these characteristics as important factors contributing to their quality of life and sense of place. These characteristics also are often primary factors that attract and retain many residents to live in these communities. According to the Colorado Statewide Comprehensive Outdoor Recreation Plan, 90 percent of Coloradans participated in some form of outdoor recreation over the past year, and more than 65 percent of residents participate in outdoor recreation activities on a weekly basis (CPW 2014d). This is an indication of the extent to which local residents' use and value public land (Hopkins 2014). Furthermore, community assessments conducted for North Central Colorado (Hopkins 2014) and Mesa County (BLM 2009) also reported its residents consider the area's recreation opportunities, wildlife resources and scenic landscape as the most valuable community characteristics.

The rural and remote landscape characteristics of the region with its diversity in topography and vegetation, presence of cultural and traditional uses (such as open rangelands), and the historical landscape contribute greatly to the "sense of place" for communities in Western Colorado, particularly those south of I-70. "Sense of place" can be described as an unquantifiable value that attracts people to

specific landscapes, generates a community identity, and ultimately contributes to the overall quality of life of its residents (Hopkins 2014).

Surveys and studies of reported preferences of the local community with respect to their quality of life have identified a wide range of different perspectives and concerns. Comments received from community groups and individuals during the public scoping period included those favoring the economic and lifestyle benefits from oil and gas development within the area as well as those placing more value on the economic and lifestyle benefits WRNF's recreational and wilderness resources.

Overall feedback gathered from interviews with officials from Mesa, Garfield, and Rio Blanco counties identified the following common themes in their constituents' attitudes and perceived quality of life changes from the ongoing growth in oil and natural gas development within the region.

- Urbanization and higher land values have reduced agriculture's viability, changing the area's culture (Redifer et al. 2007);
- Long-term residents miss the "small town atmosphere" of the past (Redifer et al. 2007);
- Many residents find it less satisfying to hunt and fish in their favorite places as development encroaches into wildlife areas (Redifer et al. 2007);
- The natural beauty of the area is disrupted as views are marred by drilling rigs and networks of access roads (Redifer et al. 2007); and
- Growth in the temporary and transient work force has caused housing shortages (BLM 2015i; Redifer et al. 2007).

In early 2014, the BLM held a public scoping period for the project. Members of the public could comment on the project through email, regular mail, fax as well as during public meetings in Glenwood Springs, Carbondale, Aspen, and DeBeque. The BLM received over 32,000 comment submissions, of which about 31,000 were form letters. Of the 866 form letter submittals originating within the four-county region, 553 (64 percent) were from self-identified Garfield County residents and 279 (32 percent) were from Pitkin County residents. Only 34 (4 percent) were by Mesa County residents. No form letters were submitted by Rio Blanco County residents.

Scoping submissions resulted in a total of 4,158 scoping comments. Of this total, 10 percent were primarily concerned with socioeconomic issues and another 5 percent raised recreation-related issues. Other major topics potentially related to the area's quality of life included water (10 percent), air quality (6 percent) and wildlife (7 percent), and human health and safety (5 percent). Grazing-related issues comprised 1 percent of comments, as did visual concerns. Three percent of the comments related to roadless areas.

Public comments from the 2,318 form letters submitted by self-identified Colorado residents included the following sentiments:

- Concerns about legally deficient oil and gas leases in WRNF and/or in the Thompson Divide and request to void the leases.
- Concerns about impacts to wildlife/wildlife habitat; inventoried roadless lands and values; threatened, endangered, and sensitive species; plant species and plant communities; scenery; and recreation opportunities.
- Request to expedite the NEPA process and to address the economic and community uncertainties of the oil and gas leases.

The following section contains a summary of non-form letter submissions provided by self-reported residents of the four-county area. The summary was derived through a review of individual scoping submissions as well as the scoping report (BLM 2015i).

The majority of local community respondents supported voiding or cancelling the leases. These concerns were predominantly related to the potential adverse impact of oil and gas development on the region's physical and natural resources and thus its "sense of place" and overall quality of life. Particular emphasis and concerns were expressed on the potential for adverse impacts on recreation and grazing due to the important contribution these activities are considered to make to the local economies. The most commonly stated concerns relating to potential oil and gas development in the analysis area are listed below. Respondents express concerns that:

- Air quality would decrease, or that there could be a higher risk of adverse health effects from increased emissions by oil and gas development activities.
- Water quality impacts could affect recreation, wildlife, fisheries and livestock grazing.
- Oil and gas activities could potentially limit or affect existing and proposed land use.
- Oil and gas activities could potentially affect the future of grazing use of the Thompson Divide area, which has been ranched for a century.
- Recreation and tourism would be adversely affected particularly in terms of big-game hunting in Thompson Divide, fishing in Roaring Fork River and skiing and resort areas around Aspen. Respondents stated that adverse impact of oil and gas activity on physical resources (e.g., air and water quality as well as traffic impacts) could compromise the region's attractiveness as a tourism and recreational destination.
- GMUs 42, 43, and 542, which are located near the leasing zones and reportedly generate more than 20,000 annual big game hunting licenses, could be adversely affected.
- Future oil and gas activity would adversely affect the economic impacts to the local economy from recreation. Commenters cited the Thompson Divide area as an example of the economic significance of recreation for their communities, generating 300 jobs and $30 million in economic activity, of which 72 jobs and $6.8 million in annual economic output were generated by hunting.

Concerns and support for the lease renewal was broadly associated with the respondent place of residents. Generally individual from the eastern part of the region (e.g., Pitkin County) mostly opposed future renewals of the leases while those in the west (particularly in Mesa County) were more likely to express support for lease continuation. Pitkin County respondents generally expressed views emphasizing the importance of the region's recreation resources, both in terms of their personal use and for the region's resort and tourism industries. These respondents also expressed an appreciation of the region's undeveloped natural resources especially in the Thompson Divide.

While a substantial portion of Garfield County respondents reported similar opinions and also expressed the importance of local agriculture and grazing to the area's economy and character, some individuals raised concerns that any lease cancellations would result in negative economic effects.

Support for retaining the leases also was expressed by other respondents and the majority of Mesa County respondents asserted the importance of oil and gas development for the region's economy. The statements of support for retaining the leases were associated with the socioeconomic impacts of the oil and gas activity in the region Respondents expressed concerns that reduced oil and gas development and possible future departure of energy companies could result in negative economic impacts such as loss of jobs, local revenue, grant funding, affordable healthcare, and emergency facilities. Respondents stated that the oil and gas development provide the community with well-paying jobs that cannot be found in other industries and that lease cancellations would affect both workers directly employed in the

extraction industry and support services. Other respondents also noted that the oil and gas industry contributes to the local communities not only through oil and gas revenues, but also through fundraisers, scholarships and other charitable ventures.

Local municipalities and service providers included the following information about the contribution of oil and gas development:

- The Town of Parachute indicated that the oil and gas industries provide a considerable amount of tax revenue from oil and gas development, and the provision of public services may be affected without this source of revenue.
- The Grand River Hospital District in Garfield County indicated that majority of the funds with which they operate are directly attributable to oil and gas development, and cited specific medical facilities that were funded with oil and gas revenues.
- The Grand Valley Fire Protection District stated that 93 percent of its budget is comprised of property taxes derived from oil and has activities.

Overall, a common sentiment among supporters and opponents of renewing the leases was that measures should be taken to avoid oil and gas activity-related deterioration on the surrounding environment and natural resources. These sentiments expressed by self-reported residents of the Four-County area also are reflected in the Master Plans developed to guide future development within each of the four counties.

- Garfield County recognizes energy development as a dominant industry with the potential for strong job growth and considerable benefit to the economic health of the county (Garfield County 2013a).
- Mesa County recognizes and seeks to protect its rural character and notes that that continued ranching may require the use of public lands to remain viable (Mesa County 2013). Furthermore, the stated overall goal of its 2011 Mesa County Mineral and Energy Resources Master Plan is to "(c)reate and maintain a balance between present and future resource development and use" by "minimizing negative impacts from Resource exploration, development and use and protecting Resources from incompatible land uses."
- Pitkin County is guided by several plans, all of which emphasize the protection of the natural environment, agriculture, and the rural character. Snowmass-Capitol Creek Valleys Master Plan (which guides development in and near Aspen) specifically seeks to prevent mineral development, including oil and gas drilling on private lands, to the extent possible, discourages such activities on public lands (Snowmass Capitol Creek Caucus 2003).
- Rio Blanco promotes the preservation of rural and agricultural areas, while at the same time acknowledging the importance of resource extraction. The Master Plan suggests the county should promote agriculture, outdoor recreation, tourism a pristine environment, and new economic opportunities to decrease negative effects of an unpredictable energy market (Rio Blanco County 2011).

3.18 Environmental Justice

EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (59 FR 7629), is "intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for participation in, matters relating to human health and the environment." It requires each federal agency to achieve environmental justice as part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority and low-income populations.

The BLM relies on the CEQ Environmental Justice Guidance under NEPA (CEQ 1997) in implementing EO 12898 for NEPA documents. The guidance for evaluating potential adverse environmental effects of projects requires specific identification of potential environmental justice communities of concern when either: 1) a low-income population is meaningfully greater than the surrounding area; 2) a minority population exceeds 50 percent of the population of the affected area; or 3) a minority population is meaningfully greater than the surrounding area. The guidance considers the following groups to be minorities: American Indian or Alaskan Native; Asian or Pacific Islander; Black or African American; and Hispanic or Latino.

3.18.1 Analysis Area

The study area for direct and indirect impacts to environmental justice includes U.S. Census Bureau tracts in Garfield, Mesa, Pitkin, and Rio Blanco counties that contain existing oil and gas leases. This includes tract 9511 in Rio Blanco County, tracts 9516, 9517.01, 9517.02, 9518.02, 9518.03, 9518.04, 9519.01, 9519.02, 9520.01, 9520.02, and 9521 in Garfield County, tract 18 in Mesa County, and tract 1 in Pitkin County. These tracts were selected by overlaying the analysis area with the 2010 Census Tracts to see which tracts were either completely within or partially within the analysis area.

3.18.2 Affected Environment

The data presented below is based on the U.S. Census Bureau's 2009-2013 American Community Survey 5-year estimates (U.S. Census 2013a,b) for the affected Census tracts. Information on poverty, race, and ethnicity are used to determine if any of the communities near the oil and gas leases are environmental justice communities of concern. In 2013, the poverty threshold was $11,888 per person or $23,624 for a family of four (U.S. Census 2013c).

3.18.3 Minority Populations

Table 3.18-1 summarizes the minority populations in the each of the counties by Census tracts. The four-county region's total population is 229,263 and predominantly consists of non-Hispanic whites (approximately 80 percent). Less than 4 percent of the population consists of African American, American Indian, Asian, or Native Hawaiian residents. The region's total minority population (excluding Hispanic or Latinos) is 8,283. Hispanic or Latinos residents account for 38,461 persons or approximately 17 percent of the total population in the four-county area.

In accordance with the CEQ guidance, minority populations should be identified when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population of the affected area is meaningfully greater (i.e., 10 percentage points greater) than the surrounding area (i.e., the county that contains the tract).

Table 3.18-1 Minority Populations 2009 – 2013 American Community Survey 5-Year Estimates

Geography	Non-Hispanic White alone[1]	Total Minority[1]	Hispanic or Latino[1]	Minority Populations by Race					
				Black or African American alone[1]	American Indian and Alaska Native alone[1]	Asian alone[1]	Native Hawaiian and Other Pacific Islander[1]	Some Other Race alone[1]	Two or More Races[1]
Rio Blanco County	85.2	14.8	10.8	0.5	1.5	0.4	0.0	0.0	1.6
Tract 9511	82.8	17.2	12.3	0.4	1.7	0.6	0.0	0.0	2.2
Garfield County	69.0	31.0	28.2	0.4	0.4	0.6	0.2	0.0	1.2
Tract 9516	69.7	30.3	28.0	0.1	0.2	0.0	0.0	0.0	2.0
Tract 9517.01	64.7	35.3	33.2	0.4	0.5	0.0	0.0	0.0	1.2
Tract 9517.02	70.8	29.2	25.9	0.5	0.0	1.8	0.0	0.0	1.1
Tract 9518.02	74.0	26.0	24.5	0.0	0.0	1.1	0.0	0.0	0.4
Tract 9518.03	62.5	37.5	36.6	0.5	0.0	0.0	0.0	0.2	0.1
Tract 9518.04	70.8	29.2	24.1	0.0	2.6	1.4	0.0	0.0	1.1
Tract 9519.01	68.4	31.6	25.7	0.3	0.0	1.9	2.6	0.0	1.0
Tract 9519.02	66.6	33.4	30.4	0.1	1.3	0.2	0.0	0.0	1.3
Tract 9520.01	59.7	40.3	38.2	0.2	0.0	0.0	0.0	0.0	2.0
Tract 9520.02	75.6	24.4	21.4	1.6	0.0	0.2	0.0	0.0	1.1
Tract 9521	74.0	26.0	23.1	0.2	0.3	0.8	0.0	0.0	1.6
Mesa County	82.7	17.3	13.5	0.6	0.4	0.7	0.1	0.2	1.9
Tract 18	90.7	9.3	5.8	0.6	2.3	0.0	0.0	0.0	0.6
Pitkin County	87.0	13.0	9.3	0.3	0.6	1.6	0.0	0.3	0.9
Tract 1	87.5	12.5	8.7	0.0	1.0	1.2	0.0	0.3	1.2

[1] Units in percent.

Note: Total minority is the sum of Minority Populations by Race and Hispanic or Latino.

Source: U.S. Census 2013a.

None of the affected tracts contain more than 50 percent of any minority population. In addition, none of the tracts contain a minority population that is 10 percentage points higher than the county as a whole.

Prehistoric sites with cultural and/or religious significance also may be in the study area. Further consultation with native tribes on the importance and locations of these sites will take place. For more details, see Section 3.9, Cultural Resources.

3.18.4 Low-income Populations

Table 3.16-2 summarizes the low-income populations in the each of the counties by Census tracts. In 2013, the range of median household incomes for the four-county area was between $49,471 for Mesa County and $72,745 for Pitkin County (U.S. Census 2013a). Of the four counties, Rio Blanco County had the highest percent of individuals with below poverty level incomes (i.e., low-income).

Table 3.18-2 Low-income Populations

Geography	Percent of Population Below the Poverty Line
Rio Blanco County	14.9
Tract 9511	16.8
Garfield County	11.9
Tract 9516	7.7
Tract 9517.01	19.5
Tract 9517.02	21.3
Tract 9518.02	6.3
Tract 9518.03	17.9
Tract 9518.04	9.5
Tract 9519.01	10.3
Tract 9519.02	5.1
Tract 9520.01	20.7
Tract 9520.02	6.1
Tract 9521	11.6
Mesa County	14.7
Tract 18	13.8
Pitkin County	10.1
Tract 1	12.1

Source: U.S. Census 2013a.

In accordance with the CEQ guidance, low-income populations should be identified when the low-income population of the affected area is meaningfully greater (i.e., 10 percentage points) than the surrounding area (i.e., the county that contains the tract).

Six of the affected tracts contain higher proportions of low-income individuals than the counties that contained them. However, none of the affected tracts had low-income proportions that were more than 10 percentage points higher than the counties that contained them.

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