3.5 Water Resources

3.5.1 Surface Water

Surface water resources include flowing and standing waters that may be affected by the development of the previously issued leases. Considered are rivers, streams, drainages, reservoirs, lakes, and ponds. The state water quality classifications are included along with specific protection areas for drinking water sources and outstanding water resource values. Consideration also is given to the upslope contributing areas to the water resources in this section. Topography in the analysis area extends from nearly 13,000 feet amsl at the peak of Mount Sopris on the eastern edge to just less than 5,000 feet amsl where the Colorado River leaves the area through DeBeque Canyon.

3.5.1.1 Regulatory Background

Specific legal and regulatory constraints that are relevant to the previously issued leases and surrounding areas include the following:

- Federal Water Pollution Control Act ("Clean Water Act") of 1972 and associated Colorado statutes and standards, including:
  - CDPHE Regulation No. 33 Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12);
  - CDPHE Regulation No. 35 Classifications and Numeric Standards for Gunnison and Lower Dolores River Basins;
  - CDPHE Regulation No. 37 Classifications and Numeric Standards for Lower Colorado River Basin;
  - CDPHE Regulation No. 61 Colorado Discharge Permit System;
  - CDPHE Regulation No. 93 Section 303(D) List of Impaired Waters, and Monitoring and Evaluation List; and
  - Other CWA section requirements and related findings or designations.
- Rivers and Harbors Act (33 United States Code [USC] 401 et seq.);
- CFR Title 33 Navigation and Navigable Waters;
- Safe Drinking Water Act – Colorado Safe Drinking Water Program;
- Colorado River Basin Salinity Control Act;
- Executive Order (EO) 11988, Floodplain Management;
- EO 11990, Protection of Wetlands, May 24, 1977;
- Colorado State Constitution Article XVI Sections 5 and 6, Water of Streams Public Property and Diverting Unappropriated Water Priority Preferred Uses;
- CCR 5 CCR 1002-31, The Basic Standards and Methodologies for Surface Water;
- COGCC Rule 317B, Public Water System Protection;
- WRNF LRMP 2002 Revision (USFS 2002a); and
- CRVFO Proposed Resource Management Plan and Final EIS (BLM 2014b).

3.5.1.2 Analysis Area

The analysis area considered for surface water resources includes the 6th-level subwatersheds, otherwise known as the 12-digit Hydrologic Unit Codes (HUC-12) of the Watershed Boundary Dataset (NRCS et al. 2010), that encompass the leases under consideration for direct, indirect, and cumulative effects to water resources. The subwatersheds comprising the analysis area, including the leases located partially or wholly within each, are listed by the four zones in **Table 3.5-1** and depicted in **Figures 3.5-1** and **3.5-2**.

Table 3.5-1 Subwatersheds Containing Previously Issued Leases

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
1	Big Wash-Plateau Creek	140100051310	35,319	COC 066926	465
	Wallace Creek	140100051401	14,469	COC 066731	161
	Alkali Creek-Colorado River	140100051403	16,591	COC 058677	543
				COC 059630	587
				COC 066727	640
				COC 066728	1,276
				COC 066729	477
				COC 066730	1,279
				COC 066731	490
				COC 066732	387
	Horsethief Creek-Colorado River	140100051404	25,274	COC 066729	177
				COC 066732	1,050
				COC 066733	1,350
				COC 066926	468
	Horseshoe Canyon-Colorado River	140100051406	37,963	COC 066733	66
			35,319	COC 066926	697
2	Headwaters West Divide Creek[1]	140100050301	21,161	COC 066917	202
	Upper West Divide Creek[1]	140100050302	19,897	COC 066723	22
				COC 066724	844
				COC 066915	2,537
				COC 066916	2,562
				COC 066917	1,253
	Alkali Creek	140100050303	15,216	COC 066723	993
				COC 066724	1,129
				COC 066918	1,622
				COC 070361	591
				COC 072157	296
	Middle West Divide Creek	140100050304	18,849	COC 066723	265
				COC 066918	935
	West Mamm Creek	140100050401	9,766	COC 061121	500
				COC 067147	307
				COC 067150	639
				COC 075070	636

Table 3.5-1 Subwatersheds Containing Previously Issued Leases

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
2	West Mamm Creek	140100050401	9,766	COC 076123	80
	Middle Mamm Creek	140100050402	9,083	COC 067147	476
				COC 067150	23
	East Mamm Creek	140100050403	13,356	COC 070013	1,044
	Dry Creek-Colorado River	140100050604	29,562	COC 061121	463
				COC 075070	249
	Beaver Creek-Colorado River	140100050701	38,092	COC 066920	418
				COC 067542	480
				COC 067544	8
				COC 070014	228
				COC 070015	678
				COC 075070	268
	Cache Creek-Colorado River	140100050702	45,715	COC 067543	1,167
				COC 067544	722
				COC 070014	1,259
				COC 070015	920
				COC 070016	51
	Owens Creek	140100051101	10,339	COC 066917	465
	Middleton Creek	140100051104	14,265	COC 070013	218
				COC 070361	47
			21,161	COC 072157	342
3	Coal Creek	140100040704	17,088	COC 066700	288
				COC 066702	746
	Thompson Creek	140100040708	49,463	COC 066691	198
				COC 066692	1,417
				COC 066693	719
				COC 066694	119
				COC 066695	1,061
				COC 066696	1,027
				COC 066697	1,872
				COC 066698	2,435
				COC 066699	114
				COC 066700	539
				COC 066701	1,885
				COC 066702	415
				COC 066707	300
				COC 066708	78
				COC 066709	165
				COC 066711	1,224
				COC 066712	875

Table 3.5-1 Subwatersheds Containing Previously Issued Leases

Zone	Subwatersheds			Previously Issued Leases	
	Name	HUC-12	Area (acres)	Serial Number	Area (acres)
3	Thompson Creek	140100040708	49,463	COC 066908	2,334
				COC 066909	2,066
				COC 066913	199
	Edgerton Creek-Crystal River	140100040709	35,999	COC 066693	876
				COC 066909	11
	Fourmile Creek	140100041001	23,833	COC 066687	1,048
				COC 066688	774
				COC 066689	40
				COC 066690	274
				COC 066693	572
				COC 066706	1,547
				COC 066707	44
				COC 066710	1,435
				COC 066711	527
				COC 066908	66
	Outlet Roaring Fork River	140100041003	25,853	COC 066687	6
	Headwaters West Divide Creek[1]	140100050301	21,161	COC 058835	1,475
				COC 058836	1,279
				COC 058837	1,669
				COC 058838	1,253
				COC 058839	898
				COC 058840	639
				COC 058841	638
				COC 066698	25
				COC 066709	285
				COC 066913	1,461
	Upper West Divide Creek[1]	140100050302	19,897	COC 058839	229
	Camp Creek-East Divide Creek	140100050305	13,573	COC 066706	1,000
				COC 066707	931
				COC 066708	2,476
				COC 066709	189
				COC 066710	894
	Clear Fork East Muddy Creek	140200040202	24,744	COC 058838	24
				COC 066700	14
			17,088	COC 066702	93
4	Headwaters Milk Creek	140500020101	24,900	COC 066948	1,454
	Upper Milk Creek	140500020102	15,638	COC 066948	1,107

[1] These two Subwatersheds have leases from Zones 2 and 3; their acreages are included in the analysis area for both (repeated).

Source: NRCS et al. 2010.

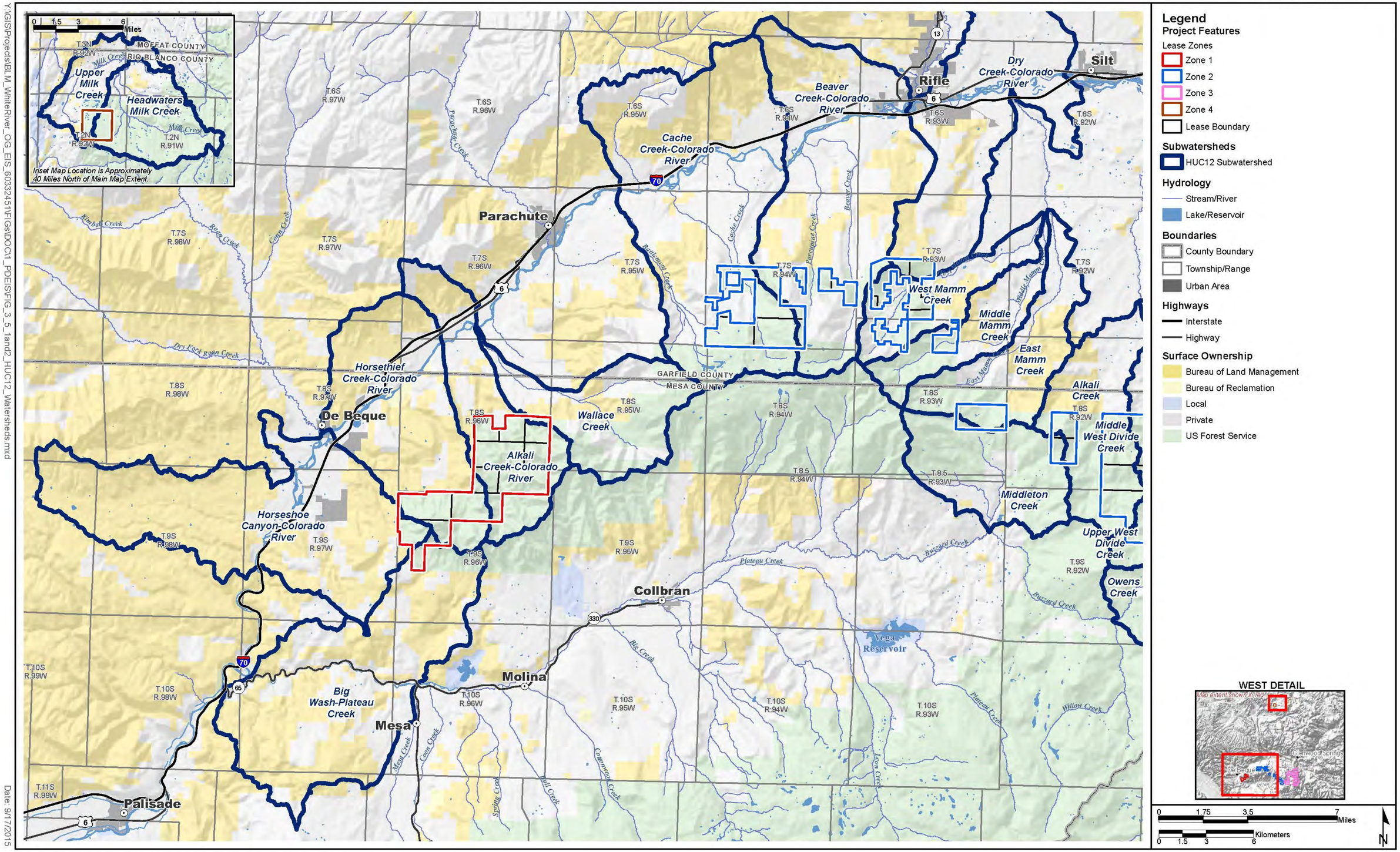

Figure 3.5-1 Hydrologic Units in the Analysis Area (West Side)

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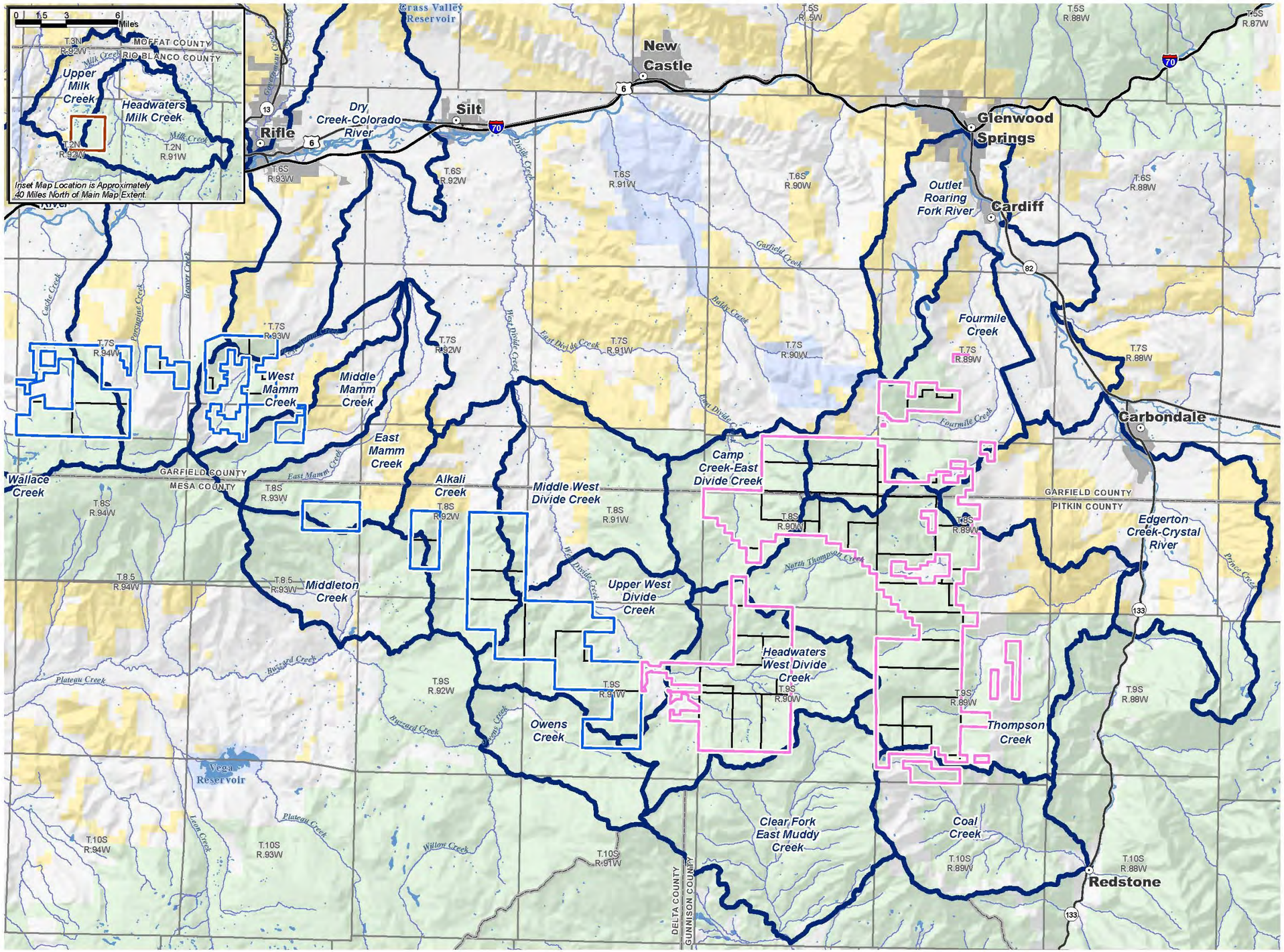


Legend

Project Features

Lease Zones
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lease Boundary

Subwatersheds
- HUC12 Subwatershed

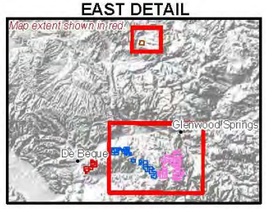
Hydrology
- Stream/River
- Lake/Reservoir

Boundaries
- County Boundary
- Township/Range
- Urban Area

Highways
- Interstate
- Highway

Surface Ownership
- Bureau of Land Management
- Bureau of Reclamation
- Local
- Private
- US Forest Service

EAST DETAIL



0 1.75 3.5 7 Miles

0 1.5 3 6 Kilometers

N

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Figure 3.5-2 Hydrologic Units in the Analysis Area (East Side)

3.5.1.3 Regional Affected Environment

The surface water analysis area is located entirely within the Colorado River Basin. Major rivers that the analysis area drains toward include the Colorado River (Zones 1, 2, and 3), Roaring Fork River and Crystal River (Zone 3), and the Yampa River (Zone 4). The analysis area of Zones 1, 2, and 3 is generally bounded by the Colorado River corridor on the north and west, the Roaring Fork and Crystal river corridors on the east, and the Plateau Creek corridor to the south. A small area of Zone 3 drains towards the Gunnison River through Muddy Creek. Zone 4 is approximately 40 miles north of the other zones, and has its own analysis area in the Milk Creek drainage (tributary to Yampa River). Additional details on specific waters are included by Zone in the following sections, and a complete listing of surface waters located within the analysis area is included in **Appendix A**, Water Resources. **Figures 3.5-3** and **3.5-4** display the different types of streams and other waterbodies within the analysis area. The WRNF Oil and Gas Leasing Final EIS (USFS 2014a) and the Watershed Specialist Report, Oil and Gas Leasing on the White River National Forest (Weinhold 2014) analyzed all NFS lands that are considered in this EIS.

Water Quality

Water Quality Beneficial Use Classifications

The Clean Water Act (CWA), Section 303(c), requires each state to review, establish, and revise water quality standards for all surface waters within the state. The State of Colorado Water Quality Control Commission has designated the rivers, streams, and lakes within the analysis area with beneficial use classifications that contain narrative and numeric water quality standards. Surface waters within the analysis area are defined by the classifications listed in **Table 3.5-2**.

Table 3.5-2 Water Quality Beneficial Use Classifications in the Analysis Area

Use Classification	Sub-class	Description
Outstanding Waters (OW)	na	Waters with existing quality determined to meet the following three criteria: equal to or better than specified numeric standards for aquatic life - 1, recreation - P and domestic water supply uses; hold an outstanding natural resource (e.g., fishery, special management); and requires protection in addition to the water quality classification and standards and the protection of the antidegradation review process.
Aquatic Life Cold (ALC)	1	These are waters that: (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions.
	2	These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.
Aquatic Life Warm (ALW)	1	These are waters that: (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions.
	2	These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

Table 3.5-2 Water Quality Beneficial Use Classifications in the Analysis Area

Use Classification	Sub-class	Description
Recreation (R)	e	Existing Primary Contact Use - These surface waters are used for primary contact recreation. Such activities include but are not limited to swimming, rafting, kayaking, tubing, windsurfing, water-skiing, and frequent water play by children.
	p	Potential Primary Contact Use - These surface waters have the potential to be used for primary contact recreation.
	n	Not Primary Contact Use - These surface waters are not suitable or intended to become suitable for primary contact recreation uses.
Water Supply (WS)	na	These surface waters are suitable or intended to become suitable for potable water supplies. After receiving standard treatment (defined as coagulation, flocculation, sedimentation, filtration, and disinfection with chlorine or its equivalent) these waters will meet Colorado drinking water regulations and any revisions, amendments, or supplements thereto.
Agriculture (AG)	na	These surface waters are suitable or intended to become suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.

na - Not Applicable.

Source: CDPHE 2013.

Section 303(d) of the CWA requires states to list all streams that do not meet their water use classifications and the associated water quality standards, and are therefore considered impaired streams. Within the analysis area, tributaries to the Colorado River between the Roaring Fork River and Parachute Creek have been identified as impaired streams due to elevated levels of selenium (CDPHE 2012). These streams are discussed in more detail in the Zone 2 subsection below. There are several other waterways that are being monitored and evaluated in the analysis area, including the Colorado River for elevated sediment loads, and Thompson Creek and its tributaries for elevated iron concentrations. **Figure 3.5-5** and **Figure 3.5-6** depicts these streams.

State of Colorado's Source Water Assessment and Protection (CSWAP) Program

The State of Colorado's source water assessment and protection (CSWAP) program is administered by the CDPHE, as required by the Safe Drinking Water Act (as amended). The purpose of the CSWAP program is to identify potential risks to public drinking water sources (CDPHE 2015a). CSWAP zones" for surface water sources (e.g., stream diversions) and groundwater under the influence of surface water (e.g., alluvial wells with direct hydrologic connection to surface waters) are delineated based on drainage networks upstream from water intakes (or alluvial wells). "CSWAP zones" for groundwater sources (e.g., wells not hydrologically connected to surface waters) are delineated based on the concept of area-of-capture around the wells.

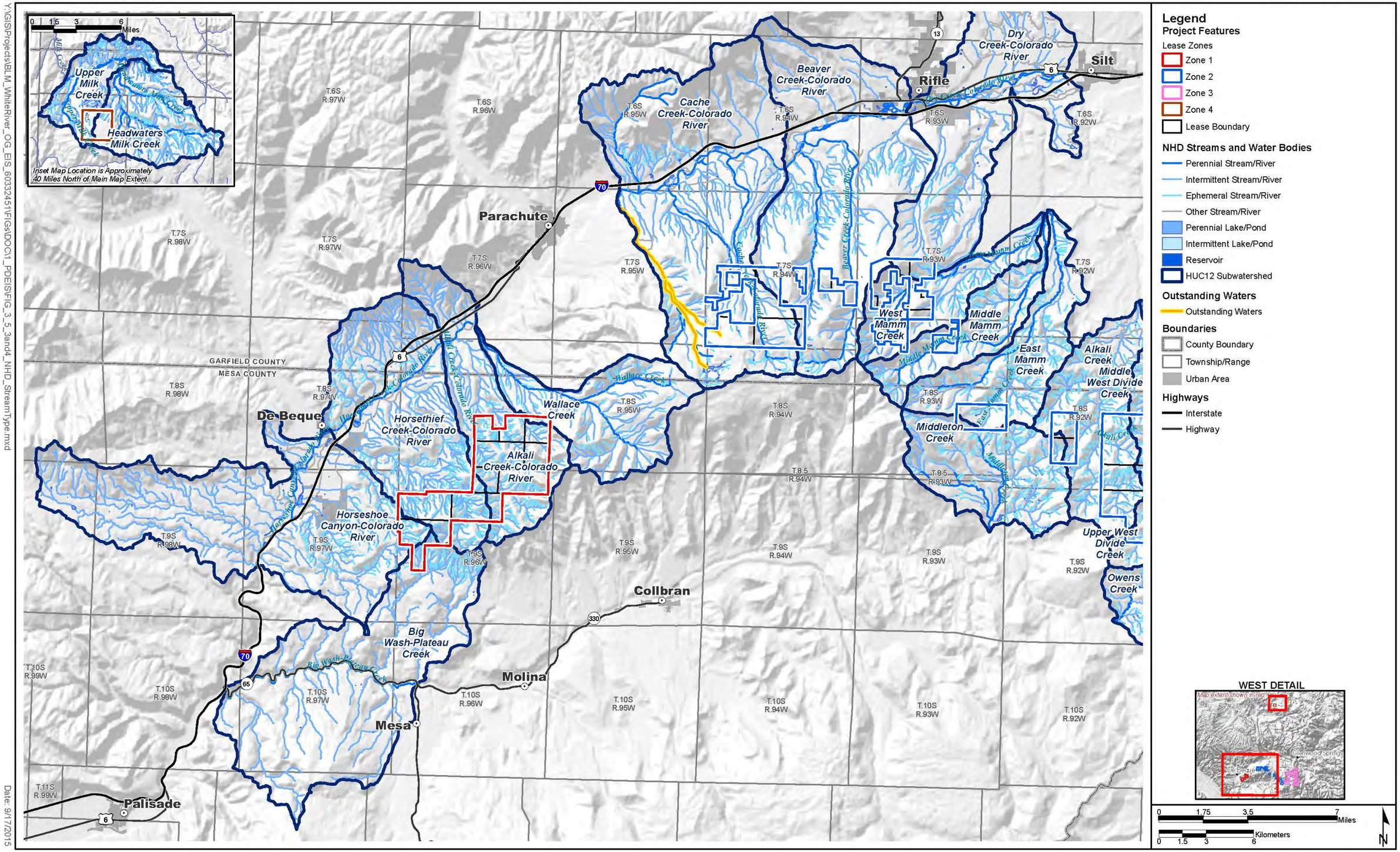

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Figure 3.5-3 Surface Water in the Analysis Area (West Side)

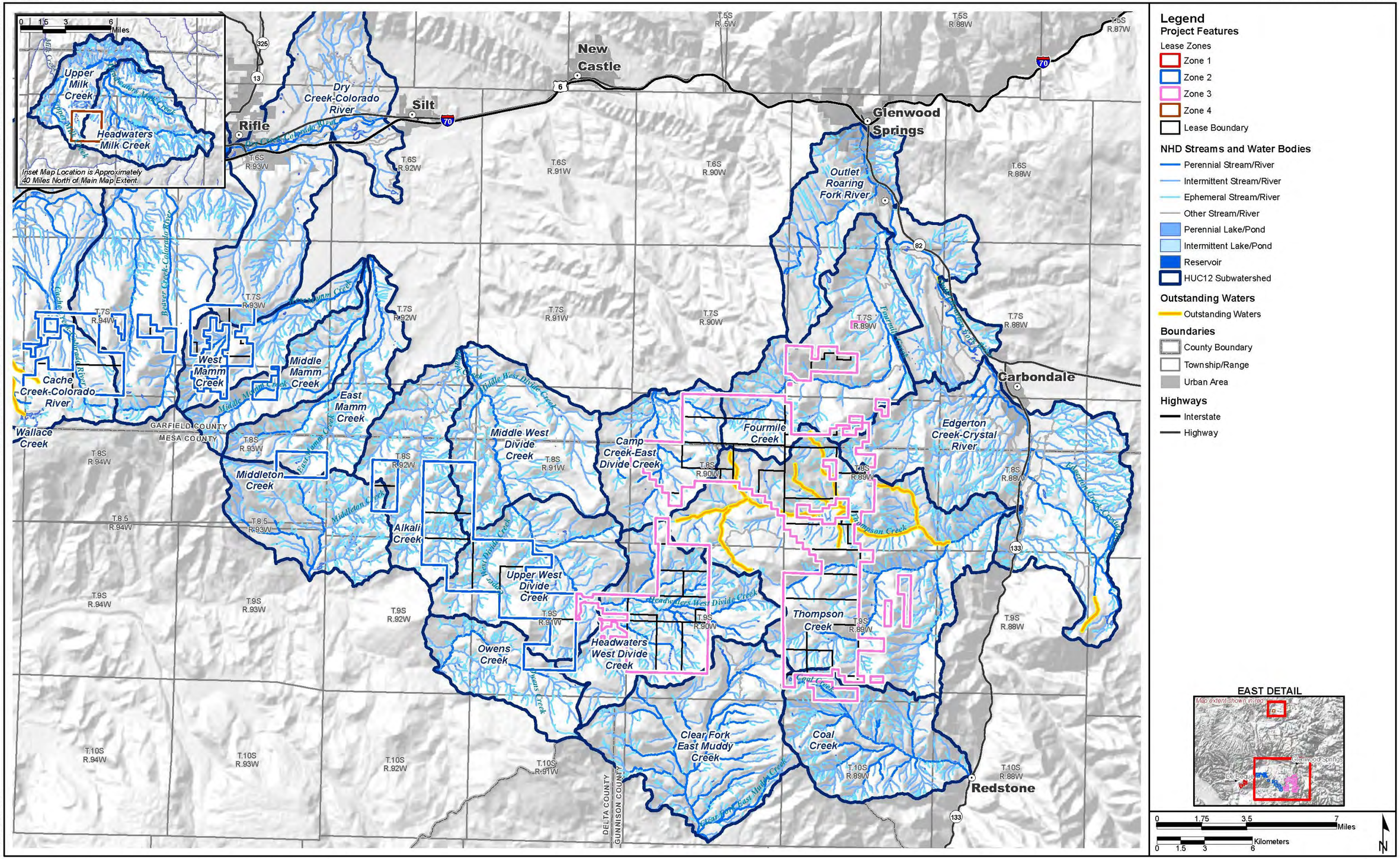

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Figure 3.5-4 Surface Water in the Analysis Area (East Side)

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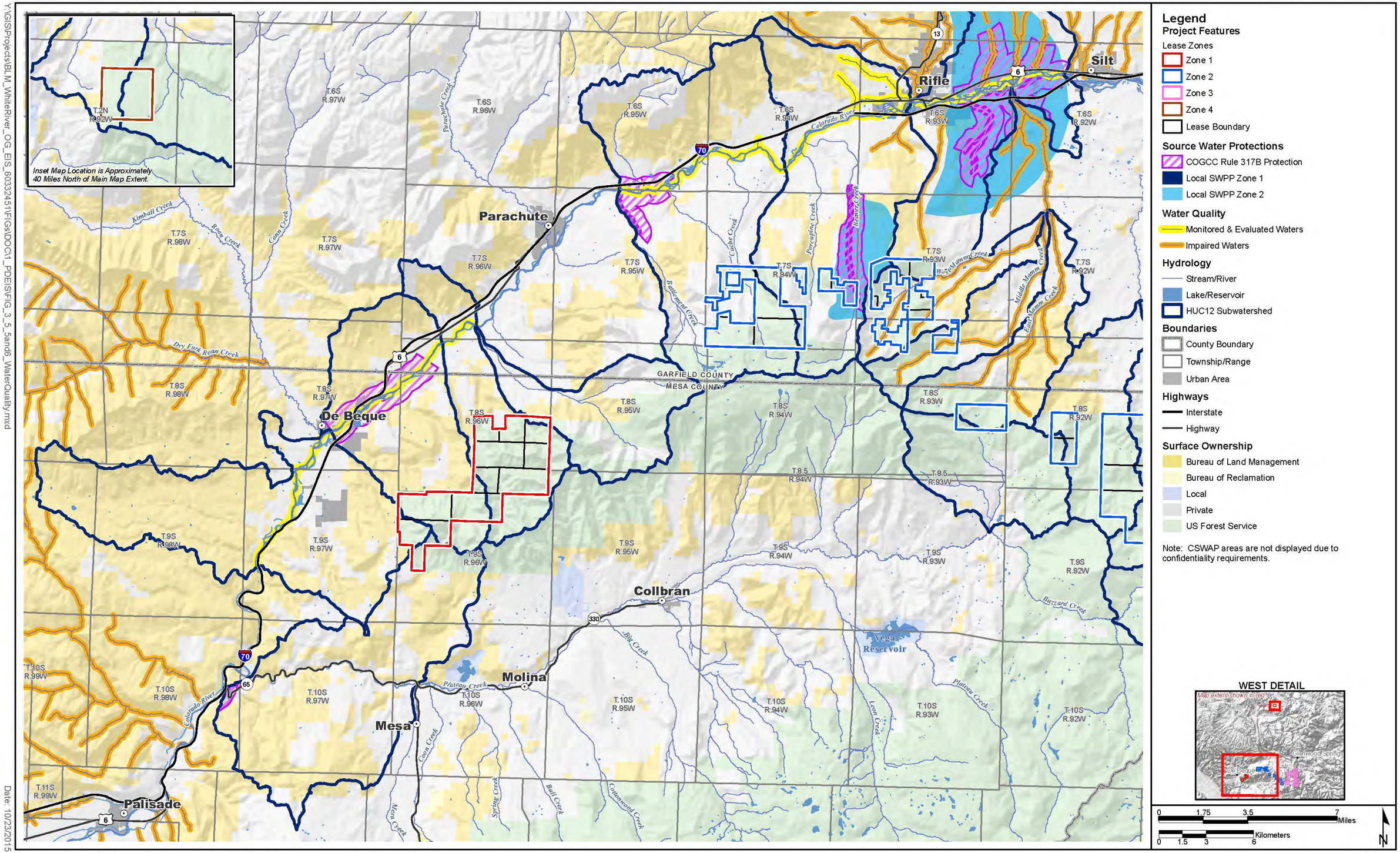

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Figure 3.5-5 Impaired Streams and Source Water Protection Areas (West Side)

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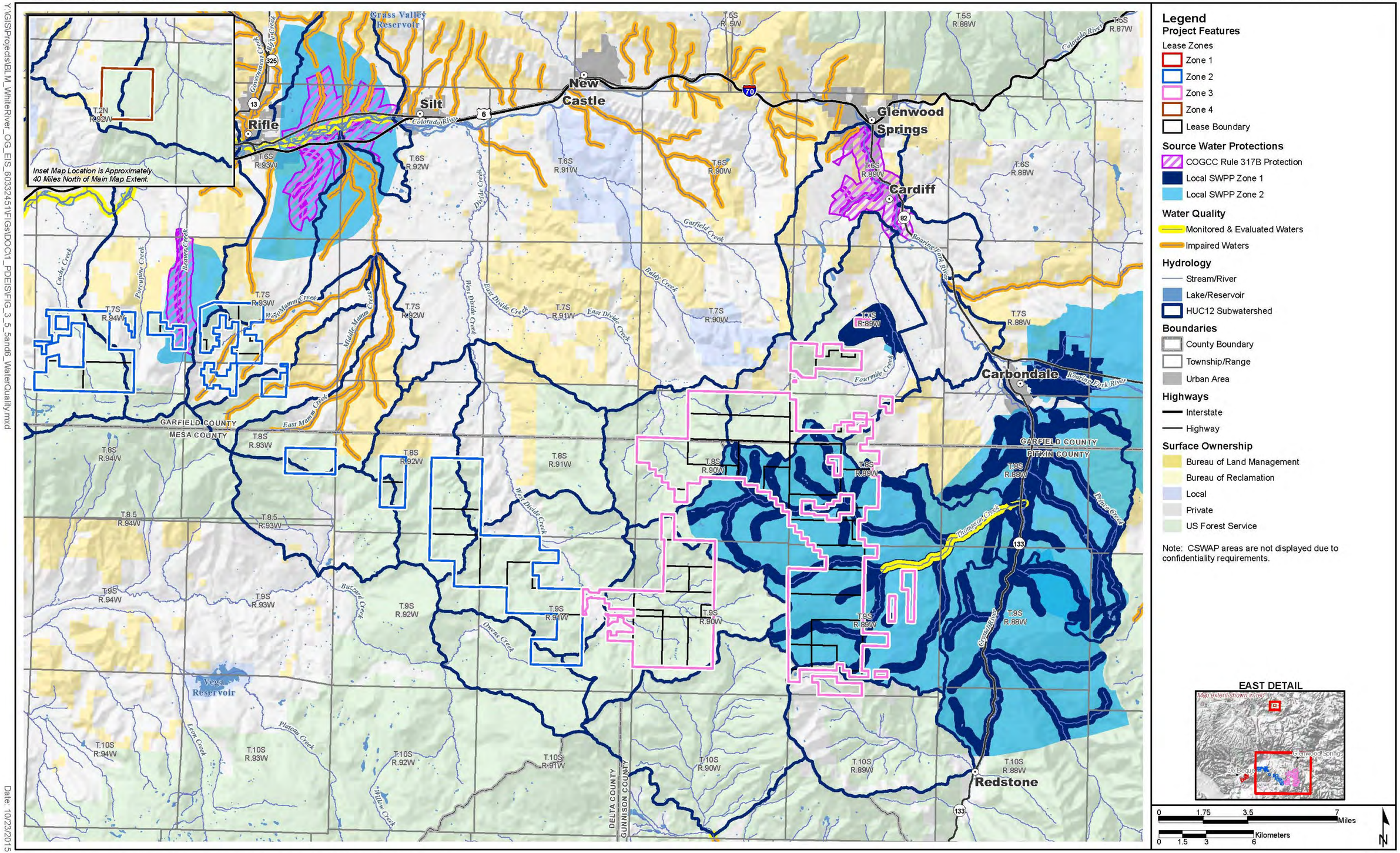

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Figure 3.5-6 Impaired Streams and Source Water Protection Areas (East Side)

The CSWAP program delineates three assessment zones associated with each surface water supply (including groundwater under the influence of surface water):

- CSWAP Zone 1 is based on the stream network, and extends 1,000 feet from streams, creating a 2,000-foot-wide dendritic pattern upstream from the intake.
- CSWAP Zone 2 also is based on the stream network, extending 1,320 feet from streams, creating a 2,640-foot-wide dendritic pattern upstream from the intake.
- CSWAP Zone 3 is based on the catchment area, extending to all locations where a drop of water might run off and eventually make it to the intake.

Because of the large extent of most assessment areas (to the top of the catchment area), each of these CSWAP zones are split into “near zones” (within 15 miles of the intake), and “far zones” (areas beyond 15 miles from the intake). The entire analysis area is covered by some form of surface water CSWAP zone. The CSWAP areas are not displayed due to confidentiality requirements.

The CSWAP program also delineated three assessment zones associated with groundwater sources:

- CSWAP Zone 1: 500-foot radius around wells;
- CSWAP Zone 2: either a 1.5-mile radius or a modelled area of capture for a 2-year period; and
- CSWAP Zone 3: either a 2.5-mile radius or a modelled area of capture for a 5-year period.

There are 63 CSWAP public drinking water sources identified in the analysis area; of these, 20 CSWAPs are within the existing leases considered in this EIS. However, when all CSWAP zones are considered, they cover the entire analysis area. Additional detail on CSWAPs is provided in the Zone 1, 2, 3, and 4 subsections below.

COGCC Rule 317B Areas

The COGCC has established protection to public water system supply areas, as defined in COGCC Rule 317B (Rule 317B). This rule identifies classified water supply segments of streams, which extends five miles upstream from public water systems subject to the rule’s protections. It further establishes three zones around the classified water supply segments where oil and gas surface operations must conform to the requirements of Rule 317B:

- Internal Zone: 0 to 300 feet from the ordinary high water mark (OHWM);
- Intermediate Zone: 301 to 500 feet from OHWM; and
- External Zone: 501 to 2,640 feet from OHWM.

New surface operations within the Rule 317B Internal Zone are prohibited without the issuance of a variance from the COGCC. Requirements for new operations within the Intermediate Zone and External Zone include collection of baseline water quality data, use of pitless drilling systems, storage of drilling fluids in tanks, secondary containment for all oil and produced water storage, notification of surface disturbing activities for potentially impacted public water systems within 15 miles downstream, and development of an emergency spill response program to train employees and notify those systems in the case of a spill or release. There are seven public water system supply areas identified under Rule 317B that fall partially or wholly within the analysis area: Battlement Mesa, Carbondale, De Beque, Glenwood Springs, Parachute, and Rifle. These seven systems are included in the state’s CSWAP program and are discussed in additional detail in the Zone 1, 2, and 3 subsections below. One of these systems, the City of Rifle’s public water system supply area, falls within the existing leases considered in this EIS.

Local Source Water Protection Plans

Local public water supply providers also can develop their own source water protection plans (SWPP). These SWPP often utilize the information generated by the CSWAP program, but do not always contain the same geographic delineations or best practices. There are three SWPPs that have been identified with water sources in the analysis area, including the public supplies for Carbondale, Rifle, and the community supply for Oak Meadows subdivision. These are discussed in additional detail in the Zone 2 and 3 subsections below.

Water Use

The use of water in the analysis area has been considered on a county-wide and Colorado Division of Water Resources (CDWR) water basis. The analysis area mainly falls within Garfield, Mesa, and Pitkin counties. The Zone 4 leases are located in Rio Blanco County, and there is a small area of existing leases in Gunnison County. The analysis area also extends into Delta and Moffat counties. However, the water use discussion is based on information available for Garfield, Mesa, and Pitkin counties because this is where the majority of the leases are located.

Within the State of Colorado, approximately 80 percent of the available water in the state (16 million acre-feet per year total in the state) originates on the West Slope, with the majority of that water flowing out of the state in the Colorado River (Colorado Water Conservation Board 2011). The CDWR water divisions that encompass the majority of Garfield, Mesa, and Pitkin counties include Divisions 38, 39, 40, 42, 45, 63, 72, and 73. Water use in these water divisions in 2008 totaled approximately 570,000 acre-feet (Colorado Water Conservation Board 2011). The Colorado Division of Water Resources reports approximately 1.2 million acre-feet and 42,000 cubic feet per second in absolute (finalized) and conditional (permitted but not finalized) water rights in the three counties. Of these rights, there are over 560,000 acre-feet and 5,400 cubic feet per second that are assigned the use of "Industrial," which would include oil and gas development (CDWR 2015).

Wetlands

Wetland and riparian areas act as water purifiers, supply groundwater recharge, and aid in flood control. This resource's affected environment description is discussed in Section 3.6.4.

3.5.1.4 Analysis Area Affected Environment

Zone 1

Zone 1 leases are within the western side of the analysis area, at the western end of Battlement Mesa (see **Figure 3.5-1**). There are five subwatersheds that contain all of the Zone 1 leases (see **Table 3.5-1**). The Zone 1 analysis area totals 129,465 acres, of which the leases cover 10,103 acres (8 percent). There are only three perennial waterways in Zone 1: the Colorado River, Plateau Creek, and Wallace Creek; the latter two are direct tributaries to the Colorado River (see **Figure 3.5-3**). None of these streams are within the previously issued leases. Several named intermittent streams are within the lease areas, including Alkali, Little Alkali, Horsethief, and Little Horsethief creeks (also all direct tributaries to the Colorado River) (USGS 2011).

Water use classifications (see **Table 3.5-2**) are ALC-2, Rp, AG, and WS in the northern portions of the zone, including the streams within the majority of leases in Zone 1. The use classifications transition into ALW-2, Rp, AG, and WS in the Horseshoe Canyon-Colorado River Subwatershed. The Big Wash-Plateau Creek Subwatershed has ALC-1, Re, WS, and AG uses designated. Each of those subwatersheds contains minimal acreage of the leases (762 acres and 465 acres, respectively). There are no streams with impaired water quality in this zone; however, the Colorado River is being monitored and evaluated for high sediment loads (see **Figure 3.5-5**).

The CSWAPs for Clifton, De Beque, and Ute Water Conservancy District are within Zone 1 leases; the "near zone" CSWAPs are within the leases with the exception of Clifton's, where only the "far zone" CSWAP reaches the leases. De Beque's Rule 317B protection area is downstream of the Zone 1 leases in the analysis area. There are no SWPP areas identified within the leases in this zone or downstream within the analysis area (see **Figure 3.5-5**).

Zone 2

Zone 2 is in the central portion of the analysis area, extending from the eastern part of Battlement Mesa to the southeast and the Thompson Divide area (see **Figures 3.5-1** and **3.5-2**). There are 12 subwatersheds that contain all of the Zone 2 leases (see **Table 3.5-1**). The Zone 2 analysis area totals 245,137 acres, of which the leases cover 24,923 acres (10 percent). There are two subwatersheds that fall within Zones 2 and 3, and are included in the acreages for both (repeated); Headwaters West Divide Creek and Upper West Divide Creek. Perennial streams within the previously issued leases include West Divide Creek, Middle and West Mamm creeks, Beaver Creek, Cache Creek, and Cottonwood Creek (see **Figures 3.5-3** and **3.5-4**). The Colorado River flows along the northern portion of this zone, outside of the leases, and other perennial streams also are outside the leases such as Mosquito Creek, Salt Creek, East Mamm Creek, and Battlement Creek. All of these streams flow towards the north to the Colorado River. Owens, Middleton, and Chenney creeks flow to the south to Buzzard Creek, which is tributary to Plateau Creek (USGS 2011). Of these, only Owens Creek crosses a small corner of the leases.

Streams have generally been assigned ALC use classifications across this zone (see **Table 3.5-2**), with ALC-1 on **NFS** lands (on all leases) and the higher-elevation streams on the east side of this zone. Battlement Creek has been designated an outstanding water. The lower elevations of the northwestern subwatersheds in this Zone have ALC-2 classifications. All the streams include uses of WS, AG, and some form of recreation (CDPHE 2015b).

Mamm Creek and its tributaries (East, Middle, West Mamm creeks) along with other Colorado River tributaries have water quality impairments because of elevated selenium levels with unknown sources (CDPHE 2012). The Colorado River is being monitored and evaluated for high sediment loads (see **Figures 3.5-5** and **3.5-6**).

There are eight CSWAPs within the Zone 2 lease areas. Battlement Mesa, Collbran, Parachute, Rifle, and Silt each have portions of their "near zone" CSWAPs within the leases; Clifton, De Beque, and Ute Water Conservancy District each have portions of their "far zone" CSWAPs within the leases. Additionally, the CSWAP for Tepee Bible Camp is downstream of the leases in the analysis area. The Rule 317B protection area for Rifle is partially within the Zone 2 lease area; and those for Battlement Mesa, Parachute, and Rifle also are downstream of the Zone 2 leases within the analysis area. Rifle has established a local ordinance protecting the municipal water source that is considered as a SWPP for the purposes of analysis in this EIS. The Rifle SWPP overlaps the CSWAP and Rule 317B areas on the Zone 2 leases in the Beaver Creek-Colorado River Subwatershed and in the analysis area downstream of the leases in the Cache Creek-Colorado River Subwatershed (see **Figures 3.5-5** and **3.5-6**).

Zone 3

Zone 3 is in the eastern portion of the analysis area, in the area locally known as Thompson Divide (see **Figure 3.5-2**). There are nine subwatersheds that contain all of the Zone 3 leases (see **Table 3.5-1**). The Zone 3 analysis area totals 231,534 acres, of which the leases cover 42,753 acres (18 percent). There are two subwatersheds that fall within Zones 2 and 3, and are included in the acreages for each (double-counted): Headwaters West Divide Creek and Upper West Divide Creek. Perennial streams in this zone within the previously issued leases that drain towards the north to the Colorado River include East and West Divide creeks, Little Beaver Creek, and Middle and East Willow creeks (see **Figure 3.5-4**). Perennial streams in this zone within the previously issued leases that drain towards

the east to the Crystal and Roaring Fork rivers include Porcupine Creek, South Branch Middle, Middle and North Thompson creeks, Yank Creek, Freeman Creek, and Fourmile Creek (USGS 2011).

Water quality uses (see **Table 3.5-2**) in this area are classified as ALC-1, WS, and AG. Streams draining to the east towards the Crystal and Roaring Fork rivers have Re classifications, and streams draining north towards the Colorado River have Rp classifications. North Thompson Creek and its tributaries have been designated as outstanding waters (CDPHE 2015c) (see **Figure 3.5-6**). The Thompson Divide Coalition commissioned water quality sampling in the reaches of Fourmile Creek, North Thompson Creek, Middle Thompson Creek, and South Middle Thompson Creek just below the previously issued leases during the time period between October 2009 and August 2010 (five sampling events). The resulting report indicates that only a few constituents that were submitted for analysis were detectable, and that those detected were within the expected normal ranges for uncontaminated surface waters (Moran 2011). **There are no streams in Zone 3 identified by Colorado as having water quality impairments; however, downstream from the leases**, **Thompson Creek is being monitored for iron concentrations.**

The Zone 3 existing leases contain portions of 18 CSWAPs: “near zones” for Brettleberg Condos, Glenwood Springs, Oak Meadows Subdivision (Phases I & II, and Phase III), Oxbow Mining, Silt, Ski Sunlight, SpringRidge Place Subdivision, Springridge Subdivision, and Sunlight Inn and Restaurant; and “far zones” only for Battlement Mesa, Clifton, De Beque, Grand Junction, Mtn. Coal Co-West Elk Mine, Parachute, Rifle, and Ute Water Conservancy District. The “near zone” CSWAPs are generally found along the northern half of the Zone 3 lease areas. There are no additional surface water CSWAPs within the analysis area downstream from the Zone 3 leases beyond those found within the leases.

There are 31 CSWAPs for groundwater sources located in the analysis area downstream from the Zone 3 leases: Aspen Equestrian - Blue Creek Ranch, Aspen Glen Waste & Sanitation District, Avalanche Campground, Carbondale, Colorado Mountain College, Crystal Valley Mobile Home Park, El Rocko Mobile Home Park, H Lazy F Mobile Home Park, Hideout Cabins & Campground, Lazy Diamond A Subdivision, Mid Valley Metropolitan District, Mountain Meadows, Prince Creek Homeowners Association, Red Canyon Water Company, Redstone Campground-Mechau, Redstone Campground-Osgood, Redstone Waste & Sanitation District, Riverside Cottages, Roaring Fork Waste & Sanitation District, Rock Gardens Mobile Home Park, Sopris Restaurant, Sopris RV Park, Sopris Village Subdivision, Sunlight View Subdivision, Swiss Village Homeowners Association, Teller Springs Homeowners Association, Three Mile Trailer Park, Waldorf School, Westbank Mesa Homeowners Association, Westbank Ranch Homeowners Association, and Wooden Deer Subdivision.

There are no Rule 317B protection areas located in the Zone 3 leases; however Glenwood Springs has a Rule 317B protection area associated with its water supply within the analysis area downstream from the leases (see **Figure 3.5-6**). Both Carbondale and Oak Meadows Subdivision have prepared SWPPs that cover locations within and downstream of the Zone 3 leases to protect their water supplies. These SWPPs cover the majority of the eastern side and central portions of the leases and analysis area surrounding Zone 3 (see **Figure 3.5-6**).

Zone 4

Zone 4 is the northern-most portion of the analysis area that is approximately 50 miles north of the others, in the Yampa River drainage (see **Figure 3.5-2**). There are two subwatersheds that contain all of the Zone 4 leases (see **Table 3.5-1**). The Zone 4 analysis area totals 40,529 acres, of which the leases cover 2,561 acres (6 percent). One perennial stream, Martin Creek, crosses a corner of the previously issued lease in this area (see **Figure 3.5-4**). Other perennial streams in the area include Milk Creek, Clear Creek, and Little Beaver Creek (USGS 2011).

Water quality uses (see **Table 3.5-2**) in this area are classified as ALC-1, Rp, WS, and AG (CDPHE 2015b). There are no impaired streams (CDPHE 2012) in Zone 4 or the associated analysis

area. One CSWAP extends into the existing leases, for the Colo-Wyo Coal Company. No Rule 317B areas or SWPPs have been identified in Zone 4 or associated analysis area (see **Figure 3.5-5**).

3.5.2 Groundwater

3.5.2.1 Regulatory Background

Specific legal and regulatory constraints that are relevant to the previously issued leases and surrounding areas include the following:

- Safe Drinking Water Act (regulations at 40 CFR 144.3, Underground Sources of Drinking Water)
- BLM Onshore Oil and Gas Order Number 2
- COGCC Rules
- Code of Colorado Regulati**o**ns 1002-8
- Office of the Colorado State Engineer Rules

FSM 2880 requires that geologic components of ecosystems, including groundwater resources, be identified and integrated into the location and design of management activities. Objectives of the policy include protecting and managing groundwater while implementing land management activities. The WRNF LRMP and LRMP Amendment described in Appendix D of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) do not address management of groundwater.

3.5.2.2 Analysis Area

The analysis area for direct and indirect effects consists of the individual lease tracts.

3.5.2.3 Regional Affected Environment

Hydro**geo**logic Units

The Piceance Basin contains alluvial and bedrock aquifers, but the alluvial aquifers are generally the most productive with wells having good flow rates and good water quality (USEPA 2004). Alluvial aquifers occur in unconsolidated deposits which consist of boulders, cobbles, gravel, sand, silt, and clay (USFS 2014a). In the larger drainages, these deposits can be more than 100 feet thick. As shown in **Figure 3.5-7**, wells are concentrated in the alluvial valleys, especially the Colorado River. Water levels in the alluvial aquifers fluctuate with changes in seasonal precipitation, with the highest levels occurring in spring and summer and the lowest levels occurring in the fall and winter.

The sedimentary bedrock aquifers are used less for water supply because of low permeability, higher total dissolved solids (TDS) concentrations, and association with hydrocarbon-bearing strata. Two major Tertiary aquifer systems in the Piceance Basin are the Upper Piceance Basin Aquifer, composed of members of the Uinta Formation, and the Lower Piceance Basin Aquifer, composed of members of the Green River Formation (Topper et al. 2003). The geologic strata of the aquifers are shown in **Table 3.5-3**. The tertiary aquifers are separated by the Mahogany oil shale zone, but may be in communication due to natural fracturing in the Mahogany zone. In the lease Zones 1, 2, and 3, the Uinta Formation has been eroded away, but an erosional remnant of the Green River Formation is present at Battlement Mesa. Sandstones of the Wasatch Formation are common aquifers in the Battlement Mesa area (URS 2006).

Table 3.5-3 Hydrogeologic Units Piceance Basin

Era	System	Series	Formation/Unit		Approximate Thickness (feet)	Composition	Hydrogeologic Unit	Well Yield (gallons per minute [gpm])	TDS Range (milligrams per liter [mg/L])
Cenozoic	Quaternary	Holocene	Unconsolidated deposits including alluvium, and glacial till		150	Sand, gravel, clay	Alluvial aquifers	20 to 1,600	**2,819 to 6,726**
	Tertiary	Eocene	Uinta Formation		0 to1,400	Silty sandstone, siltstone, and marlstone	Upper Piceance Basin aquifer	1.0 to 900	**500 to 1,000**
			Green River Formation	Parachute Creek Member	500 to 1,800	Kerigenous marlstone and shale	Mahogany Confining Unit		
				Anvil Points Member	0 to 1,870	Shale, fine-grained sandstone, and marlstone	Lower Piceance Basin aquifer	1.0 to 1,000	**1,000 to 10,000**
				Garden Gulch Member	0 to 900 feet	Claystone, siltstone, clay-rich oil shale, and marlstone	Confining Unit		
				Douglas Creek Member	0 to 900	Siltstone, shale, and channel sandstones			
		Paleocene	Wasatch Formation		5,000	Shale and lenticular sandstones	Wasatch aquifer	10	**558 to 5,281**
	Cretaceous		Mesaverde Group	Williams Fork Formation	3,000 to 7,000	Sandstone, shale, and coal	Mesaverde aquifer	Low to 45	**Less than 500 to 32,429**
				Iles Formation		Sandstone, shale, and coal			**3,820 to 16,100**
			Mancos Shale		Greater than 7,000	Marine shale, isolated sandstones	Mancos Confining Unit		

Sources: Cumella et al. 2014; Glover et al. 1998; Kaiser and Scott 1996; Thomas and McMahon 2012; Thyne 2008; Topper et al. 2003; URS 2006; Wright Water Engineers 2003.

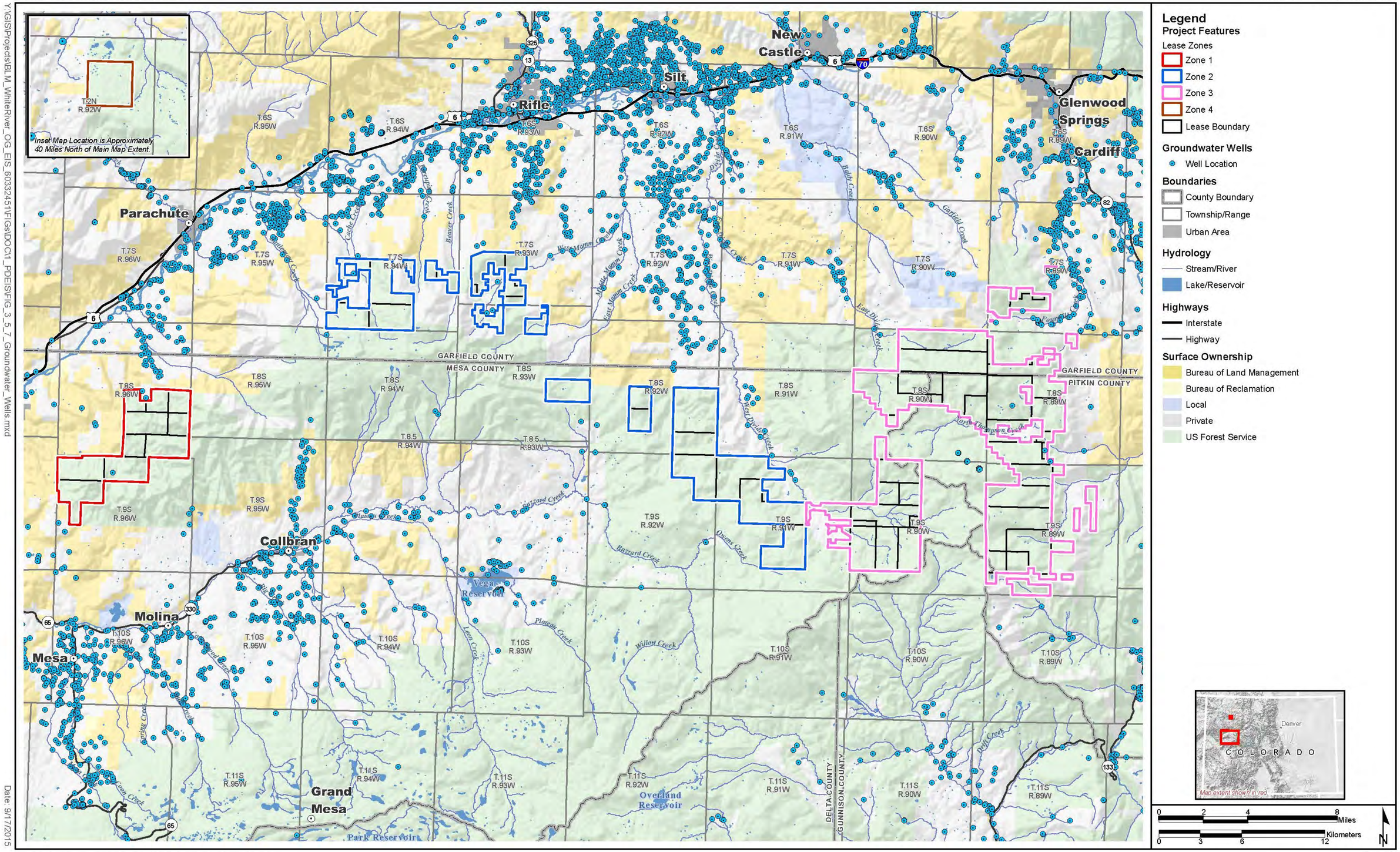

Figure 3.5-7 Locations of Groundwater Wells

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Another bedrock aquifer is the Mesaverde aquifer which is composed of sandstones and coals of the Williams and Iles Formations. Due to overall low permeability, poor water quality, depth, and association with natural gas and CBNG production, the Mesaverde aquifer may not be considered a source of potable water except in isolated areas (Papadopulos & Associates 2007b). Recharge to the Mesaverde aquifer may occur through precipitation on the outcrop, infiltration from streambeds, vertical inflow from overlying or underlying geologic formations, but overall recharge is limited. Water flow in the Mesaverde aquifer is generally from the outcrop or recharge areas towards the deeper parts of the basin. Flow is complicated by the Divide Creek, Wolf Creek, and Coal Basin structures. Analysis of pressure tests from gas wells indicates that the potentiometric surface of the Mesaverde aquifer is a complex of mounds and ridges (Kaiser and Scott 1996). In lease Zones 1, 2, and 3, the Mesaverde aquifer is mostly in the subsurface at depths of up to several thousand feet, but also outcrops on the east side of Zone 3 and along the axis of the Divide Creek Anticline.

Zone 4 is located on the northwest edge of the Eagle Basin, a 1,500-square-mile area that encompasses Eagle and Pitkin counties and portions of Garfield, Rio Blanco, and Routt counties. The sedimentary rock section may be more than 30,000 feet thick and includes the Maroon Formation, which is the thickest formation of at least 10,000 feet (Topper et al. 2003). Important aquifers are mainly Paleozoic rocks with flow rates up to 3,000 gallons per minute (gpm). Local aquifers have more modest yields averaging 22 gpm.

Groundwater Quantity

In 1995, groundwater withdrawals from the Piceance Basin aquifers totaled approximately 46,000 acre-feet, with most of the water being drawn from alluvial aquifers (Topper et al. 2003). In the Eagle Basin, groundwater withdrawals ranged from 993 acre-feet in Pitkin County to almost 15,000 acre-feet in Rio Blanco County.

Groundwater Quality

Generally, groundwater quality is better in the alluvial aquifers than the bedrock aquifers; however, the quality of water in alluvial aquifers can vary from valley to valley and is strongly influenced by the bedrock. In the Piceance Basin, analysis of groundwater samples by the USGS from 1946 to 2009 indicated TDS concentrations are commonly less than 1,000 milligrams per liter (mg/L), but range up to over 7,000 mg/L (Thomas and McMahon 2012). Seventy percent of the samples exceeded the USEPA secondary drinking water standard of 500 mg/L. Dissolved solids greater than 7,000 mg/L were generally found in samples from the Green River Formation in Rio Blanco County. In the USGS groundwater sample analysis database for the Piceance Basin (Thomas and McMahon 2012), most of the geologic units for the sample wells are unknown (87 percent or 1,325 sites out of 1,545 sites).

Groundwater Use

In the USGS groundwater sample database referenced above for the Piceance Basin, 1,045 were domestic wells, 444 were for monitoring, 39 for irrigation, and 58 were described as not known or “other” (Thomas and McMahon 2012). Most of the samples (62 percent) were from Garfield County in an area that overlaps the analysis area, Zones 1, 2, and 3.

Groundwater accounts for only a small percentage of total water use in the Eagle Basin where most of the water supply is from surface water (Topper et al. 2003). Groundwater uses include domestic, agricultural, and industrial.

Groundwater Contamination

There are numerous potential sources of groundwater contamination in the analysis area. Alluvial aquifers can be the most susceptible to contamination due to the widespread use of the aquifers, the attributes of the aquifer (unconfined and near surface water tables), and tributary connections with surface waters. In addition, there are concerns that contamination from the drilling and completion of oil and gas wells poses a threat to groundwater resources. **Figure 3.5-8** shows the relative sensitivity of aquifers to potential contamination. The aquifer sensitivity is a measure of how well water flows into an aquifer, and by implication how well contaminants can move into groundwater (Focazio et al. 2002). The risk of contamination to community and public groundwater sources have been assessed through the state CSWAP program and protected through local SWPPs. Section 3.5.1.3 includes a description of these areas within the analysis area.

3.5.2.4 Analysis Area Affected Environment

Zones 1, 2, 3

Zones 1, 2, and 3 are similar enough that they are grouped together for discussion and analysis of groundwater. The aquifers in the area encompassed by the zones include alluvial aquifers, sandstones of the Wasatch Formation, and the Mesaverde aquifer. The alluvial aquifers are found in the major drainages in the vicinity which include the Colorado River, Dry Creek, Mamm Creek, Dry Hollow Creek, West Divide Creek, East Divide Creek, and Divide Creek (URS 2006). Alluvial aquifer potable water wells average 60 feet deep and have an average pumping rate of almost 20 gpm. Groundwater flow in the alluvial aquifers is generally along the topographic gradient of the alluvial deposits.

The aquifers in the Wasatch Formation consist of coarse-grained lenses of sandstone interbedded with fine-grained mudstones (URS 2006). Wasatch aquifer wells average about 200 feet deep, but can be up to 600 feet deep. Overall, the Wasatch aquifer exhibits lower well yields as compared to the alluvial wells with yields averaging around 10 gpm. Where Wasatch wells have higher yields, it is thought that increased density of natural fractures contributes to the increased productivity (URS 2006). Groundwater in the Wasatch aquifer is believed to follow topography and generally flows from south to north, however mounding of water levels coincides with mesas because it is believed that the mesas represent recharge areas.

The Mesaverde aquifer in the Divide Creek area is capable of artesian flow at rates up to 63,000 gallons per day (44 gpm) (Kaiser and Scott 1996). The wells exhibiting artesian flow have generally good water quality with chloride salinity of less than 200 mg/L. Generally, TDS concentrations in the Mesaverde aquifer are greater than 10,000 mg/L (USEPA 2004). Underpressured flows are present in the Divide Creek area and can be attributed to either unconfined conditions in the aquifer where discharge exceeds recharge or to water withdrawals associated with gas and CBNG production. Kaiser and Scott (1996) attribute high flow rates in the Mesaverde aquifer to high permeability due to widespread fractures and faults at the Divide Creek Anticline.

Water quality data obtained from previous sampling and analysis for the Mamm Creek Field Area (Papadopulos & Associates 2008; URS 2006) were summarized by Thyne (2008). **The Mamm Creek Field study area included Townships 7 South, Ranges 92 and 93 West and portions of Townships 6 South, Ranges 92 and 93 West that are south of the Colorado River. Zone 2 leases in this study are in Sections 19, 20, 21, 28, 29, 30, 31, 32, and 33, Township 7 South, Range 93 West.**

The domestic wells that were sampled exhibited TDS concentrations generally less than 1,000 mg/L. **Some of the domestic wells showed elevated levels of nitrate, selenium, and fluoride; but none of the three inorganic contaminants appeared related to petroleum activities at the time (Thyne 2008). Selenium, fluoride, and nitrate are not contaminants usually associated with oil and gas activities, these constituents are more often related to other sources. Elevated selenium**

concentrations in waters are more likely to be associated the Mancos Shale (Sares 2000). Fluoride is a common natural contaminant in groundwater in Colorado and nitrate is associated with agricultural activities (Matheson and Bowden 2011). However, in the Mamm Creek Field study, solute concentrations of methane and chlorides that were either below regulatory standards or not regulated, were above natural background concentrations.

Methane was analyzed in a number of water well samples, but it was difficult to determine whether elevated levels of gas result from natural conditions or are the result of drilling gas wells. **Thyne (2008) concluded that while a small amount of vertical migration of gas from the Wasatch Formation is likely naturally occurring, the low pre-drilling concentrations and trend of increasing dissolved methane that is positively correlated to well numbers indicate that drilling and production activities are the cause.**

Contamination of groundwater and surface water occurred in 2004 in West Divide Creek when hydrocarbons were released from an improperly cemented natural gas well (COGCC 2004). Known as the West Divide Creek Seep located in Section 12, Township 7 South, Range 92 West (in Zones 2 and 3), the latest monitoring data indicates that the groundwater plume has diminished over time, probably due to natural attenuation (Rule Engineering 2013).

Aquifer sensitivity as identified in **Figure 3.5-7** shows, in general, that Zone 1 leases are in an area of high sensitivity, Zone 2 leases are in an area of primarily low sensitivity, and Zone 3 leases are in an area of moderate or medium sensitivity.

Zone 4

Groundwater for domestic and stock use is obtained from the Iles and Williams Fork Formations in the Mesaverde Group and from alluvial sources (Reheis 1984). No water quality analyses are available. Springs were reported in the Mancos Shale, but the quality of the water is not known. **Figure 3.5-8** shows, in general, that the Zone 4 leases are in an area of high aquifer sensitivity.

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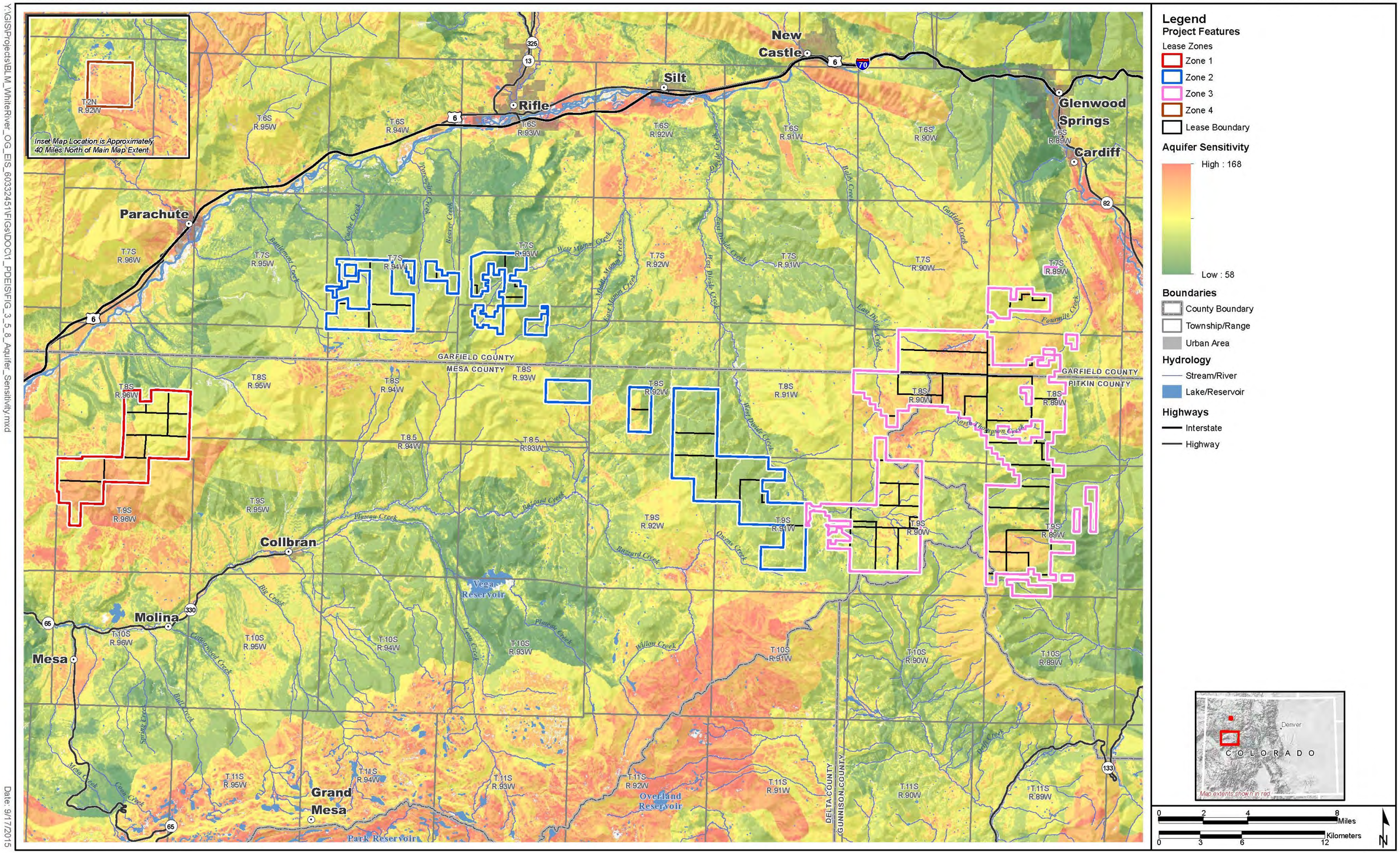

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Figure 3.5-8 Aquifer Sensitivity

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3.6 Vegetation, Riparian and Wetlands, Special Status Species, and Noxious Weeds

Vegetative resources presented in this section include general vegetation cover types, wetlands and riparian habitats, noxious weeds/invasive species, and special status plant species and significant plant communities.

3.6.1 Regulatory Background

Statutes and regulations that directly influence vegetation resources **for this analysis** are primarily implemented by the BLM, Forest Service, Department of Agriculture for Colorado and the U.S. Army Corps of Engineers (USACE), as follows:

- General Vegetation including Timber: FLPMA of 1976; BLM Integrated Vegetation Handbook H-1740-2; National Forest Management Act (NFMA) of 1976; Forest Management Act of 1972; and Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book; USDI and USDA 2007).
- Riparian and Wetland Areas (also see Section 3.6.4): CWA (33 USC 1344); Rivers and Harbors Act (33 USC 401 et seq.); CFR Title 33 Navigation and Navigable Waters; EO 11988, “Floodplain Management,” May 24, 1977; EO 11990, “Protection of Wetlands,” May 24, 1977; Colorado Code of Regulations 5 CCR 1002-31; and BLM Utah Riparian Policy (Instruction Memorandum -UT-2005-091).
- Noxious and Invasive Weeds (also see Section 3.6.5): Federal Plant Protection Act of 2000 (formerly the Noxious Weed Act of 1974) 7 USC 2801-2814; Colorado Revised Statutes 35-5.5-104.5 to 35-5.5-119; 25-8-205; 25-8-205.5; 35-9-118; Colorado Code of Regulations 8 CCR 1206-2; and FSM 2000 Zero Code 2080.
- Special Status Plant Species (also see Section 3.6.6): Endangered Species Act (ESA) of 1973; BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125); and FSM 2670.

3.6.2 Analysis Area

The analysis area for impacts to general vegetation is comprised of the 65 lease areas (lease area) which are divided into four zones (Zone 1, 2, 3, and 4). The analysis area is located within portions of the WRNF and the GMUGNF boundaries and is comprised of approximately 80,380 acres. The analysis area is located within Mesa, Garfield, Pitkin, and Rio Blanco counties, south of Interstate 70 (I-70), between the towns of DeBeque and Carbondale, except for one lease northeast of Meeker.

The area considered for the Special Status Plant Species and Significant Plant Communities analysis is defined as the lease area plus a 300-meter buffer beyond the edge of the lease boundary. This encompasses the area of potential effects from oil and gas development. The total analysis area is approximately 110,768 acres. Special Status Plant Species and Significant Plant Communities are discussed in Section 3.6.5.

3.6.3 Vegetation Cover Types in the Analysis Area

Vegetation types and community characterizations are based on vegetation cover types identified through the Forest Service Field Sampled Region 2 Vegetation Data (FSVeg) geospatial database. (USFS 2010b). FSVeg stores data about cover type, dominant vegetative lifeforms, and understory vegetation.

There are 13 primary vegetation cover types found within the analysis area. The vegetation cover types presented below are grouped from cover types identified in the FSVeg dataset and include: aspen, Douglas fir/mixed conifer, gambel oak/mixed mountain shrub, grassland/forbland, lodgepole pine, pinyon-juniper, riparian/wetland, sagebrush/shrub mix, saltbush/greasewood, montane shrubland, snowberry, spruce/fir, and unvegetated. Distribution of vegetation types in these areas is strongly influenced by variations in landscape position, soil type, moisture, elevation, and aspect. **Table 3.6-1** summarizes the acreage of each vegetation type within the analysis area and **Figures 3.6-1** and **3.6-2** display the vegetation cover types throughout the analysis area.

Aspen and Spruce/Fir comprise the dominant cover types in the analysis area. Pinyon-juniper is the dominant cover type for Zone 1. Aspen and Gambel Oak-mixed Mountain Shrub are co-dominant cover types for Zone 2. Aspen is the dominant cover type for Zones 3 and 4. Lodgepole Pine and Saltbush/Greasewood have the least amount of cover in the analysis area and are only observed in Zone 4 and Zone 1, respectively.

Aspen

This vegetation cover type is found between 7,100 to 10,300 feet elevation in the analysis area. It consists of open to dense stands of quaking aspen (*Populus tremuloides*) in sometimes isolated pockets in higher elevations. Other tree species known to occur within the aspen cover type include subalpine fir (*Abies lasiocarpa*), lodgepole pine (*Pinus contorta*), Englemann spruce (*Pinus engelmannii*), blue spruce (*Picea pungens*), and Douglas fir (*Pseudotsuga menziesii*). Common shrubs include: Gambel oak (*Quercus gambelii*), Rocky Mountain juniper (*Juniperus scopulorum*), shrubby cinquefoil (*Dasiphora fruticosa*), serviceberry (*Amelanchier* spp.), snowberry (*Symphoricarpos* spp.), sagebrush (*Artemesia* spp.), and willow (*Salix* spp.). The herbaceous layers may be lush and diverse. Common forbs include: Porter's licorice-root (*Ligusticum porteri*), alpine larkspur (*Delphinium barbeyi*), and vetch (*Vicia* spp.). Common graminoids include sedges (*Carex* spp.), Thurber's fescue (*Festuca thurberi*), and needleandthread grass (*Hesperostipa comata*) (Colorado Natural Heritage Program [CNHP] 2005).

Douglas Fir/Mixed Conifer

This vegetation cover type is found between 6,000 and 10,000 feet elevation and is dominated by Douglas fir, ponderosa pine (*Pinus ponderosa*), and Englemann spruce. Quaking aspen (aspen) is often present as intermingled individuals in remnant aspen clones, or in adjacent patches. Other less common trees include subalpine fir, and two-needle pinyon pine (*Pinus edulis*). Two-needle pinyon pine also may grow as a shrub within the analysis area. Shrub species that may be present within a sparse- to moderately dense shrub layer include: alderleaf mountain mahogany (*Cercocarpus montanus*), Gambel oak, serviceberry, willow, snowberry, and Rocky Mountain juniper. Perennial graminoids are the most abundant in the sparse to moderately dense herbaceous layer. Characteristic graminoids include: Arizona fescue (*Festuca arizonica*), needleandthread grass, and sedges. The forb layer can be diverse but generally has little cover. Common forbs include: aster (*Aster* spp.), goldenrod (*Solidago* spp.), and beardtongue (*Penstemon* spp.) (CNHP 2005).

Gambel Oak/Mixed Mountain Shrub

The Gambel Oak/Mixed Mountain Shrub cover type is found between 6,000 to 9,500 feet elevation along dry foothills and lower mountain slopes. Gambel oak typically dominates this cover type; however, co-dominant shrubs may include serviceberry, big sagebrush (*Artemesia tridentata*), alderleaf mountain mahogany, and snowberry. Scattered trees or other shrubs may occur, including Rocky Mountain juniper, and two-needle pinyon pine. Gambel oak and other dominant shrubs can range from dense thickets with little understory to relatively mesic mixed-shrublands with a rich understory of shrubs, grasses and forbs. Common gramanoids include: grama (*Bouteloua* spp.), and *Festuca* spp. Common forbs include western yarrow (*Achilliea millefolium*), *Geranium* spp., and vetch (CNHP 2005).

Table 3.6-1 Vegetation Cover Types within the Analysis Area

Vegetation Cover Type[1]	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)	Total Percent Cover in the Analysis Area[3]
Aspen	0 (0)	*7,238 (29)*	*23,066 (54)*	*1,288 (50)*	39
Douglas Fir/Mixed Conifer	1,378 (14)	448 (2)	826 (2)	53 (2)	3
Gambel Oak/Mixed Mountain Shrub	488 (5)	*7,313 (29)*	1,035 (2)	68 (3)	11
Grassland/Forbland	24 (<1)	827 (3)	2,340 (6)	28 (1)	4
Lodgepole Pine	0 (0)	0 (0)	0 (0)	605 (24)	<1
Montane Shrubland	735 (7)	1,040 (4)	160 (<1)	104 (4)	3
Pinyon-Juniper	*5,414 (54)*	335 (1)	7 (<1)	0 (0)	7
Riparian/Wetland[2]	**1,635 (16)**	**2,444 (10)**	**6,228 (15)**	**301 (12)**	**13**
Sagebrush/Shrub Mix	740 (7)	3,176 (13)	335 (1)	0 (0)	5
Saltbush/Greasewood	111 (1)	0 (0)	0 (0)	0 (0)	<1
Snowberry	0 (0)	985 (4)	831 (2)	180 (7)	2
Spruce/Fir	181 (2)	3,280 (13)	12,672 (30)	236 (9)	*20*
Unvegetated	1,041 (10)	271 (1)	177 (<1)	0 (0)	2
Zone Acreage Total[3]	**10,114 (13)**	**24,938 (31)**	**42,767 (53)**	**2,562 (3)**	**100**

[1] Dominant cover type by zone is *italicized and highlighted.*

[2] The Riparian/Wetland cover **acreage** was determined **separately from the general vegetation** by analyzing three separate data sources: FSVeg, National Wetland Inventory, Forest Service Water Influence Zones data, and Forest Service Fen data. **Portions of these datasets overlap portions of other general vegetation cover types.**

[3] **Zone Acreage Total and Total Percent Cover in the Analysis Area represent the total acres and percentages within the lease area. Because the Riparian/Wetland vegetation type was analyzed using a separate data set, it overlaps the other vegetation cover types and percent cover. The zone acreages and percentages do not account for this data overlap and therefore, the individual vegetation acreage is greater than the Zone Acreage Total listed in the table. A**pproximately 7 acres or 0.01 percent of the total 80,380 acres is not included in the total due to differences in resolution between the FSVeg WRNF dataset compared to the FSVeg GMUGNF dataset.

Source: USFS 2010b.

Grassland/Forbland

Grasslands and forblands are very diverse in the WRNF. Their composition is dependent on soil type, land use, aspect, and elevation (between 5,500 to 11,400 feet). Most of these areas are located in valley bottoms, uppermost south-facing slopes, and in scattered patches on windswept ridges. Typical grasses include: Thurber's fescue, Arizona fescue, Idaho fescue (*Festuca idahoensis*), rough fescue (*Festuca campestris*), bluegrass (*Poa* spp.), wildrye (*Leymus* spp.), and brome (*Bromus* spp.). Common forbs include western yarrow, mountain goldenbanner (*Thermopsis montana*), Porter's licorice-root, buckwheat (*Eriogonum* spp.), and beardtongue (*Penstemon* spp.). Sedges also are common within this cover type. Few shrubs and trees are present within this cover type, but may occur on area edges. These include sagebrush, Gambel oak, aspen, snowberry, rabbitbrush (*Chrysothamnus* spp.), willow, Douglas fir, Englemann spruce, blue spruce, and subalpine fir (CNHP 2005).

Lodgepole Pine

Lodgepole pine forests occur between 8,000 and 9,500 feet elevation on gentle to steep slopes on all aspects inside of the analysis area. This cover type represents an early successional stage and is the result of past stand-replacing fires. In these stands, the community is usually dominated by dense monocultures of trees of similar age, but understory species can be found in more open areas. Sometimes stands are intermingled with mixed conifer/aspen stands. Typical shrubs include snowberry, *Vaccinium* spp., and currant (*Ribes* spp.) (CNHP 2005).

Montane Shrubland

Shrublands occur between 5,900 and 9,500 feet elevation in the analysis area. This cover type is generally very diverse in plant composition and is usually associated with exposed sites, rocky substrates, and drier conditions, which limit tree growth. Dominant species include Gambel oak, serviceberry, snowberry, alderleaf mountain mahogany, sagebrush, currant, and saltbush (*Atriplex* spp.) (CNHP 2005).

Pinyon-Juniper

This cover type generally occurs on dry mountains and foothills and is typically found between 5,500 and 8,500 feet elevation within the analysis area. This cover type occurs on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Two-needle pinyon pine, Rocky Mountain juniper (at higher elevations), and Utah juniper (*Juniperus osteosperma*) dominate. Shrubs are common and can co-dominate; these include sagebrush, serviceberry, saltbush, and snowberry (CNHP 2005).

Riparian/Wetland

Riparian areas, fens, other wetland cover types (including waterbodies) are associated with and depend on the presence of water during some part of the growing season. Riparian areas are generally defined as the vegetated transitional zones that lie between aquatic and terrestrial (upland) environments. Riparian areas usually occur as belts along streams, rivers, lakes, marshes, bogs, and other water bodies. As a transitional zone between aquatic and upland environments, riparian systems often exhibit characteristics of both. Generally, only perennial and intermittent streams can support riparian areas that serve the entire suite of riparian ecological functions. Ephemeral streams rarely possess the hydrologic conditions that allow true riparian vegetation to grow. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions under normal circumstances. Wetland types include marshes, lakeshores, bogs, fens, wet meadows, willow carrs, springs, seeps, and riparian areas. Fens in Colorado are relict wetlands from the last glaciation, and as a result have very unique characteristics including water-saturated substrates and an accumulation of about 30 centimeters or more of peat (organic soil material). Peatlands, which include fens, are widely distributed across boreal regions. In Colorado, fens may be the most common wetland type in the 8,500 to 10,000 feet elevation range (USFS 2014a, Glossary, page 23).

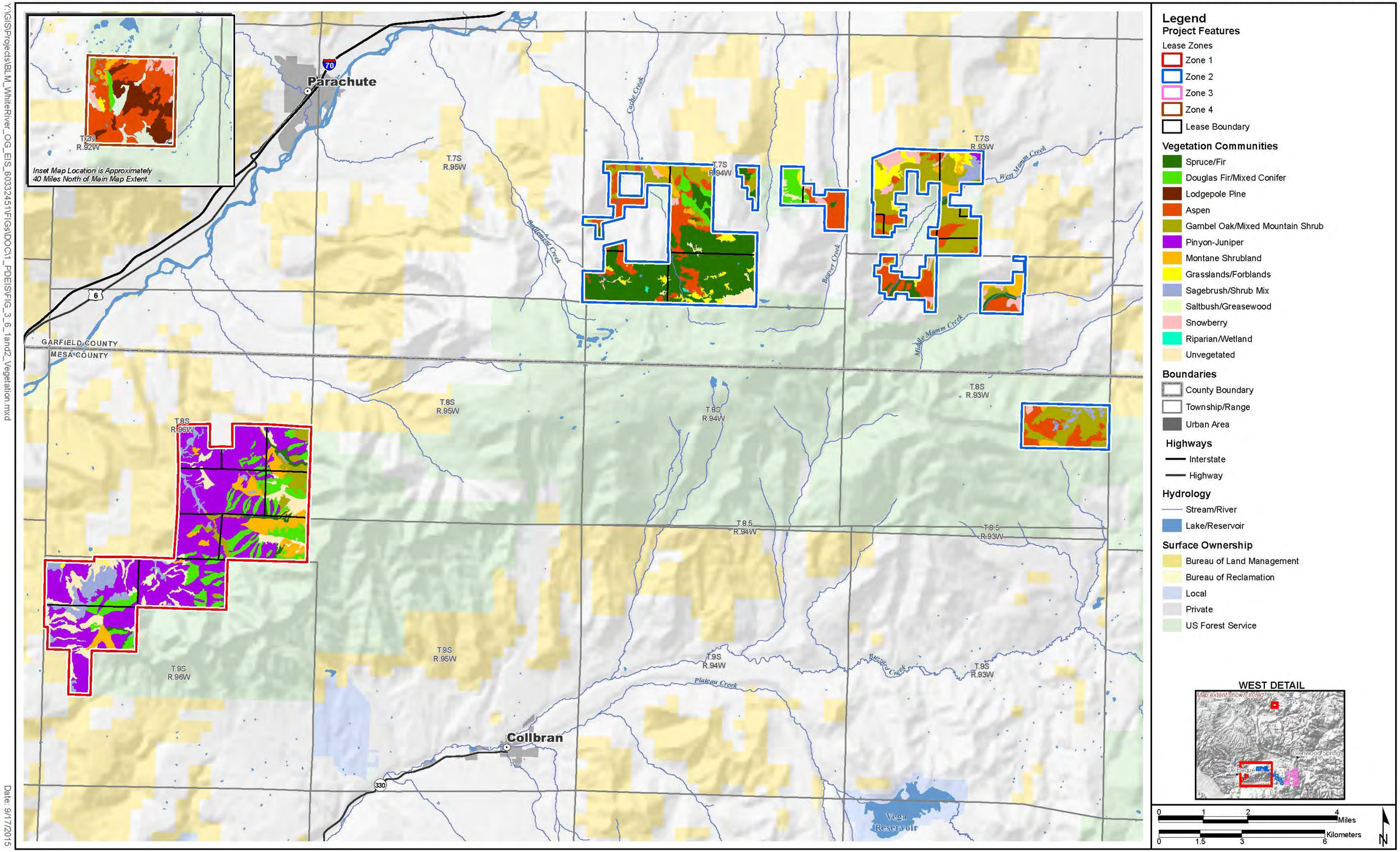

Figure 3.6-1 Vegetation Cover Types in Analysis Area (West)

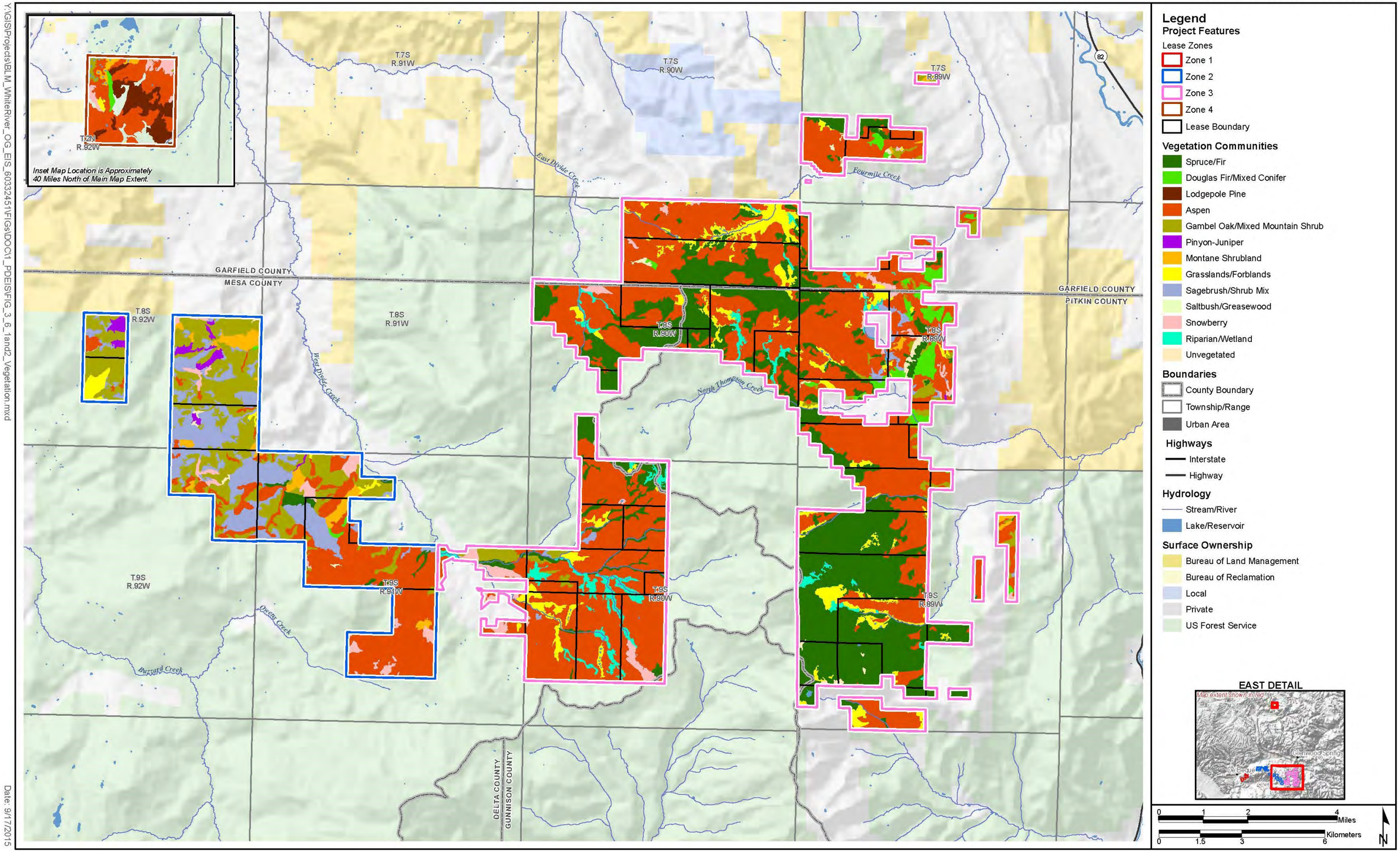

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Figure 3.6-2 Vegetation Cover Types in Analysis Area (East)

Due to the complexity of wetland characteristics, the riparian/wetland data was analyzed separately from the other vegetation cover types using additional sources noted in Table 3.6-1 footnotes. The riparian/wetland acreages presented in Table 3.6-1 overlap the other general vegetation types and therefore are not included in the Zone Acreage Totals or Total Percent Cover in the Analysis Area.

A variety of vegetation types are found within riparian, fen, and other wetland areas, common graminoids include: rush (*Juncus* spp.), sedge, bluejoint reedgrass (*Calamagrostis canadensis*), and smallflowered woodrush (*Luzula parviflora*). Forbs include: yarrow, wild mint (*Mentha arvensis*), and heartleaf bittercress (*Cardamine cordifolia*). Shrubs are dominated by willow, but other species such as gray alder (*Alnus incana*), redosier dogwood (*Cornus sericea*) and Woods rose (*Rosa woodsii*) may be common. Tree species found within riparian and wetland cover types include subalpine fir, Englemann spruce, aspen, blue spruce, narrowleaf cottonwood, and Douglas fir. One threatened and endangered species is known to grow in riparian environments within the analysis area: Ute Ladies'-tresses (*Spiranthes diluvialis*). Section 3.6.4 describes threatened and endangered species and their habitats in more detail.

Sagebrush/Shrub Mix

This cover type is commonly found between 5,500 and 9,500 feet elevation. Several sagebrush species are present within this cover type including Wyoming big sagebrush (*Artemesia tridentata* subs. *wyomingensis*) and mountain big sagebrush (*Artemesia tridentata* subs. *vaseyana*). Other common shrubs include Gambel oak, serviceberry, snowberry, saltbush, greasewood (*Sarcobatus* spp.), alderleaf mountain mahogany, rabbitbrush, and snakeweed (*Gutierrezia* spp.). Two-needle pinyon pine, Rocky Mountain juniper, Utah juniper, and chokecherry (*Prunus virginiana*) also are commonly found within this cover type. Milkvetch (*Astragalus* spp.), buckwheat, and penstemon are common forbs. Graminoids include needleandthread grass and fescue (CNHP 2005).

Saltbush/Greasewood

This cover type is generally found in lower elevations of the analysis area (5,700 to 6,700 feet). This cover type is characterized by accumulations of salt on poorly developed deep soils. Soils in this cover type generally have a higher pH, which restricts the uptake of water by all but the most salt-tolerant plants. Saltbush and greasewood species dominate the landscape. Two-needle pinyon pine and milkvetch are other species found within this cover type in the analysis area (CNHP 2005).

Snowberry

The Snowberry cover type is typically found at the same elevation as the Montane Shrub cover type. Snowberry is a montane shrub; however, it is the dominant species in this cover type. Other montane shrubs that may be observed in this cover type in the analysis area include serviceberry, Gambel oak, Rocky Mountain juniper, and sagebrush may be present or co-dominate. Tree species that may occur within the cover type include aspen and Englemann spruce (CNHP 2005).

Spruce/Fir

Spruce/fir forests are usually found between 7,000 and 11,000 feet. These areas typically have shallow soils and contain dense stands of Englemann spruce, Douglas fir, and subalpine fir with a closed canopy. Openings in the forest support many herbaceous and woody plants often associated with the montane shrublands and grasslands cover types and include snowberry, serviceberry, willow, juniper, cottonwood, aspen, redosier dogwood, Porter's licorice-root, bluntseed sweetroot (*Osmorhiza depauperata*), and fescue (CNHP 2005).

Unvegetated

This cover type includes both badlands and sparsely vegetated scree areas found within the analysis area. Badlands generally occur at lower elevations in the analysis area (5,500 to 8,000 feet), while the

sparsely vegetated scree areas are at or above 10,000 feet. Vegetation is very sparse and may be naturally absent in some places. If vegetation is present it may be dominated by dwarf shrubs including saltbush in badland areas. Scattered small trees (pinyon or juniper) may be present. Subalpine fir and Englemann spruce may be present at higher elevations (CNHP 2005). Badlands are common on the western portion of the analysis area; alpine areas are not common in the analysis area. Two threatened and endangered species are known to grow in badland environments within the analysis area: DeBeque phacelia (*Phacelia submutica*) and Colorado hookless cactus (*Sclerocactus glaucus*). Three BLM sensitive species are known to grow in badland environments within the analysis area: DeBeque milkvetch (*Astragalus debequaeus*), Naturita milkvetch (*Astragalus naturitensis*), and Paradox breadroot (*Pediomelum aromaticum*). Section 3.6.4 describes threatened and endangered and BLM sensitive species and their habitats in more detail.

3.6.4 Wetlands and Waters of the U.S.

Wetlands and other waters of the U.S. (WUS) are protected under Section 404 of the CWA. Section 404 requires that any discharges of dredge or fill material into these water must be permitted. Most oil and gas development, such as well pads and pipelines, is likely to be conducted under Nationwide Permits. However, it should be noted that the USACE has revoked the use of Nationwide Permits in fen wetlands in Colorado in order to protect the unique wetland type.

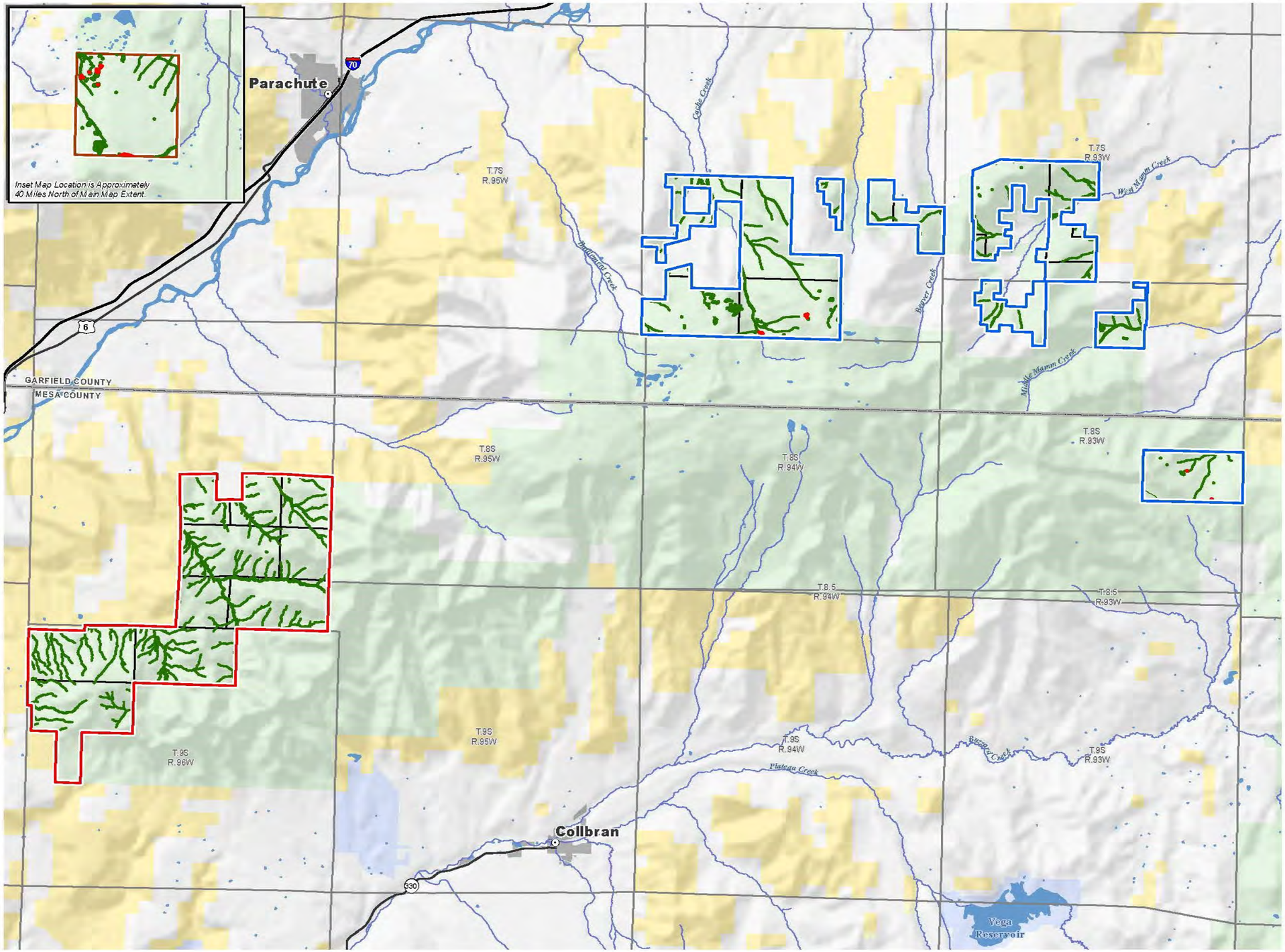
WUS are defined in 33 CFR 328.3 as all non-tidal waters that are currently, or were used in the past, or may be susceptible to use in interstate commerce; all interstate waters including wetlands; all other waters such as interstate lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, of which the use, degradation or destruction could affect interstate commerce; and all impoundments of WUS. In addition, tributaries of the above listed waters, including intermittent drainages, and wetlands adjacent to the above waters also are considered to be WUS.

Wetlands are a WUS and are considered to be a special aquatic site. According to the USACE's 1987 Wetland Delineation Manual, a "three-parameter" approach is required for delineating USACE-defined wetlands (USACE 1987), where areas are identified as wetlands if they exhibit hydrophytic vegetation, hydric soils, and wetland hydrology.

Common wetland types found in the analysis area include marshes, lakeshores, bogs, fens, wet meadows, willow carrs, springs, and seeps. A brief description of dominant vegetation species found in wetlands and riparian areas is described in Section 3.6.2. **Figures 3.6-3** and **3.6-4** display riparian areas, fens, and other wetlands in the analysis area.

3.6.5 Noxious Weeds and Invasive Species

Noxious weeds include those listed by the State of Colorado Department of Agriculture. Noxious weeds are defined by the Colorado Noxious Weed Act in 8 CCR 1203-19 as plants that aggressively invade or are detrimental to economic crops or native plant communities; are poisonous to livestock; are carriers of detrimental insects, diseases, or parasites; or are detrimental to the environmentally sound management of natural or agricultural ecosystems. Noxious weeds are officially designated as non-native plant species that are invasive, can become monocultures, and pose a serious threat to the continued productivity and biological diversity of the ecosystem. These non-native species can cause harm to land value, native ecology, agricultural interests, wildlife habitat, livestock forage, riparian resources, and aesthetic and visual values of land (USFS 2014a, page 379).



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Project Features

Lease Zones
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lease Boundary

Fens, Wetlands, and Riparian Areas
- Fen
- Wetland or Riparian Area

Hydrology
- Stream/River
- Lake/Reservoir

Boundaries
- County Boundary
- Township/Range
- Urban Area

Highways
- Interstate
- Highway

Surface Ownership
- Bureau of Land Management
- Bureau of Reclamation
- Local
- Private
- US Forest Service

WEST DETAIL

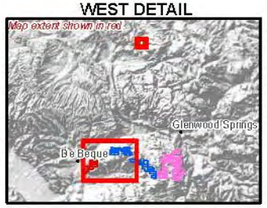

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Figure 3.6-3 Riparian Area, Fens, and Other Wetlands in the Analysis Area (West)

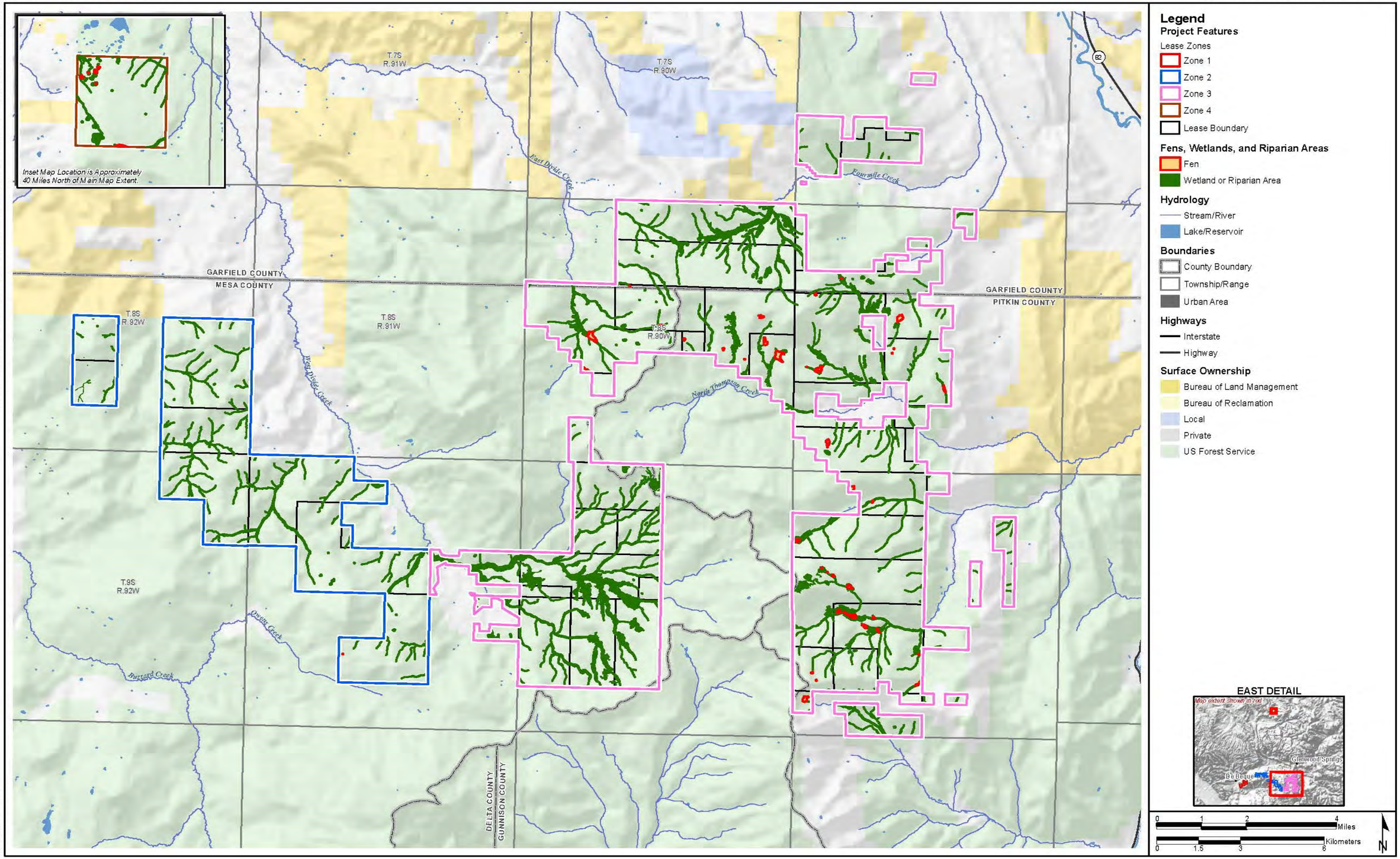

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Figure 3.6-4 Riparian Area, Fens, and Other Wetlands in the Analysis Area (East)

Colorado has published a list of 72 noxious weeds that may be found in the state. The species on the list have been assigned a rating of "A," "B," or "C," depending on the severity of the threat. Of these, 18 have been put on the "A" list, meaning that they are currently rare in Colorado and are subject to eradication wherever detected. The other 54 species are either on the "B" or "C" list. List B species are those that have discrete statewide distributions. The goal for List B species is to stop the spread; List B species are subject to eradication, containment, or suppression. List C species have existing statewide populations; the goal for these species is to control the growth and spread (Colorado Department of Agriculture 2015).

Noxious weed populations have slowly but continually increased throughout the WRNF in the past few decades. Non-native noxious weeds are very opportunistic and tend to invade where soil disturbance activities take place. Oil and gas development activities such as access roads, pipelines, facilities, and well pad construction all create optimum environments for noxious weed establishment and spread (USFS 2014a, page 379). Noxious weeds are distributed across the WRNF and GMUGNF. Surface-disturbing activities along with other vectors have led to the continued spread and establishment of noxious weeds in these forests.

Of the 72 weeds listed by the state, the Forest Service has identified 17 noxious weed species that are present in the analysis area. **Table 3.6-2** lists known populations of noxious weeds and their occurrence in each zone.

Table 3.6-2 Noxious Weed Populations in the Analysis Area

Noxious Weed (Scientific Name)	State Noxious Weed Category[1]	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)
Bull thistle (*Cirsium vulagare*)	B		82 (<1)	12 (<1)	
Canada thistle (*Cirsium arvense*)	B		14 (<1)	135 (<1)	<1 (<1)
Cheatgrass/Downy brome (*Bromus tectorum*)	C	1 (<1)	3 (<1)	10 (<1)	
Common mullein (*Verbascum thapsus*)	C		<1 (<1)		
Common tansy (*Tanacetum vulgare*)	B			10 (<1)	
Corn chamomile (*Anthermis arvensis*)	B		8 (<1)		
Dalmation toadflax (*Linaria dalmatica*)	B			<1 (<1)	
Field bindweed (*Convolvulus arvensis*)	C		1 (<1)		
Gypsyflower/Houndstongue (*Cynoglossum officinale*)	B		277 (1)	170 (<1)	
Hardheads/Russian knapweed (*Acroptilon repens*)	B		<1(<1)		
Nodding plumeless thistle/Musk thistle (*Carduus nutans*)	B		668 (3)	54 (<1)	

Table 3.6-2 Noxious Weed Populations in the Analysis Area

Noxious Weed (Scientific Name)	State Noxious Weed Category[1]	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)
Oxeye daisy (*Chrysanthemum leucanthemum*)	B		<1 (<1)	10 (<1)	
Saltcedar (*Tamarix chinensis, T. parviflora, T. ramosissima*)	B	1 (<1)	6 (<1)		
Spiny plumeless thistle (*Carduus acanthoides*)	B		94 (<1)	10 (<1)	
Spotted knapweed (*Centaurea maculosa*)	B		1 (<1)	<1 (<1)	
Stinking chamomile/ Mayweed chamomile (*Anthemis cotula*)	B		25 (<1)		
Whitetop/Hoary cress (*Cardaria draba*)	B		2 (<1)		
Total Noxious Weed Occurrences[2]		**2 (<1)**	**1,182 (5)**	**414 (1)**	**<1 (<1)**

[1] A – Subject to eradication wherever detected; B – stop the spread by eradication, containment, or suppression; C – management controls are recommended.

[2] **Total Noxious Weed Occurrence include some overlap in acreage between individual weed species. Actual noxious weed cover acreage is addressed in Section 4.6.**

Source: USFS 2015a,b.

The WRNF produced the 2011 Invasive Specie [sic] Management Environmental Assessment (USFS 2011). This report describes invasive plant species and their impacts to native plant communities across the WRNF. Current invasive species treatment on the WRNF combines biological, mechanical, and cultural control for eradication, with use of herbicides in limited areas (USFS 2011).

3.6.6 Special Status Plant Species and Significant Plant Communities

This section discusses four categories of special status plants: 1) threatened and endangered species and their critical habitat, 2) BLM sensitive species, 3) Forest Service Regional Forester's sensitive species, and 4) Forest Service local concern species. Significant plant communities also are discussed in this section. The Forest Service prepared a Biological Assessment (BA) (USFS 2014e) and Biological Evaluation (BE) (USFS 2014f) as part of the WRNF Oil and Gas Leasing Final EIS (USFS 2014a) for all potentially affected special status plant species that could occur within the WRNF.

The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over species listed as threatened or endangered under Section 7 of the federal ESA (16 USC 1536 et seq.). Under Section 7 of the ESA federal agencies are required to consult with USFWS on any action they authorize, fund, or conduct that may affect a listed species or result in adverse modification of critical habitat. Additionally, BLM must confer with USFWS on any activity that may jeopardize a proposed species or it if is "likely to result" in adverse modifications or destruction of proposed critical habitat. Section 7(a)(1) requires **f**ederal agencies to use their authorities to further conservation of federally listed species. This involves BLM's cooperation with USFWS in species recovery and conservation as provided in species recovery plans for federally listed species.

Federal candidate species and their habitats and species designated as sensitive by the BLM State Director are managed as BLM sensitive species with a greater emphasis on conservation. On BLM-administered public lands, BLM sensitive species would be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA (i.e., maintain viable populations, thereby preventing federal listing from occurring). The BLM may coordinate with the CNHP to develop conservation strategies and to mitigate threats to rare plants that are not designated as BLM special status species.

The FSM 2600 (USFS 2005) provides policies pertaining to the management of sensitive plants on NFS land. This manual stipulates that the Forest Service provide special management importance for sensitive species to ensure their sustainability and preclude trends toward federal listing. The Forest Service accomplishes this by maintaining a list of sensitive plant species specific to the region (the Regional Forester's sensitive species list). Section 2672.2 of the manual states that the Forest Service should manage habitat at levels that aid in the recovery of federally listed species as documented in USDA recovery plans (USFS 2005).

To facilitate management of native and desirable non-native plant species, the Forest Service developed a list of species of local concern separate from the Regional Forester's sensitive plant species list. The Region 2 Planning Desk Guide (USFS 2003a) defines species of local concern as "species that are documented or suspected to be at risk at a local scale within Region 2, but do not meet the criteria for regional Sensitive Species designation."

Significant plant communities (potential conservation areas) have been delineated by CNHP to identify the land area that provides habitat and ecological processes upon which a particular species, suite of species, or natural community depends for its continued existence (NatureServe 2015).

While the specific habitat requirements vary for each of the Forest Service Regional Forester's Sensitive Species and Forest Service Local Concern Species evaluated in this report, they were broadly divided into the following spatially identifiable and quantifiable categories for analysis comparison purposes: Alpine, Non-Forested, Forested, Riparian/Wetland – Non-Fen, and Fen. **Table 3.6-3** provides brief descriptions of these habitat categories within the 110,768-acre analysis area.

3.6.6.1 Federally Threatened and Endangered Plant Species

The Grand Junction office of the USFWS identified four federally listed plant species as occurring, potentially occurring, or potentially being affected by its management activities in the analysis area (USFS 2014a, page 232). **Table 3.6-4** identifies those species along with their status, a brief habitat description, and their suitable habitat acreage (and critical habitat acreage) in the analysis area. **Figures 3.6-5** and **3.6-6** show the suitable habitat and critical habitat for the federally listed species.

Table 3.6-3 Regional Forester's Sensitive Species and Local Concern Species Habitat Categories for Analysis

Habitat Category[1]	Description	Total Analysis Area Acres (%)[2,3]
Alpine[4]	Occurs above 11,500 feet or treelimit. Treelimit occurs at around 11,500 to 12,000 feet in the analysis area. Alpine habitat is sometimes referred to as alpine tundra.	1 (<1)
Non-Forested	The most abundant non-forested cover type in the analysis area is Gambel Oak/Mixed Mountain Shrub followed by Sagebrush/Shrub Mix.	27,315 (25)
Forested	The most abundant cover type in the analysis area. is Aspen, followed by Spruce/Fir.	67,276 (61)
Riparian/Wetland – Non-Fen	All riparian and wetland habitats other than fens.	**10,482**(**9**)
Fen	Wetlands with water-saturated substrates and an accumulation of about 30 centimeters or more of peat (organic soil material). Common in the 8,500 to 10,000 feet elevation range.	276 (<1)

[1] The WRNF 2014 EIS describes the process in which these habitat categories were identified.

[2] Percentage calculated based on the total analysis area (including the 300-meter buffer); 110,768 acres.

[3] Only data specific to the WRNF portion of the lease specific analysis area has been obtained. Information for the GMUGNF is unavailable.

[4] Alpine habitat does not occur within the lease area; however, it occurs within the 300-meter buffer.

Source: USFS 2014a.

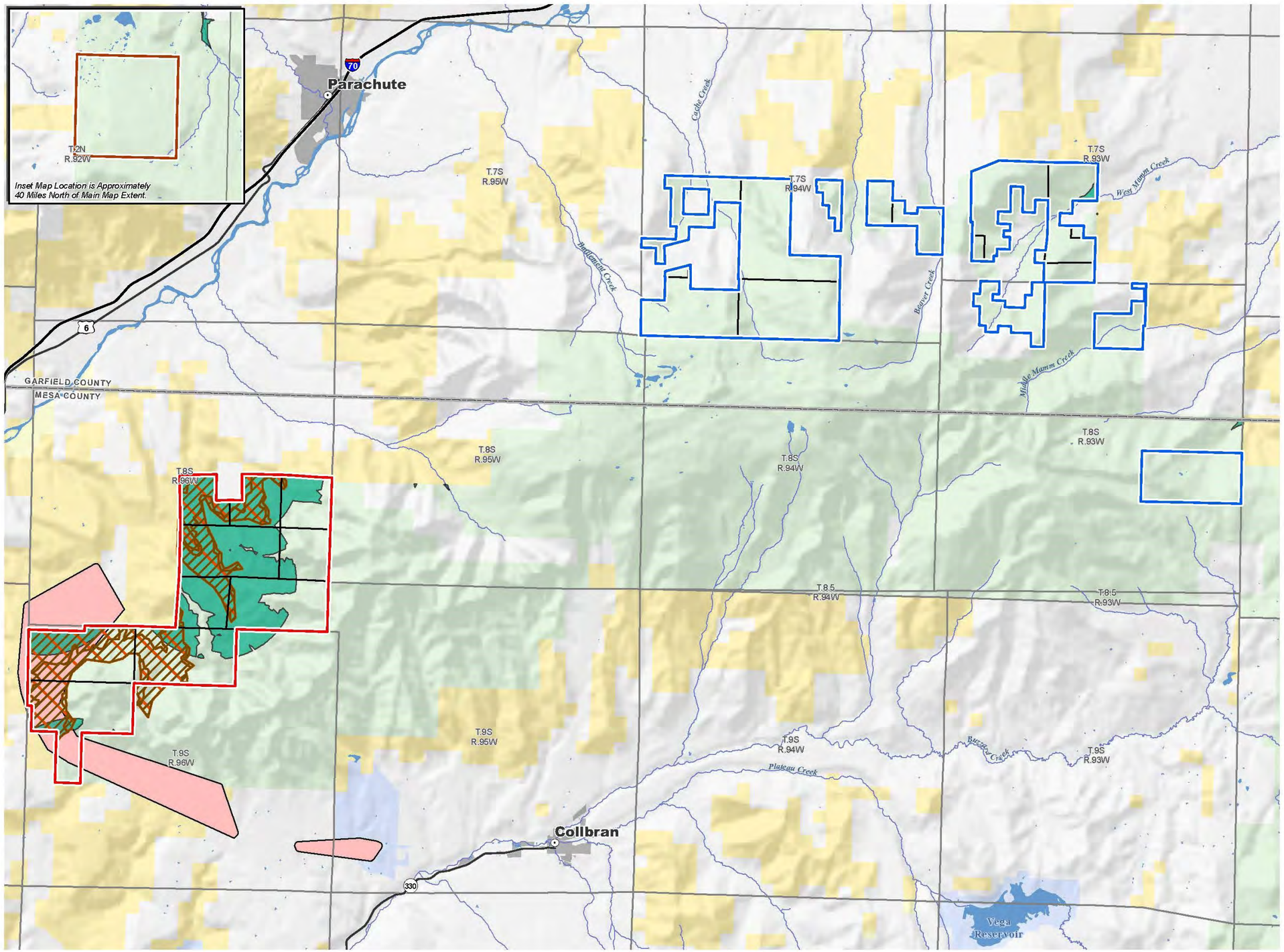
Table 3.6-4 Federally Listed Plant Species Considered in this Analysis

Species (Scientific Name)	Status	Habitat Description	Total Suitable Habitat Acreage in Analysis Area[1] (%)
Penland alpine fen mustard (*Eutrema edwardsii* spp. *penlandii*)	Threatened	Alpine tundra above 11,800 feet. Rooted in mosses on stream banks and wetlands. Endemic to the Mosquito Range in central Colorado	0 (0)
DeBeque phacelia[2] (*Phacelia submutica*)	Threatened	Below 6,700 feet within the South Rifle Ranger District near DeBeque, Colorado. Found on sparsely vegetated slopes in chocolate brown or gray clay soils (Atwell Gulch and Shire Members of Wasatch Formation).	Suitable Habitat: 3,850 (3) Critical Habitat: 1,903 (2)
Colorado hookless cactus (*Sclerocactus glaucus*)	Threatened	Below 6,700 feet on the South Rifle Ranger District near DeBeque, Colorado. Found on alluvium derived from seleniferous shales (Mancos shale, or members of the Wasatch Formation).	3,850 (3)
Ute ladies'-tresses (*Spiranthes diluvialis*)	Threatened	Seasonally moist soils and wet meadows of drainages below 7,200 feet in Eagle, Garfield, and Pitkin counties. Sub-irrigated meadows along margins of ditches.	5,277 (5)

[1] Percentage calculated based on the analysis area (including the 300-meter buffer); 110,768 acres.

[2] Only DeBeque phacelia critical habitat is found within the lease specific analysis area and the analysis area.

Source: USFWS 2015a; USFS 2014a.



Legend

Project Features

Lease Zones
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lease Boundary

Threatened and Endangered Plant Habitat
- Colorado Hookless Cactus Suitable Habitat
- DeBeque Phacelia Suitable Habitat
- Ute Ladies'-tresses Suitable Habitat
- DeBeque Phacelia Critical Habitat

Boundaries
- County Boundary
- Township/Range
- Urban Area

Hydrology
- Stream/River
- Lake/Reservoir

Highways
- Interstate
- Highway

Surface Ownership
- Bureau of Land Management
- Bureau of Reclamation
- Local
- Private
- US Forest Service

WEST DETAIL

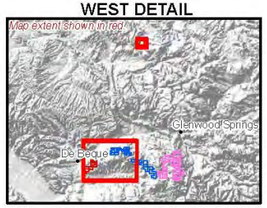


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Figure 3.6-5 Threatened and Endangered Plant Species Habitat (West)

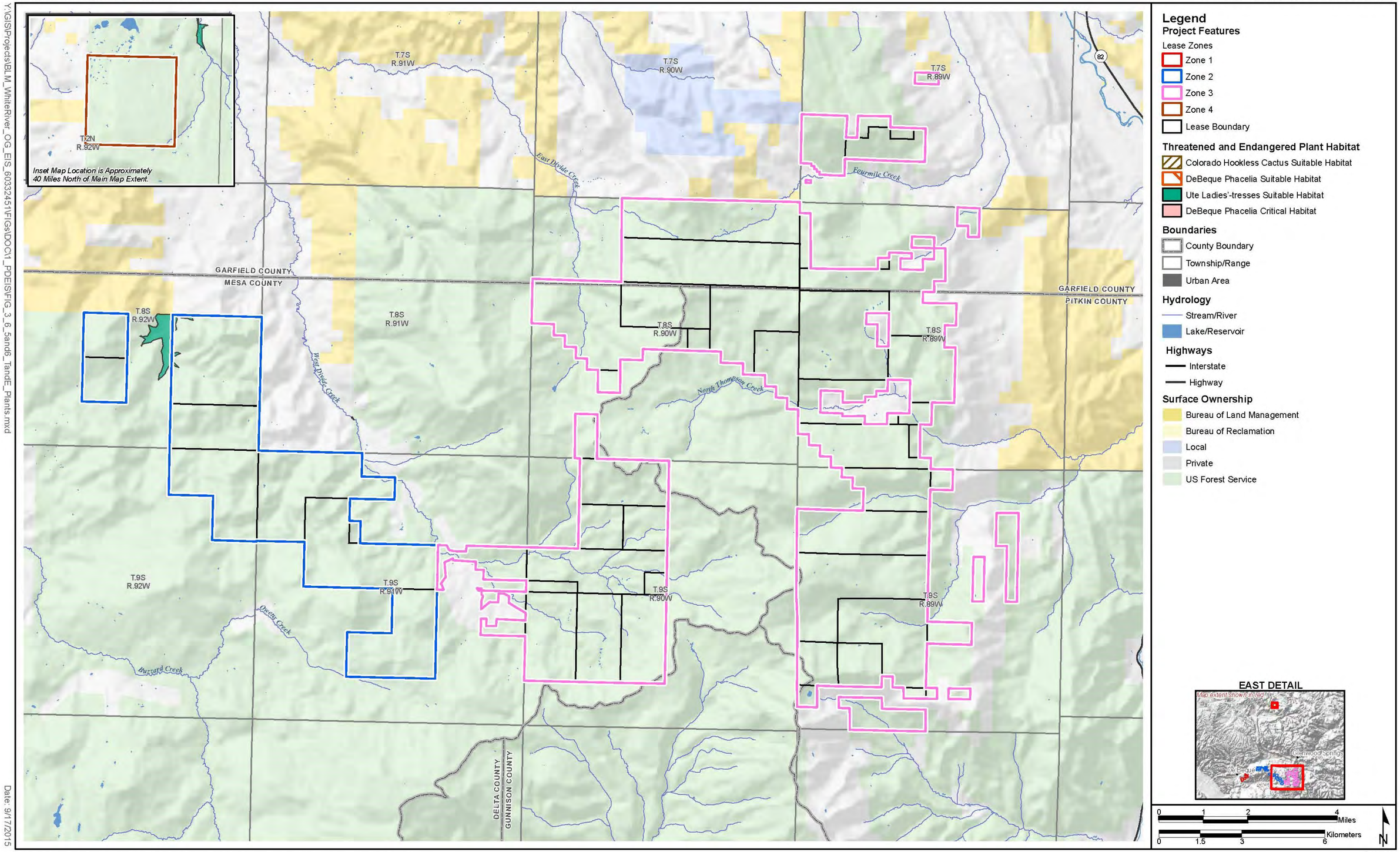

Figure 3.6-6 Threatened and Endangered Plant Species Habitat (East)

A pre-field review done in support of the 2014 WRNF Oil and Gas Leasing Final EIS concluded that three threatened, endangered, and proposed plant species have occurrences or suitable habitat within the analysis area (USFS 2014a, page 233). Based on this analysis, DeBeque phacelia, Colorado hookless cactus, and Ute ladies'-tresses are carried forward for analysis. Because there are no plants, or suitable alpine habitat within or connectivity to the analysis area for Penland alpine fen mustard (*Eutrema edwardsii* spp. *penlandii*), it will not be discussed further in this document.

3.6.6.2 BLM Sensitive Species

The BLM CRVFO identifies three sensitive plant species as occurring, potentially occurring, or potentially being affected by its management activities in the analysis area (BLM 2015d). **Table 3.6-5** identifies those species along with a brief habitat description. The general suitable habitat and their cover area within the analysis area is the same as that of DeBeque phacelia and Colorado hookless cactus and described in more detail above in Section 3.6.2 and in **Table 3.6-4**.

Table 3.6-5 BLM Sensitive Plant Species Considered in this Analysis

Species (Scientific Name)	Habitat Description
DeBeque milkvetch (*Astragalus debequaeus*)	Varicolored, fine-textured, seleniferous, saline soils of the Atwell Gulch Member of the Wasatch Formation, in areas surrounded by pinyon-juniper woodlands and desert shrub (4,900 to 6,700 feet elevation). Plants are mostly clustered on toe slopes and along drainages, but many occur on steep sideslopes. Soils are clayey but littered with sandstone fragments. Suitable habitat exists near the southwest portion of the analysis area.
Naturita milkvetch (*Astragalus naturitensis*)	Sandstone mesas, ledges, crevices and slopes in pinyon-juniper woodlands. Between 5,000 and 7,000 feet elevation. Suitable habitat exists near the southwest portion of the analysis area.
Paradox breadroot (*Pediomelum aromaticum*)	Open pinyon-juniper woodlands, in sandy soils or adobe hills. Between 4,600 and 6,700 feet elevation. Suitable habitat exists near the southwest portion of the analysis area.

Source: BLM 2015d; CNHP 1997.

3.6.6.3 Forest Service Regional Forester's Sensitive Plant Species

Based on analysis conducted for the WRNF Oil and Gas Leasing Final EIS, there are 33 sensitive plant species documented or suspected to occur in the WRNF. Five species do not have occurrences or suitable habitat within the analysis area and have been dropped from further consideration in this analysis. The remaining 28 species are known to occur, suspected to occur, or have potential, suitable habitat within the analysis area (USFS 2014a, page 234). These species were carried forward into the effects portion of this analysis. **Table 3.6-6** lists the Forest Service Regional Forester's sensitive plant species and their category type. Potential habitat coverage in the analysis area is described above in **Table 3.6-3**.

A BE was prepared as part of the WRNF Oil and Gas Leasing Final EIS for all potentially affected Regional Forester's sensitive plant species that could occur within the analysis area (USFS 2014f).

Table 3.6-6 Forest Service Regional Forester's Sensitive Plant Species Considered in this Analysis

Habitat[1]	Species (Scientific Name)
Alpine Habitat[2]	Smooth northern-rockcress (*Braya glabella*) Gray's draba (*Draba grayana*) Colorado tansyaster (*Machaeranthera coloradoensis*)
Non – Forested	Narrowleaf grapefern (*Botrychium lineare*) Peculiar moonwort (*Botrychium paradoxum*) Plains rough fescue (*Festuca halli*) Harrington beardtongue (*Penstemon harringtonii*) Cathedral bluff meadow-rue (*Thalictrum heliophilum*)
Forested	Harrington beardtongue
Riparian/Wetland – Non-Fen	Park milkvetch (*Astragalus leptaleus*) Triangle lobe moonwort (*Botrychium ascendens*) Lesser panicled sedge (*Carex diandra*) Yellow lady's slipper (*Cypripedium parviflorum*) Stream orchid (*Epipactis gigantea*) Kotzebue's grass of Parnassis (*Parnassia kotzebueii*) Dwarf raspberry (*Rubus arcticus* ssp. *acaulis*) American cranberrybush (*Viburnum opulus* var. *americanum*)
Fen	Livid sedge (*Carex livida*) Roundleaf sundew (*Drosera rotundifolia*) Whitebristle cottongrass (*Eriophorum altaicum* var. *neogaeum*) Chamisso's cottongrass (*Eriophorum chamissonis*) Slender cottongrass (*Eriophorum gracile*) Simple bog sedge (*Kobresia simpliciuscula*) Porter's false needlegrass (*Ptilagrostis porteri*) Sageleaf willow (*Salix candida*) Autumn willow (*Salix serissima*) Fine bog-moss (*Sphagnum angustifolium*) Baltic bog moss (*Sphagnum balticum*) Lesser bladderwort (*Utricularia minor*)

[1] Habitats descriptions are provided in **Table 3.6-3.**

[2] Alpine habitat does not occur within the lease area; however, it occurs within the 300-meter buffer.

Source: USFS 2014a.

3.6.6.4 Significant Plant Communities

Significant plant communities, or potential conservation areas, are known to occur, suspected to occur, or have potential, suitable habitat within the analysis area. Significant plant communities cover approximately 20,022 acres (18 percent) within the 110,768-acre analysis area. Based on data from CNHP, there are four significant plant communities in the analysis area. A brief description of the biodiversity significance for each community is provided below.

Beaver Creek at Battlement Mesa – contains two plant communities that are vulnerable on a global scale: blue spruce/thinleaf alder (*Alnus incana*) montane riparian forest and aspen/thinleaf alder montane riparian forest (CNHP 2014).

Fourmile Creek at Sunlight – contains Booth's willow (*Salix boothii*)/ mesic graminoid willow carr. Also includes three more common plant communities: Booth's willow/beaked sedge (*Carex utriculala*) willow carr, subalpine fir/thimbleberry forest and oak-serviceberry shrubland (CNHP 2014).

Middle Thompson Creek – Includes one of the largest good-condition riparian areas observed in the lower Crystal River/Roaring Fork Watershed. It supports an excellent ranked riparian plant community as well as subalpine riparian woodland carr habitats (CNHP 2014).

Rare Plants of the Wasatch – This site is a botanical hotspot and contains almost the entire known population of the globally imperiled DeBeque milkvetch and the globally imperiled DeBeque phacelia. There also are excellent and good occurrences of the globally imperiled adobe thistle (*Cirsium perplexans*), good occurrences of the globally imperiled Naturita milkvetch and several good occurrences of the globally imperiled Colorado hookless cactus (CNHP 2014).

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3.7 Terrestrial Wildlife Including Special Status Species

3.7.1 Regulatory Background

Laws, regulations, and policies that directly influence wildlife management decisions made as part of the EIS for Previously Issued Leases in the White River National Forest are primarily implemented by the BLM, USFWS, and the Colorado Parks and Wildlife (CPW). Prominent laws, regulations, directives, and agreements relevant to the proposed include:

- Colorado Revised Statutes 33-1-101, 33-2-104;
- ESA of 1973;
- Migratory Bird Treaty Act (MBTA) (16 USC 703 et seq.);
- Forest Service Agreement #08-MU-1113-2400-264;
- EO 13186 (66 FR 3853);
- FSM 2670;
- BLM Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125);
- Colorado Revised Statutes 33-2-105; and
- Bald and Golden Eagle Protection Act (BGEPA) (16 USC § 668 et seq.).

Information regarding wildlife species and their habitats within the wildlife analysis area was obtained from a from a review of existing published sources, BLM RMPs, Forest Service land and resource management plans (forest plans), file information from BLM, Forest Service, CPW, and USFWS, as well as CNHP database information and Colorado's Comprehensive Wildlife Conservation Strategy and Wildlife Action Plans (2006).

3.7.2 Analysis Areas

Analysis areas for terrestrial and wildlife species were chosen to represent the combination of geographic areas containing contiguous habitat that would be impacted by the proposed leasing decisions, as well as the management regimes to which this habitat is subject. The analysis areas for terrestrial wildlife species are defined as follows:

- *Nongame and Small Game Terrestrial Wildlife Analysis Area*: The terrestrial wildlife analysis area for small game species and nongame species, including raptors and other migratory birds, includes suitable habitat (as determined through use of the Forest Service Region 2 vegetation data) within the lease boundaries.
- *Special Status Species Wildlife Analysis Area:* The analysis area for special status species, including Federally Listed, Proposed, or Candidate Wildlife Species, Forest Service and BLM Sensitive Wildlife Species, and Forest Service Management Indicator Species (MIS) comprises of suitable, historic, or occupied, habitat within the lease boundary based on Region 2 vegetation data. The exception is elk, which is an MIS but is analyzed under the big game analysis area described above.
- *Big Game Analysis Area*: The big game analysis area consists of the Game Management Units (GMUs) that are crossed by the lease boundaries. Sensitive habitat is typically considered the limiting factor for big game populations, therefore additional focus will be given on these areas (e.g., winter range, transition range, migratory corridors, fawning and calving areas and summer range) within the GMUs. GMUs included in the analysis area are 12, 23, 42, 43, 421, and 521.

- *Canada Lynx Analysis Area*: The Canada lynx analysis area comprises Lynx Analysis Units (LAUs) crossed by the lease boundaries.
- *Greater Sage-grouse Analysis Area*: The greater sage-grouse analysis area includes Priority Habitat Management Areas (PHMA) and General Habitat Management Areas (GHMA) as classified by CPW, crossed by the lease boundaries.

3.7.3 Regional Affected Environment

The terrestrial wildlife analysis areas provide a variety of habitats for wildlife species that are broadly described based on the Forest Service Region 2 vegetative cover. The terrestrial wildlife analysis area is comprised of the 65 lease areas (lease area), which are divided into four zones (Zone 1, 2, 3, and 4). The analysis area is located within portions of the WRNF and the GMUGNF boundaries and is comprised of approximately 80,380 acres. **Table 3.7-1** lists the types and amount of vegetation communities within the terrestrial wildlife analysis area. Wildlife species may utilize several different habitat types or vegetation communities in different seasons or throughout their life cycles. Detailed descriptions of these vegetation community types are discussed in Section 3.6, Vegetation. For more detailed discussions of habitats on the WRNF, please see the Forest Plan (USFS 2002a; Final EIS, pp 3-289-335 and Appendices, pp D-14-50) and the Forest Service WRNF EIS (USFS 2014a; Final EIS pp 182-191).

Table 3.7-1 Vegetation Community Types within the Action Area

Vegetation Cover Type[1]	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)	Total Percent Cover in the Action Area[3]
Aspen	0 (0)	*7,238 (29)*	*23,066 (54)*	*1,288 (50)*	39
Douglas Fir/Mixed Conifer	1,378 (14)	448 (2)	826 (2)	53 (2)	3
Gambel Oak/Mixed Mountain Shrub	488 (5)	*7,313 (29)*	1,035 (2)	68 (3)	11
Grassland/Forbland	24 (<1)	827 (3)	2,340 (6)	28 (1)	4
Lodgepole Pine	0 (0)	0 (0)	0 (0)	605 (24)	<1
Montane Shrubland	735 (7)	1,040 (4)	160 (<1)	104 (4)	3
Pinyon-Juniper	*5,414 (54)*	335 (1)	7 (<1)	0 (0)	7
Riparian/Wetland[2]	**1,635 (16)**	**2,444 (10)**	**6,228 (15)**	**301 (12)**	**13**
Sagebrush/Shrub Mix	740 (7)	3,176 (13)	335 (1)	0 (0)	5
Saltbush/Greasewood	111 (1)	0 (0)	0 (0)	0 (0)	<1
Snowberry	0 (0)	985 (4)	831 (2)	180 (7)	2
Spruce/Fir	181 (2)	3,280 (13)	12,672 (30)	236 (9)	*20*

Table 3.7-1 Vegetation Community Types within the Action Area

Vegetation Cover Type[1]	Zone 1 Acres (%)	Zone 2 Acres (%)	Zone 3 Acres (%)	Zone 4 Acres (%)	Total Percent Cover in the Action Area[3]
Unvegetated	1,041 (10)	271 (1)	177 (<1)	0 (0)	2
Total[3]	**10,114 (13)**	**24,938 (31)**	**42,767 (53)**	**2,562 (3)**	**100**

[1] Dominant cover type by zone is *italicized and highlighted.*

[2] The Riparian/Wetland cover acreage was determined separately from the general vegetation by analyzing three separate data sources: FSVeg, National Wetland Inventory, Forest Service Water Influence Zones data, and Forest Service Fen data. It overlaps the general vegetation analysis, and is therefore not included in the Zone Acreage Total or Total Percent Cover in the Analysis Area.

[3] **Zone Acreage Total and Total Percent Cover in the Analysis Area represent the total acres and percentages within the lease area. Because the Riparian/Wetland vegetation type was analyzed using a separate data set, it overlaps the other vegetation cover types and percent cover. The zone acreages and percentages do not account for this data overlap and therefore, the individual vegetation acreage is greater than the Zone Acreage Total listed in the table. Approximately 7 acres or 0.01 percent of the total 80,380 acres is not included in the total due to differences in resolution between the FSVeg WRNF dataset compared to the FSVeg GMUGNF dataset.**

Source: USFS 2010b.

The terrestrial wildlife analysis areas support a diverse terrestrial wildlife community of large and small mammals, migratory birds, and reptiles. Occurrence and density of wildlife species within this analysis area are dependent upon a variety of factors including the size and mobility of the animal, food habits, water, existing and ongoing development, and overall habitat carrying capacities (Prior Magee 2007). All wildlife species present in the analysis areas are important members of a functioning ecosystem and wildlife community, but most are common and have wide distributions in the region. Consequently, the relationships of most of these species to this analysis area are not discussed in the same depth as species that are threatened, endangered, sensitive, of special concern, of special economic interest, or otherwise of high public interest or unique value.

3.7.4 Nongame Species

The analysis area supports many types of nongame species (e.g., small mammals, raptors, passerines, and reptiles) occupying the habitat types within the wildlife analysis area. Nongame species serve as predators, prey, and scavengers in ecosystems.

3.7.4.1 Small Mammals

<u>Bats</u>

Bats are insectivores that utilize trees, caves, buildings, and rock crevices as day and maternal roost sites, as well as hibernacula. Bat species are most vulnerable to disturbance at birth and during hibernation. Representative bat species most likely to occur in the region include the little brown bat (*Myotis lucifugus*), Yuma myotis (*M. yumanensis*), long-eared myotis (*M. evotis*), fringed myotis (*M. thysanodes*), long-legged myotis (*M. volans*), California myotis (*M. californicus*), small footed myotis (*M. ciliolabrum*), silver-haired bat (*Lasionycteris noctivagans*), western pipistrelle (*Pipistrellus hesperus*), big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), Townsend's big-eared bat (*Corynorhinus townsendii*), spotted bat (*Euderma maculatum*), pallid bat (*Antozous pallidus*), and Brazilian free-tailed bat (*Tadarida brasiliensis*) (BLM 2014b). Within the terrestrial wildlife analysis area, emphasis is placed on the protection of cave habitat utilized as both maternity and winter hibernaculum

by some species of bats. The fringed myotis and Townsend's big-eared bat are considered MIS cave species and are addressed in Section 3.7.6, Special Status Species.

Other Mammals

Other common small mammals occurring within the terrestrial wildlife analysis area include voles, chipmunks, gophers, woodrats, ground squirrels, and mice that provide a substantial prey base for predators within the wildlife analysis area including larger mammals and raptors. The CRVFO RMP (BLM 2014b) provides the following information on the composition of small mammals present within the region:

> Common predators occupying the region include the long-tailed weasel (*Mustela frenata*), mink (*M. vison*), and American badger (*Taxidea taxus*), raccoon (*Procyon lotor*), ringtail (*Bassariscus astutus*), striped skunk (*Mephitis mephitis*), and spotted skunk (*Spilogale gracilis*). Small herbivores include larger rodents, such as the beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), yellow-bellied marmot (*Marmota flaviventris*), pine squirrel (*Tamiasciurus hudsonicus*), rock squirrel (*Otospermophilus variegatus*), thirteen-lined ground squirrel (*Ictidomys tridecimlineatus*) golden-mantled ground squirrel (*Callospermophilus lateralis*), and chipmunks (*Neotamias* spp.). Common lagomorphs include the black-tailed jackrabbit (*L. californicus*), mountain cottontail (*Sylvilagus nuttallii*), and desert cottontail (*S. audubonii*). Another lagomorph, limited to higher elevations, is the snowshoe hare (Lepus americanus), the primary prey species for the Canada lynx. Common nocturnal small mammals include the northern pocket gopher (*Thomomys talpoides*) bushy-tailed woodrat (packrat) (*Neotomoa cinerea*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), and long-tailed vole (*Microtus longicaudus*) in addition to a variety of shrews.

3.7.4.2 Reptiles

As described for in the 2014 CRVFO RMP (BLM 2014b), reptiles in this region occur mostly in dryer habitats at lower elevations, such as semidesert shrub, sagebrush, and pinyon-juniper. The 2002 White River LRMP (USFS 2002a) indicates 14 species of reptiles on the Forest. Representative reptile species include lizards, such as the collared lizard (*Crotaphytus collaris*), short-horned lizard (*Phrynosoma hernandesi*), sagebrush lizard (*Sceloporus graciosus*), plateau lizard (*S. tristichus*), tree lizard (*Urosaurus ornatus*), plateau striped whiptail (*Aspidocelis velox*); and snakes, such as the racer (*Coluber constrictor*), gopher snake or bull snake (*Pituophis catenifer*), midget faded rattlesnake (*Crotalus oreganus concolor*) (a subspecies of the western rattlesnake), milk snake (*Lampropeltis triangulum*), smooth green snake (*Liochlorophis vernalis*), and western terrestrial garter snake (*Thamnophis elegans*) (BLM 2014b).

3.7.4.3 Birds

A number of songbird, raptor, and other bird species occur within the terrestrial wildlife analysis area and utilize all habitats presented in **Table 3.7-1**. The majority of these avian species are migratory and occur only as summer residents within the project vicinity. Many of the summer residents are neotropical migrants that winter in Central and South America. In addition, a number of upland game birds and waterfowls species occur within the terrestrial wildlife analysis area. These species are discussed further under small game species below.

It is generally thought that many bird species are more vulnerable to disturbance during the breeding season. Although most bird species have relatively well-defined breeding seasons, information for some species-specific breeding periods remains unavailable. The timing and duration of the breeding season is species-specific and may vary according to latitude, elevation, and climatic conditions. Since weather is a major determinant of nesting season, breeding generally occurs later in higher latitudes of a species'

range (Baicich and Harrison 1997). This trend also applies to higher elevations, where snow and cold temperatures remain longer than at lower elevations. In areas with significant elevation gradients, the breeding season for a given species may be prolonged. In addition, many species have extended breeding periods because they may produce two or even three clutches each year.

In general, large avian species (e.g., owls and eagles) have prolonged periods of development when the young remain in the nest and are dependent upon the parents. Other species, such as quail and grouse, may leave the nest within hours of hatching and forage with their parents long before they can fly. Small songbirds remain in the nest until they can fly; however, their development is often so rapid that the adults may complete the entire nesting cycle in 1 month or less. The duration of incubation and nestling periods is well established and may be predicted within a few days for most avian species.

Migratory Birds

The MBTA provides federal legal protection for bird species listed at 50 CFR 10.13. In accordance with EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (January 10, 2001) the Forest Service has agreed to a Memorandum of Understanding with the USFWS to promote migratory bird conservation (Forest Service Agreement #08-MU-1113-2400-264). Under this Memorandum of Understanding, the Forest Service has committed to focus its evaluation of the effects of agency actions on those species of management concern along with their priority habitats.

In addition to the MBTA, bald and golden eagles are protected under the BGEPA (16 USC 668 et seq.). This statute prohibits anyone without a permit from committing “take” of bald and golden eagles, including their parts, nests, and eggs. “Take” is defined as the actions to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest and disturb. In 2009, the USFWS implemented two rules authorizing new permits under BGEPA.

- 50 CFR 22.26 would authorize limited “take” of bald and golden eagles where the “take” is associated with, but is not the purpose of an activity and cannot practicably be avoided.
- 50 CFR 22.27 would authorize the intentional take of eagle nests where necessary to alleviate safety hazards to people or eagles; to ensure public health and safety; where a nest prevents the use of a human-engineered structure; and when an activity, or mitigation for the activity, will provide a net benefit to eagles. Only inactive nests are allowed to be taken, except in the case of safety emergencies.

BGEPA provides the Secretary of Interior with the authority to issue eagle-take permits only if he/she is able to determine that the take is compatible with the preservation of the eagle. This take must be “…consistent with the goal of increasing or stabilizing breeding populations.” For golden eagles, current data indicate a negative population trend in the lower latitudes, such as the southwestern U.S., while data indicate a positive population trend in the northern Bird Conservation Regions. These trends may simply indicate movement patterns; however, evidence may demonstrate a lack of resiliency in golden eagle populations.

Raptors

Raptors are protected under state and federal laws including the MBTA and the BGEPA. A variety of raptor habitats are within the lease area, from lower elevation grassland and shrublands to montane shrublands and forests. As a result, there are a variety of raptor species likely to hunt and breed in the area. A number of songbird and other bird species also may occur within the lease area, which include open-country species associated with grassland and shrubland habitats and woodland species associated with coniferous forests. The majority of these avian species are migratory and occur only as summer residents. Many of the summer residents are neotropical migrants that winter in Central and South America.

Open-country raptors likely to occur near the leases include golden eagle (*Aquila chrysaetos*), turkey vulture (*Cathartes aura*), northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and prairie falcon (*Falco mexicanus*). Species closely associated with open water and riparian habitats are osprey (*Pandion haliaetus*), bald eagle, and peregrine falcon. Common montane forest or forest edge dwelling species include Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), northern goshawk (*Accipiter gentilis*), great horned owl (*Bubo virginianus)*, long-eared owl (*Asio otus*), flammulated owl (*Otus flammeolus*), northern pygmy-owl (*Glaucidium gnoma*), and northern saw-whet owl (*Aegolius acadicus*).

In the lease area, osprey, golden eagle, red-tailed hawk, northern goshawk, and great horned owl typically nest in relatively large trees with open crowns. Ospreys require trees along major rivers, lakes, and reservoirs. Osprey also will nest on power poles, artificial platforms, and other man-made structures. All but northern goshawk and osprey also may nest on rock ledges on cliffs and rock outcrops. Northern goshawks typically nest in mature to old-growth stands of aspen, ponderosa pine, and lodgepole pine. Prairie and peregrine falcons nest on ledges and in rock cavities on cliff faces. The American kestrel is a cavity nester, and abandoned woodpecker holes are used as nest sites. American kestrel inhabits a variety of open and wooded habitats and avoids densely forested habitats. Northern harriers nest on the ground in low shrubs or in pockets of dense shrub and grass cover, often near wetlands. Other preferred habitats include native and non-native grasslands, agricultural areas, and marshes (Carter 1998).

Cooper's hawk nests in aspen or in deciduous trees in riparian situations but also is known to nest in mature conifers (Ehrlich et al. 1988; Terres 1980). Nests are typically constructed in an upper crotch of a tree near the trunk and below the canopy top. Sharp-shinned hawks, unlike the Cooper's hawk, nest in a wide variety of wooded habitats ranging from mountain mahogany stands to conifers.

A variety of owl species may occur throughout the leases. Long-eared owls, like great horned owl, do not build their own nest and usually occupy abandoned magpie, hawk, crow, or squirrel nests in tall shrubs or trees (Ehrlich et al. 1998). Although primarily an open-country hunter, long-eared owls typically nest in juniper thickets, woodland perimeters, edges of riparian woodlands and at forest edges near water or moist meadow habitats (Terres 1980). Flammulated owl, northern pygmy-owl, and northern saw-whet owl are all cavity-nesting, coniferous forest dwelling species. The flammulated owl is considered a common summer resident in Colorado and occupy stands of aspen within the analysis area. Northern pygmy-owls are year-round residents in Colorado, but probably exhibit some elevation movements over the seasons (Kingery 1998). Preferred breeding habitat in Colorado appears to be areas that include a mixture of pine, spruce, fir, and aspen with nearby meadows and a water source such as a creek or pond (Rashid 2009). Northern saw-whet owls also are year-round residents in Colorado that also exhibit some elevation movement in response to the seasons (Rashid 2009). The species is relatively widespread in Colorado and prefers old-growth pinyon-juniper and ponderosa pine habitats (Boyle 1998). They can be found nesting in the same higher elevation habitats and areas used by northern pygmy-owls (Rashid 2009). Areas with larger and more mature trees are more likely to provide cavities for nesting for these species.

Birds of Conservation Concern

The USFWS places the highest management priority on the Birds of Conservation Concern (BCC) list (USFWS 2008b). The BCC list was developed as a 1988 amendment to the Fish and Wildlife Conservation Act. This Act mandated that the USFWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973." The goal of the BCC list is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. The habitats and ranges of the BCC for the Southern Rockies/Colorado Plateau (Bird Conservation Region 16) (USFWS 2008) were reviewed to identify BCC potentially occurring in the terrestrial wildlife analysis area (**Table 3.7-2**).

Table 3.7-2 BCC Potentially Occurring within the Special Status Species Wildlife Analysis Area

Common Name	Scientific Name	Associated Habitat
Bald eagle	*Haliaeetus leucocephalus*	Open water, woody riparian and wetlands
Ferruginous hawk	*Buteo regalis*	Cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland
Golden eagle	*Aquila chrysaetos*	Agricultural land, cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland, tundra
Peregrine falcon	*Falco peregrinus*	Aspen forest and woodland, cliff and canyon, conifer forest, deciduous forest, desert shrubland, grassland, herbaceous wetland, montane grassland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland, riparian, woody riparian and wetlands
Prairie falcon	*Falco mexicanus*	Cliff and canyon, desert shrubland, grassland, montane grassland, montane shrubland, sagebrush shrubland, saltbush shrubland
Long-billed curlew	*Numenius americanus*	Agricultural land, grassland, herbaceous wetland, open water, riparian, woody riparian and wetlands
Flammulated owl	*Otus flammeolus*	Aspen forest and woodland, conifer forest
Lewis's woodpecker	*Melanerpes lewis*	Aspen forest and woodland, conifer forest, deciduous forest, pinyon-juniper, riparian
Willow flycatcher	*Empidonax traillii*	Deciduous forest, montane shrubland, riparian, woody riparian and wetlands
Gray vireo	*Vireo vicinior*	Cliff and canyon, desert shrubland, montane shrubland, pinyon-juniper, sagebrush shrubland, saltbush shrubland
Pinyon jay	*Gymnorhinus cyanocephalus*	Conifer forest, montane shrubland, pinyon-juniper
Juniper titmouse	*Baeolophus ridgwayi*	Pinyon-juniper
Brewer's sparrow	*Spizella breweri*	Sagebrush shrubland
Brown-capped rosy-finch	*Leucosticte australis*	Cliff and canyon, tundra
Cassin's finch	*Carpodacus cassinii*	Agricultural land, aspen forest and woodland, conifer forest, pinyon-juniper, riparian, woody riparian and wetlands

Sources: Kingery 1998; USFWS 2008b.

3.7.5 Game Species

3.7.5.1 Ungulates

All ungulates within the region are considered big game species. As described above, the analysis area for big game species includes sensitive habitat (e.g., severe winter range, production range, etc.) within the GMUs that are crossed by the lease boundaries. In Colorado, big game is managed by the CPW within specific geographic areas within herd areas, or GMUs, based on objectives set within a herd management plan, also known as a Data Analysis Unit (DAU). Herds are capable of using multiple or single GMUs (CPW 2014-2015) The DAU represents the year-round range of a big game herd and includes all of the seasonal ranges of a specific herd. The purpose of a DAU plan is to integrate the plans and intentions of CPW with the concerns and ideas of land management agencies and interested publics to determine how a big game herd in a DAU should be managed (CPW 2015b). GMUs are used

to delineate the big game DAUs. GMUs included in the analysis area for big game are units 12, 23, 42, 43, 421, and 521 (**Figure 3.7-1**). This analysis area, which comprises 2,121,890 acres, provides the context for project and cumulative impacts on habitat specifically managed by state agencies for big game populations and is further referred to as the big game analysis area through the remainder of the document.

The big game ungulate species that are known to occur in the big game analysis area include mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), moose (*Alces alces*), pronghorn (*Antilocapra americana*), and Rocky Mountain bighorn sheep (Ovis *canadensis*). Herd size and viability of big game populations are dependent on the combination, availability, and quality of seasonal ranges. Seasonal ranges are not mutually exclusive and fulfill different requirements for resident and migratory big game populations. CPW has identified several types of seasonal ranges (i.e., summer, winter, production, etc.) ranked according to their relative biological value.

Mule Deer

A variety of vegetation communities provide suitable habitat for mule deer. These vegetation communities include aspen forests and woodlands, conifer forests, shrublands, and pinyon-juniper woodlands. Although their diet varies somewhat by season, mule deer are primarily browsers, feeding on a wide variety of woody vegetation including shoots, leaves, and twigs of shrubs and trees. Winter habitat for mule deer occurs in areas of relatively high sagebrush densities and overall low snow accumulation, on south- and west-facing slopes.

The leases are within the range of the White River, North Grand Mesa, Maroon Bells, and Grand Mesa deer herds (DAUs 7, 12, 13, and 51, respectively). DAU plans provide specific information including herd dynamics and population trends, habitat utilized by the herd, and current land use within the DAU. Currently, DAU plans are available from CPW for D-12 and D-13, but not D-7 and D-51. However, the CPW 2014 Big Game Regional Hunt Guides for the Northwest and Southwest Regions of the state provide additional information on the White River and Grand Mesa herds (CPW 2014-2015). Based on the information provided in D-12 and D-13, the main issues include the quality and quantity of winter range, land development, and the expansion of energy development (CPW 2011, 2010).

Sensitive mule deer ranges within the lease areas are detailed in **Table 3.7-3** and include winter range, winter concentration areas, and severe winter range. CPW (2010) defines these ranges as follows:

- *Winter Range:* that part of the range where 90 percent of the animals are located during average winters.
- *Winter Concentration Area*: the part of the range where densities are at least 200 percent greater than the surrounding winter range in average winters.
- *Severe Winter Range:* that part of the range where 90 percent of the animals are located during the two worst winters in 10 years as determined by the maximum annual snow pack and minimum temperatures.

The big game analysis area contains approximately 622,042 acres of mule deer winter range, 278,292 acres of winter concentration areas, and 184,360 acres of severe winter range. As shown below in **Table 3.7-3**, no severe winter range is found within the lease boundaries, the leases contain very little winter concentration areas, and contain over 6,000 acres of winter range (1 percent of available winter range within the big game analysis area), most of which is located in Zone 1. **Figure 3.7-2** identifies sensitive mule deer range in and near the leases.

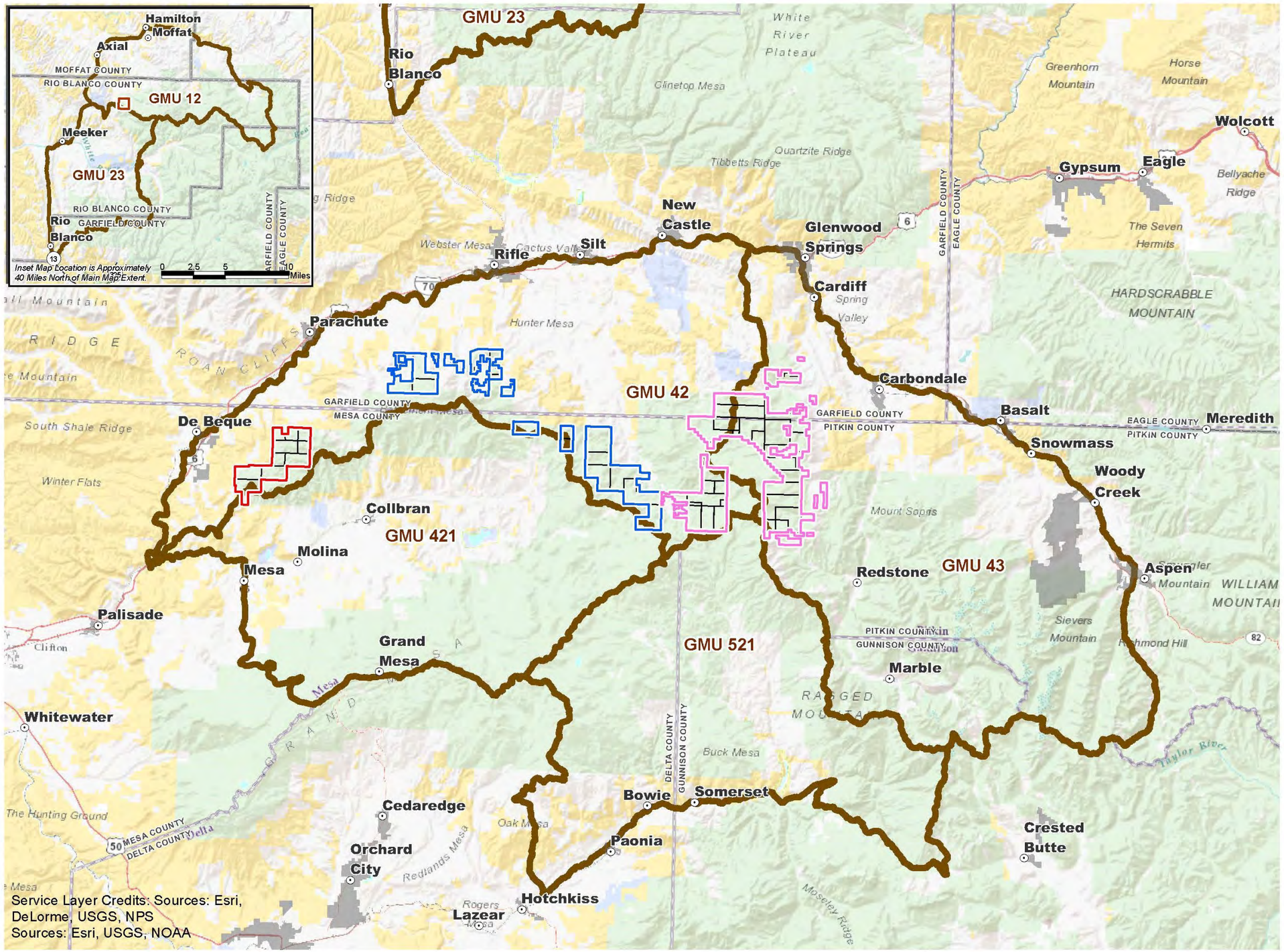

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Figure 3.7-1 Big Game Management Areas In and Near the Leases

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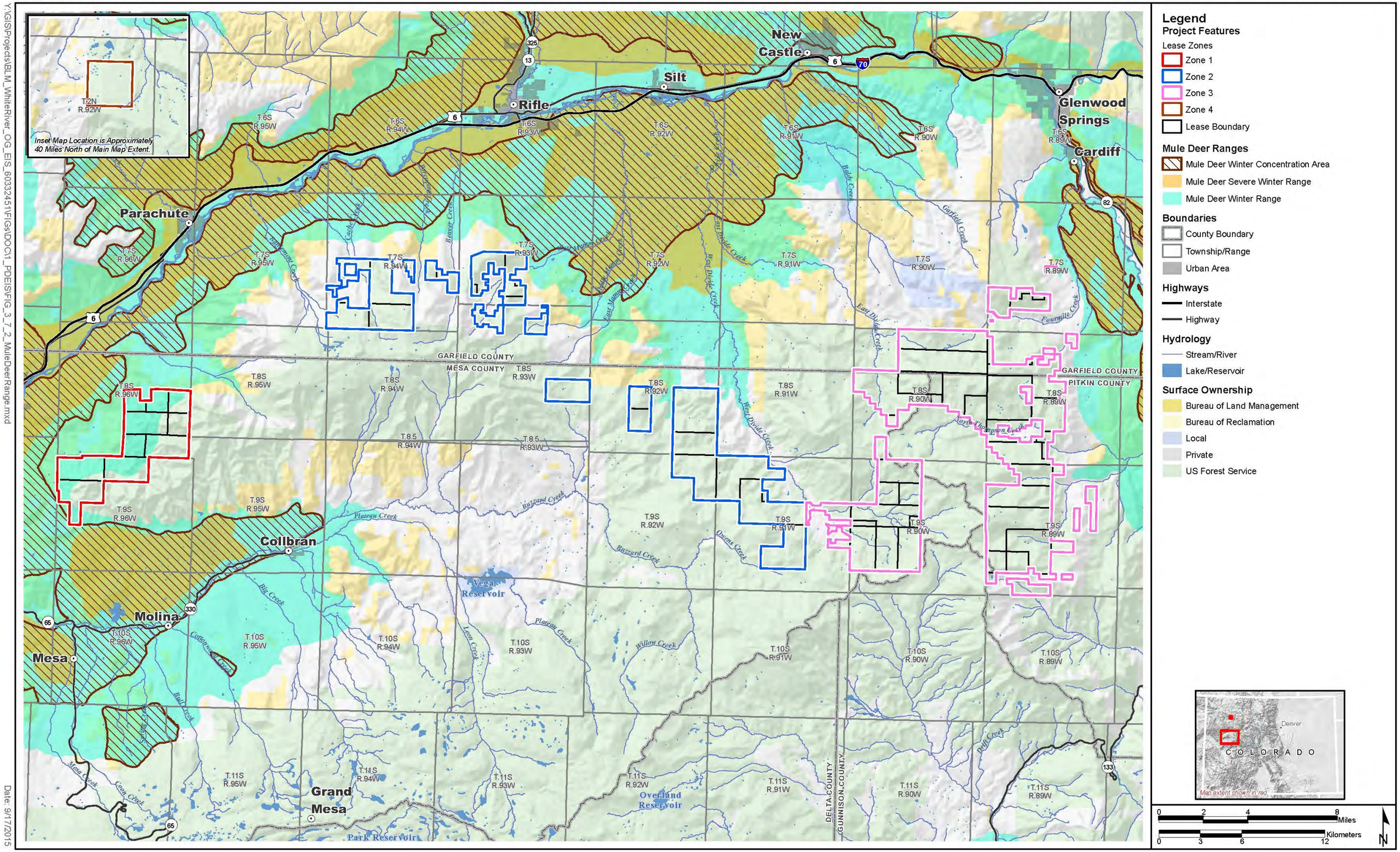

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Figure 3.7-2 Mule Deer Ranges within the Big Game Analysis Area

Table 3.7-3 Sensitive Mule Deer Ranges by Zone and Lease

Zone	GMU	DAU	Lease No.	Sensitive Range (acres)	
				Winter Concentration Areas	Winter Range
1	42	D-12	COC 058677		543
			COC 059630		572
			COC 066728		1,028
			COC 066729		655
			COC 066730		287
			COC 066731		272
			COC 066732		861
			COC 066733		1,254
			COC 066926		427
	421	D-12	COC 066926	19	262
Zone 1 Total				**19**	**6,160**
2	42	D-12	COC 061121		2
			COC 066918		60
Zone 2 Total					**62**
3	43	D-13	COC 066688		3
Zone 3 Total					**3**
Total Acres within the Lease Boundaries				**19**	**6,225**
Total Acres within the Big Game Analysis Area				**278,292**	**622,042**
Percent of the Designated Range Impacted by the Lease Boundaries				**<1%**	**1%**

Source: USFS 2013c.

Elk

In Colorado, elk range covers the western two-thirds of the state, generally at elevations above 6,000 feet (Armstrong et al. 2011). Elk are typically found in forested habitats, although in northwestern Colorado elk are found in large herds during the winter months in open sagebrush shrublands and grasslands (Colorado Division of Wildlife [CDOW] 2012b). Winter habitat for elk typically consists of low elevation rolling hills, meadows, and agricultural fields. However, unlike mule deer, elk are not as susceptible to harsh winter conditions due to their nutritional requirements and large body size and will often remain at higher elevations until snow depths reach approximately 16 inches (Armstrong et al. 2011).

Considered generalist feeders, elk are both grazers and browsers. In the northern and central Rocky Mountains, grasses and shrubs compose most of the winter diet, with grasses becoming of primary importance in the spring months. Forbs become increasingly important in late spring and summer, and grasses again dominate in the fall. Forbs tend to be favored on drier sites, but browse is preferred in most mesic areas including aspen stands, willow communities, and moist meadows. Upland meadow

and mountain shrub habitats provide the highest-quality forage areas for elk within the big game analysis area. Elk breed in the fall with the peak of the rut in Colorado occurring during the last week of September and first week of October. Breeding typically is over by late October. Most calves are born in late May to early June. Calving grounds generally are in areas where forage, cover, and water are in juxtaposition. Elk tend to inhabit higher elevations during spring and summer and migrate to lower elevations for winter range. Spring and fall migrations are tied to weather and forage availability.

The leases are within the range of the White River, Grand Mesa, and Avalanche Creek elk herds (DAUs E-6, E-14, and E-15, respectively). Sensitive elk range includes production areas, winter range, severe winter range, summer concentration areas, winter concentration areas, and winter range. The CPW defines these areas as follows:

- Production areas are that part of the overall range of elk occupied by the females from May 15 to June 15 for calving.
- Severe winter range represents that part of the overall range of elk where 90 percent of the individuals are located when the annual snowpack is at its maximum and/or temperatures are at a minimum in the 2 worst winters out of 10.
- Summer concentration areas are those areas where elk concentrate from mid-June through mid-August. High quality forage, security, and lack of disturbance are characteristics of these areas to meet the high energy demands of lactation, calf rearing, antler growth, and general preparation for the rigors of fall and winter.
- Winter concentration areas include that part of the winter range where densities are at least 200 percent greater than the surrounding winter range density during the average 5 winters out of 6 from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.
- Winter range is that part of the overall range of elk where 90 percent of the individuals are located during the average 5 winters out of 10 from the first heavy snowfall to spring green-up, or during a site-specific period of winter as defined for each DAU.

Within the big game analysis area, there are 230,971 acres of production areas, 249,501 acres of summer concentration areas, 302,898 acres of severe winter range, 303,275 acres of winter concentration areas, and 1,086,391 acres of winter range. Sensitive elk ranges within the lease area are detailed in **Table 3.7-4**. As shown in the table, the leases contain very little severe winter range or winter concentration areas (less than 1 percent), but contain over 23,000 acres of production areas and over 25,000 acres of summer concentration areas (10 percent of all available range production areas and summer concentration areas within the big game analysis, area). **Figure 3.7-3** identifies sensitive elk range in and near the leases.

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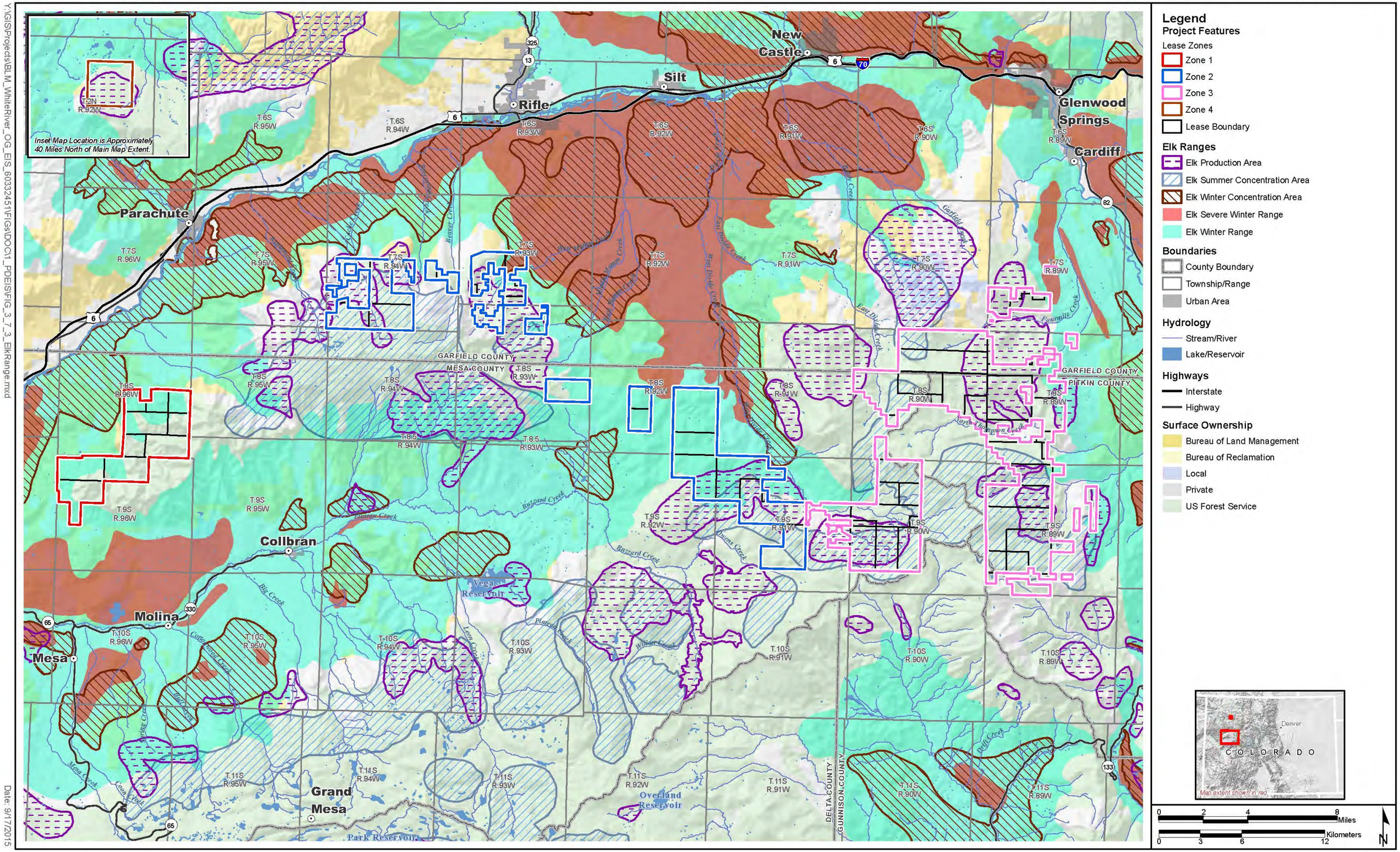

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Figure 3.7-3 Elk Ranges within the Big Game Analysis Area

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Table 3.7-4 Sensitive Elk Ranges by Zone and Lease

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
1	42	E-14	COC 058677					534
			COC 059630					587
			COC 066727					39
			COC 066728					728
			COC 066729					110
			COC 066731					506
			COC 066732					594
			COC 066733					1,166
			COC 066926					447
	421	E-14	COC 066926					327
Zone 1 Total								**5,038**
2	42	E-14	COC 061121	184		425	429	695
			COC 066723					1,280
			COC 066724	768	10			1,871
			COC 066915	1,845	518		0	2,325
			COC 066916	1,839	1,886			136
			COC 066917	70	924			
			COC 066918			19		2,557
			COC 066920		45			
			COC 067147	628	212			462
			COC 067150	625	1			
			COC 067542	145	32			14
			COC 067543	268	1,167			
			COC 067544	586	95			19
			COC 070013					634
			COC 070014	389	1,486			
			COC 070015	683	1,287			
			COC 070016	46	51			
			COC 070361			0		591
			COC 072157					298
			COC 075070	425		12	25	194
			COC 076123	80				

Table 3.7-4 Sensitive Elk Ranges by Zone and Lease

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
2	421	E-14	COC 070013					162
			COC 070361					47
			COC 072157					340
Zone 2 Total				**8,581**	**7,714**	**455**	**454**	**11,625**
3	42	E-14	COC 058835	1,239	1,233			
			COC 058836	1,026	1,176			
			COC 058837	232	187			10
			COC 058838	304	1,197			
			COC 058839	528	222			184
			COC 058840		149			
			COC 058841		578			
			COC 066698		27			
			COC 066706		273			
			COC 066707		331			
			COC 066708	297	898			
			COC 066709		467			
			COC 066710	6	722			
			COC 066913	168	1,241			
	43	E-15	COC 066687	733				8
			COC 066688	160		100		174
			COC 066689	40				
			COC 066690	203				45
			COC 066692		623			3
			COC 066693	1,070				901
			COC 066695	175	440			442
			COC 066696	289	893			81
			COC 066697	1,028	1,863			
			COC 066698	913	2,433			
			COC 066699		78			
			COC 066700		668			
			COC 066701	395	1,885			
			COC 066702		467			
			COC 066706	693				
			COC 066708		1			

Table 3.7-4 Sensitive Elk Ranges by Zone and Lease

Zone	GMU	DAU	Lease No.	Sensitive Elk Ranges Designated within the Big Game Analysis Area (acres)				
				Production Area	Summer Concentration Area	Severe Winter Range	Winter Concentration Area	Winter Range
3	521	E-14	COC 066710	416				
			COC 066711	632				
			COC 066712	488				
			COC 066908	1,945				
			COC 066909	543				263
			COC 066913		3			
			COC 066702		9			
Zone 3 Total				**13,523**	**18,063**	**100**		**2,112**
4	12	E-6	COC 066948	1,485				317
	23	E-6	COC 066948	223				
Zone 4 Total				**1,709**				**317**
Total Acres within the Lease Boundaries				**23,813**	**25,778**	**555**	**454**	**19,091**
Total Acres within the Big Game Analysis Area				**230,971**	**249,501**	**302,898**	**303,275**	**1,086, 391**
Percent of the Designated Elk Range Impacted by the Lease Boundaries				**10**	**10**	**<1**	**<1**	**2**

Source: USFS 2013c.

Moose

Moose are not common within the big game analysis area but occur in DAUs M-5 and M-6 as part of the White River and Grand Mesa herds (CPW 2014-2015).Until 1978 when moose were reintroduced to North Park from Utah and Wyoming, moose were not breeding in Colorado and only considered migrants into the state (CPW 2014a). From 2005 to 2007, moose were reintroduced to the Grand Mesa, near the lease area (CPW 2014b). Typically, this species is found in forested areas, primarily along riparian areas with abundant willow habitat. Moose feed on a wide variety of plants including trees, shrubs, grasses, forbs, algae, and other aquatic plants (Armstrong et al. 2011). On the Grand Mesa, moose are found most frequently Gambel oak-dominated woodlands, followed by aspen, then conifer forests, and mixed aspen-conifer stands. Only 3 percent of locations since 2005 have been in willow or riparian areas (CPW 2014b). Generally, moose are not as susceptible to severe winter conditions as other big game animals due to their large body size that allows them to forage in deep snow.

Within the big game analysis area, there are 124,086 acres of concentration areas and 334,837 acres of summer range. **Table 3.7-5** identifies moose range by zone and by lease. The leases contain about 9 percent (11,445 acres) of all available concentration areas within the big game analysis area. The majority of these areas are in Zone 2. There is a small amount of moose summer range in Zone 3 (<1 percent of all available summer range within the big game analysis area). Moose range in and near the leases is displayed on **Figure 3.7-4**.

Table 3.7-5 Sensitive Moose Ranges by Zone and Lease

Zone	GMU	DAU	Lease No.	Sensitive Range (acres)	
				Concentration Areas	Summer Range
2	42	M-5	COC 066723	1,206	
			COC 066724	1,973	
			COC 066915	2,537	
			COC 066916	2,224	
			COC 066917	0	
			COC 066918	916	
			COC 072157	4	
Zone 2 Total				**8,861**	
3	42	M-5	COC 058835	276	
			COC 058836	6	
			COC 058837	1,132	
			COC 058838		0
			COC 058839	924	
			COC 058840	64	
			COC 066913	183	
	43	M-5	COC 066700		0
			COC 066702		0
	521	M-5	COC 058838		24
			COC 066700		14
			COC 066702		90
Zone 3 Total				**2,584**	**128**
Total Acres within the Lease Boundaries				**11,445**	**128**
Total Acres within the Big Game Analysis Area				**124,086**	**334,837**
Percent of the Designated Range Impacted by the Lease Boundaries				**9%**	**<1%**

Source: USFS 2013c.

Pronghorn

Pronghorn, like moose, are not common within the big game analysis area but occur in DAU A-34 as part of the Axial Basin herd (CPW 2014-2015). No sensitive ranges for pronghorn overlap with the lease boundaries. Within Colorado, pronghorn are found on the eastern plains, in the larger mountain parks and valleys, and on shrublands west of the mountains. Pronghorn generally live in grasslands and semidesert shrublands on rolling topography that affords good visibility (CPW 2015a). Pronghorns are largely browsers, subsisting on sagebrush, supplemented by leafy forage in summer (CPW 2015a). Breeding occurs in the fall from mid-September to mid-October, and give birth in late May to mid-June (CPW 2015a).

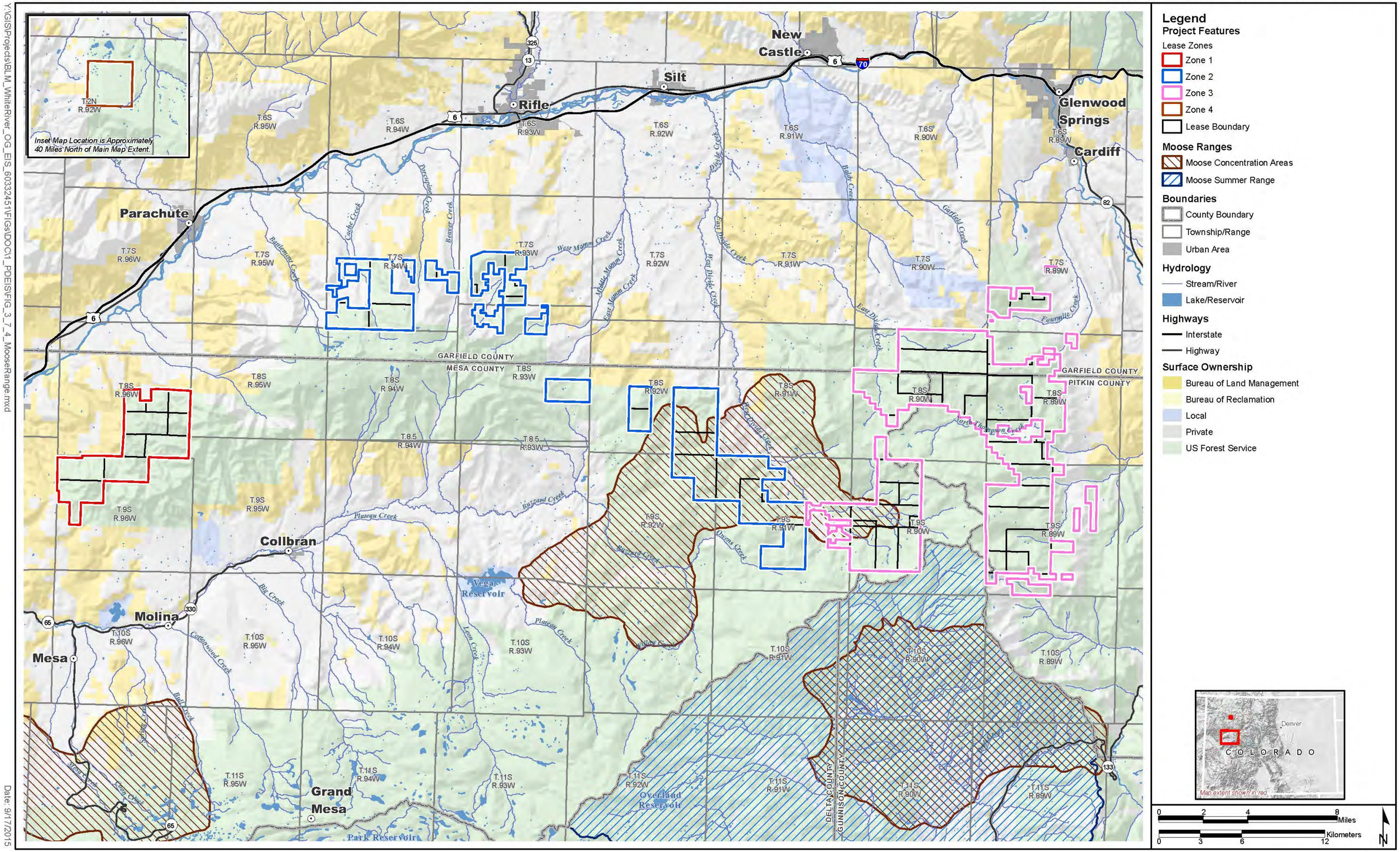

Figure 3.7-4 Moose Ranges within the Big Game Analysis Area

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Rocky Mountain Bighorn Sheep

Rocky Mountain bighorn sheep occur in portions of the big game analysis area and are listed as Forest Service sensitive in the WRNF (USFS 2013a). Rocky Mountain bighorn sheep can be found in a variety of habitats from alpine to lower elevation foothills but typically occupy steep, inaccessible habitat that provides them vantage points for predator detection and escape cover (Armstrong et al. 2011; CDOW 2009). This species feeds primarily on grasses, shrubs, and some forbs depending on the elevation of occupied habitat. Winter range for Rocky Mountain bighorn sheep typically consists of low elevation south-facing slopes that are blown free of snow cover. Rocky Mountain bighorn sheep are gregarious and exhibit high site fidelity. In many areas of their range, this species spends the winter months in the same localized winter habitat each year (Armstrong et al. 2011; CDOW 2009).

The Battlement and Avalanche Creek herd ranges overlaps with the leasing area within the DAUs S-24 (GMUs 42 and 421) and S-25 (GMU 43), respectively (CPW 2014c). The Battlement herd is one of only four low elevation indigenous bighorn herds remaining in Colorado (USFS 2014a). According to the Forest Service BE (USFS 2014e) for the WRNF, the range for this herd is primarily the Rifle District of the WRNF, the GMUGNF, Grand Mesa and Uncompahgre National Forests, and a small amount of BLM land. The herd historically occupied the Battlement Range between Horsethief Mountain and Mamm Peaks, with the higher-elevation eastern end of the Battlements providing summer range habitat and the lower-elevation end providing winter range habitat (USFS 2014a). The current population is estimated at approximately 50 individuals (USFS 2014a).

The Avalanche Herd primarily resides outside the big game analysis area on the east side of the Crystal River with the majority of their range existing in the Maroon Bells-Snowmass Wilderness, but the boundary of DAU 2-25 overlaps with Zone 3. According to the BE (USFS 2014e, pg. 27) for the WRNF, this herd is primarily a native herd with only one record of augmentation, including five rams that were added from the Basalt Herd. The current population is approximately 60 animals, and this herd has been declining since the late 1990s.

Table 3.7-6 details the amount of Rocky Mountain Bighorn Sensitive ranges within the lease areas. As shown in the table, only Zone 1 contains sensitive bighorn sheep ranges. Leases within this zone contain 3 to 7 percent of all the sensitive ranges within the big game analysis area. The exception is water sources, where 43 percent lie within lease boundaries found in Zone 1. In addition to the designated ranges overlapping the lease boundaries, 1,401 acres of severe winter range exists within the big game analysis area, but outside the lease boundaries. Rocky Mountain bighorn sheep range in and near the leases is displayed as **Figure 3.7-5**.

Table 3.7-6 Bighorn Sheep Ranges by Zone and by Lease

Zone	GMU	Lease No.	Range (acres)					
			Overall Range	Production Areas	Summer Concentration Areas	Summer Range	Winter Concentration Areas	Water Source
1	42	COC 058677	362			362		362
		COC 059630	365			365		289
		COC 066727	640			640		518
		COC 066728	1,275			1,275		1,275
		COC 066729	655			655		270
		COC 066730	1,279			1,279		605
		COC 066731	625			625		120
		COC 066732	1,435			1,435		768
		COC 066733	1,096			1,096		688
		COC 066926	1,161	561	245	1,161	245	332
	421	COC 066926	468	374	158	468	158	
Zone 1 Total			**9,361**	**935**	**404**	**9,361**	**404**	**5,227**
Total Acres within the Lease Boundaries			**9,361**	**935**	**404**	**9,361**	**404**	**5,227**
Total Acres within the Big Game Analysis Area			**164,545**	**30,034**	**8,744**	**149,229**	**5,484**	**12,224**
Percent of the Designated Range Impacted by the Lease Boundaries			**6%**	**3%**	**5%**	**6%**	**7%**	**43%**

Source: USFS 2013c.

3.7.5.2 Carnivores

Big Game

The big game carnivore species that are known to occur in the big game analysis area include black bear (*Ursus americanus*), and mountain lion (*Puma concolor*). Similar to the big game ungulate species, viability of these big game populations are dependent on the combination, availability, and quality of seasonal ranges. Seasonal ranges are not mutually exclusive and fulfill different requirements for resident and migratory big game populations. CPW has identified several types of seasonal ranges (i.e., summer, winter, production, etc.) ranked according to their relative biological value.

Black Bear

Black bear are classified as a big game species in Colorado. The species is fairly common within the big game analysis area (DAUs B-10 and B-1), especially in forested, woody riparian, and wetland areas along perennial waterbodies (Armstrong et al. 2011). Black bears generally occur at low densities in habitats found within the big game analysis area and their distribution is dependent on existing and ongoing disturbance and available food sources. The big game analysis areas include 498,538 acres of fall concentration areas and 435,815 acres of summer concentration areas. The CPW defines fall and summer concentration areas as:

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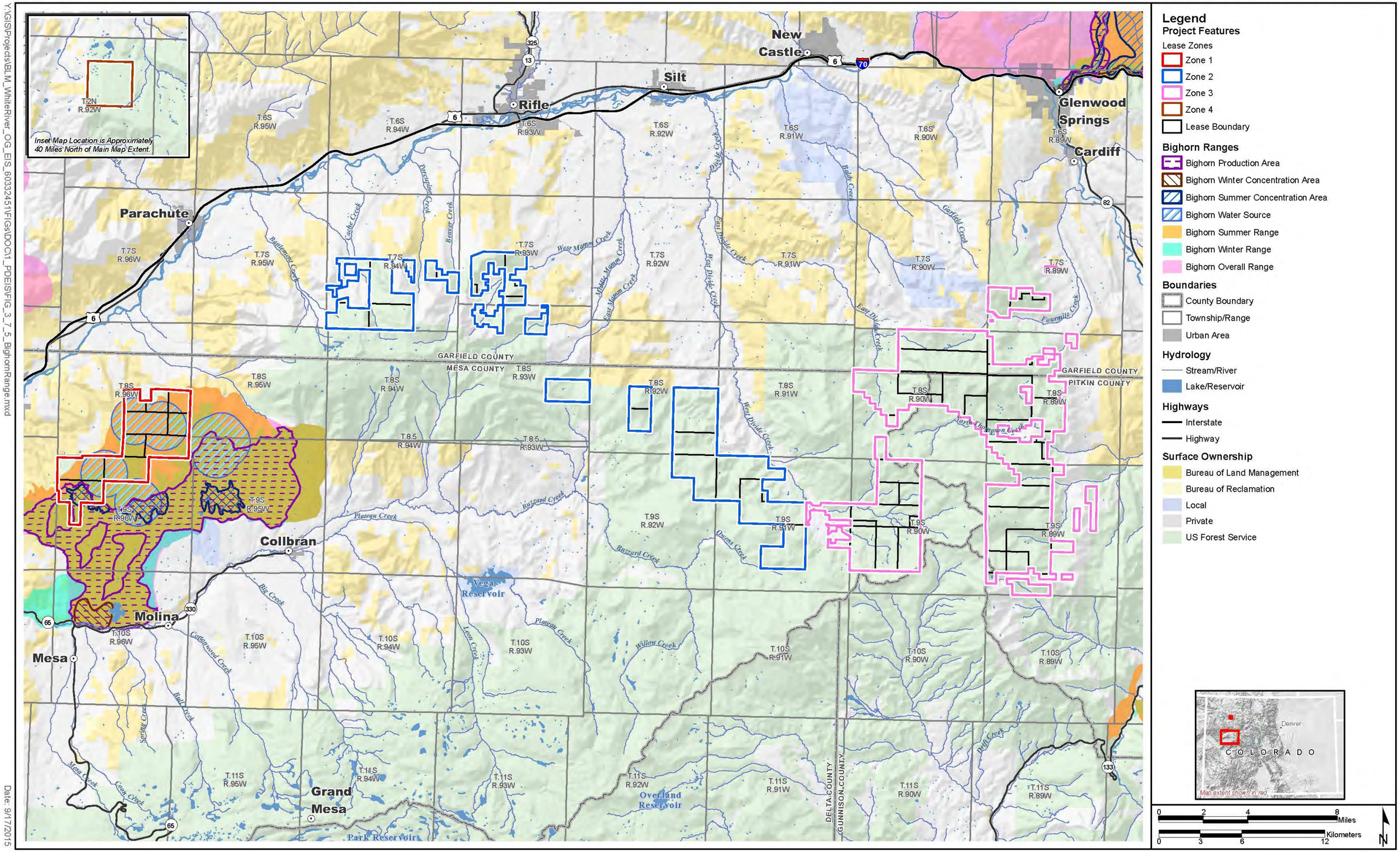

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Figure 3.7-5 Bighorn Sheep Ranges within the Big Game Analysis Area

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- Fall Concentration: That portion of the overall range occupied from August 15 until September 30 for the purpose of ingesting large quantities of mast and berries to establish fat reserves for the winter hibernation period.
- Summer Concentration: That portion of the overall range of the species where activity is greater than the surrounding overall range during that period from June 15 to August 15.

As shown below in **Table 3.7-7**, the leases contain a small percentage of concentration areas (3 percent of available fall concentration areas and less than 1 percent of available summer concentration areas within the big game analysis area), most of which are located in Zones 2 and 3. **Figure 3.7-6** identifies black bear habitat in and near the leases.

Table 3.7-7 Black Bear Concentration Areas Zone and by Lease

Zone	GMU	Lease No.	Fall Concentration Areas (acres)	Summer Concentration Areas (acres)
1	42	COC 059630	126	
		COC 066727	218	
		COC 066731	649	
1 Total 993				
2	42	COC 061121	441	
		COC 066723	1,104	
		COC 066724	1,224	
		COC 066915	2,503	
		COC 066916	1,176	
		COC 066918	2,084	
		COC 066920	6	
2	42	COC 067147	662	
		COC 067150	307	
		COC 067542	343	
		COC 067543	1,057	
		COC 067544	730	
		COC 070013	942	
		COC 070014	566	
		COC 070015	1,598	
	421	COC 070016	51	
		COC 070361	33	
		COC 075070	31	
		COC 070013	0	
2 Total 14,857				
3	42	COC 058838		0
		COC 058839	44	
	43	COC 066695	241	
		COC 066700		0
		COC 066702		0

Table 3.7-7 Black Bear Concentration Areas Zone and by Lease

Zone	GMU	Lease No.	Fall Concentration Areas (acres)	Summer Concentration Areas (acres)
	521	COC 058838		24
		COC 066700		14
		COC 066702		90
3 Total 285				**128**
4	12	COC 066948		2
4 Total				**2**
Total Acres within the Lease Boundaries			**16,135**	**130**
Total Acres within the Big Game Analysis Area			**498,538**	**435,815**
Percent of the Designated Range Impacted by the Lease Boundaries			**3%**	**<1%**

Source: USFS 2013c.

Mountain Lion

Mountain lions are classified as a big game species in Colorado. The species is fairly common within the big game analysis area, especially in forested, woody riparian and wetland areas along perennial waterbodies (Armstrong et al. 2011). Mountain lions generally occur at low densities in habitats found within the mule deer big game analysis area (DAUs 7 and 12) and their distribution is dependent on available food sources, primarily mule deer.

3.7.5.3 Furbearers

Furbearers likely to occur within the wildlife analysis area include beaver, muskrat, raccoon, striped skunk, long tailed weasel, short-tailed weasel, American badger, bobcat, coyote, mink, gray fox, kit fox, and red fox (CDOW 2012a). These species have wide distributions within the wildlife analysis area and are found within a variety of habitat types (e.g., sagebrush shrubland, desert shrub, pinyon-juniper, montane shrubland, grassland, etc.). The distribution of furbearers within the wildlife analysis area is typically determined by available food sources (e.g., small rodents, fish, insects, waste grain, human food waste). The Canada lynx also is a furbearer but is listed as threatened by the USFWS and is discussed under Section 3.7.6, Special Status Species.

3.7.5.4 Small Game Species

Small game species that occur within the wildlife analysis area include upland game birds, small mammals, furbearers, and waterfowl. Potential habitat for small game species (except waterfowl) within the wildlife analysis area includes all of the vegetative communities present. Potential habitat for waterfowl within the wildlife analysis area includes herbaceous wetland, open water, riparian, and woody riparian and wetlands vegetation communities.

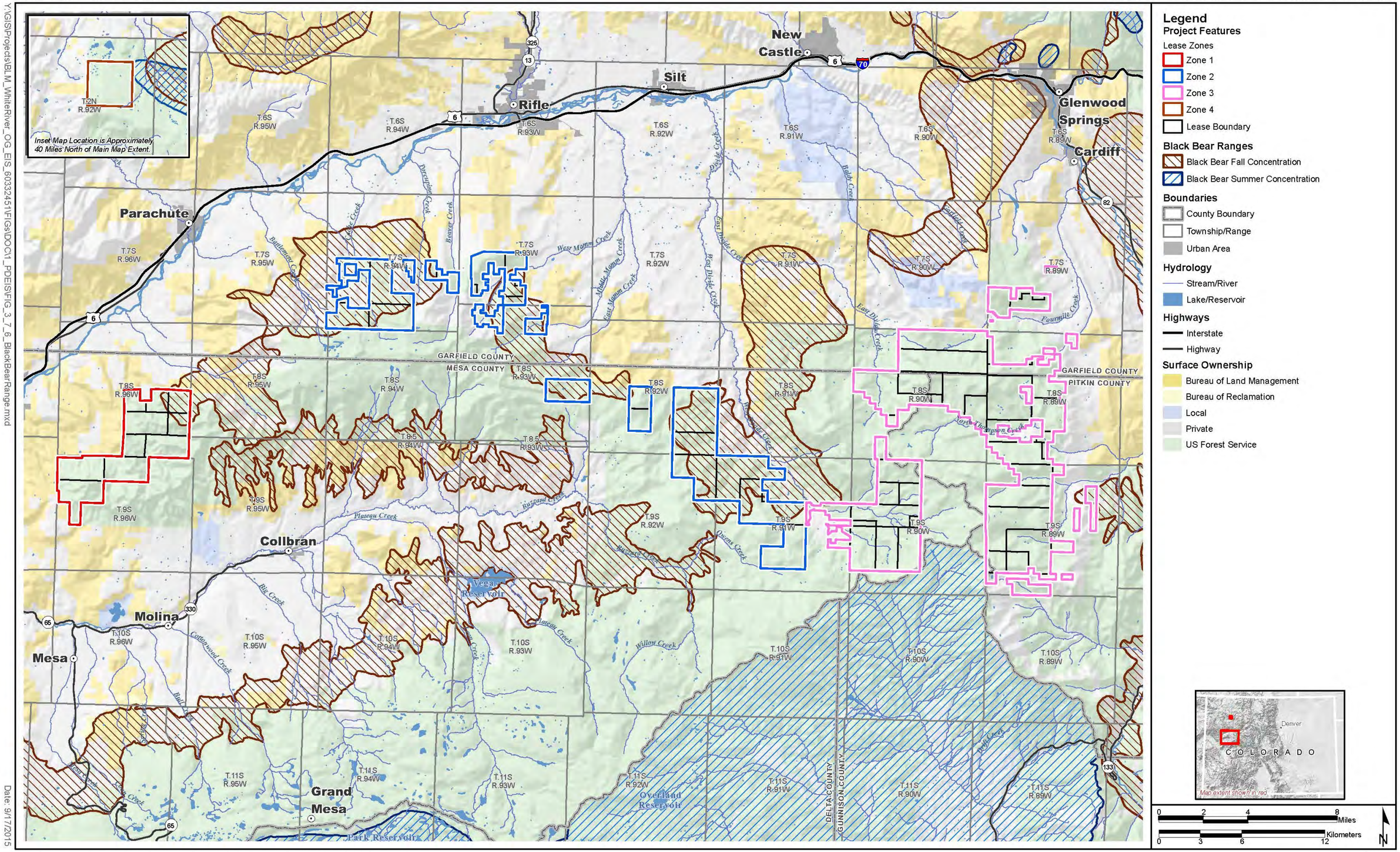

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Figure 3.7-6 Black Bear Sheep Range Locations Within and Near Leases

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Upland Game Birds

Upland game bird species that occur within the wildlife analysis area include greater sage-grouse (*Centrocercus urophasianus*), dusky grouse (*Dendragapus obscurus*), wild turkey (*Meleagris gallopavo*), Gambel's quail (*Callipepla gambelii*), band-tailed pigeon (*Patagioenas fasciata*), and mourning dove (*Zenaida macroura*). The greater sage-grouse is a Forest Service Sensitive species, BCC, and state species of concern for Colorado and is discussed under Special Status Species. Dusky grouse are found in forested areas of Colorado that contain aspen, chokecherry, serviceberry, Douglas fir, lodgepole pine, and spruce/fir vegetation types (Kingery 1998; Stokes and Stokes 1996). Wild turkeys are found in Colorado and are typically associated with ponderosa pine and oakbrush habitats but also may be found in riparian and agricultural areas with suitable trees for roosting (Boyle 1998). Gambel's quail are found in Colorado (Stokes and Stokes 1996). This species of quail occupies brushy habitats near riparian areas (Stokes and Stokes 1996). Band-tailed pigeons occur in Colorado in forests and mountain shrub habitats, primarily ponderosa pine and oakbrush (Dexter 1998). Mourning doves occur in habitats ranging from deciduous forests to shrubland and grassland communities, often nesting in trees or shrubs near riparian areas or water sources (Stokes and Stokes 1996). Most upland game bird species feed on a wide variety of plant and insect species depending on the time of year (i.e., insects during the spring and summer and leaves and seeds during the fall and winter). Many of the species described above exhibit annual population fluctuations depending on habitat conditions and weather patterns.

Waterfowl

The lease area is located within the Central and Pacific Flyways. Common waterfowl species that may occur within the wildlife analysis area include Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), green winged teal (*A. crecca*), northern pintail (*A. acuta*), gadwall (*A. strepera*), American wigeon (*A. americana*), and common goldeneye (*Bucephala clangula*). Other common summer residents include blue-winged teal (*A. discors*), northern shoveler (*A. clypeata*), redhead (*Aythya americana*), and greater and lesser scaup (*A. marila* and *A. affinis*) (Cerovski et al. 2004; Floyd et al. 2007; Kingery 1998; Stokes and Stokes 1996).

These species distributions are limited to the rivers, streams, lakes, reservoirs, ponds, and wetlands found within the wildlife analysis area. For the purposes of this analysis, these habitats are classified as open water and wetland/riparian vegetation communities. Population numbers for these species vary annually based on available habitat and weather patterns. While waterfowl species are considered game birds, they also are protected under the MBTA.

3.7.6 Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed species that are protected under the ESA and species designated as sensitive by the Forest Service.

In accordance with the ESA, the BLM, in coordination with the USFWS, must ensure that any action that they authorize, fund, or carry out is not likely to jeopardize a federally listed species or result in the destruction or adverse modification of critical habitat. In addition, as stated in the BLM's Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-125), it is BLM policy "to conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA provisions are no longer needed for these species, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA." The FSM 2670 states "Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing."

3.7.6.1 Federally Listed and Candidate Wildlife Species

One federally listed wildlife species (**Canada lynx**) ha**s the** potential to occur within the special status wildlife analysis area. A summary of the listing status, habitat, and general distribution for each federally listed, candidate, and proposed wildlife species is provided in **Table 3.7-8**.

Table 3.7-8 Federally Listed, Candidate, and Proposed Wildlife Species with the Potential to Occur within the Analysis Area

Species Scientific Name	Species Common Name	Status	Associated Habitat	Included in Detailed Analysis
Mammals				
Lynx canadensis	Canada lynx	FT	Boreal forests.	Yes, see suitable habitat table below.
Mustela nigripes	Black-footed ferret	FE	Large prairie dog colonies found within short-grass prairie.	No. The lease boundaries are currently located outside the Northwestern Colorado/Northeastern Utah Black–footed Ferret Experimental Population Area and no wild ferrets are documented outside reintroduced populations.
Birds				
Coccyzus americanus	Western yellow-billed cuckoo	FT	Large contiguous blocks of cottonwoods/riparian.	**No. Suitable habitat is not found within the previous leases area and this species has not been reported within the lease boundaries.**
Strix occidentalis lucida	Mexican spotted owl	FT	Mixed coniferous forests and hardwood forests in rocky steep-walled canyons.	**No. No mapped Forest Service potential habitats are found within the analysis area. Additionally, according to correspondence with the USFWS (pers. Correspondence with C. Clayton February 1, 2016), there is no suitable habitat for MSO within the analysis area and no MSO have ever been reported from these areas.**

Status Key: FT – Federally Threatened; FE – Federally Endangered.

Source: USFWS 2015b; USFS 2015e.

Federally Threatened

Canada Lynx

The contiguous U.S. Distinct Population Segment of the Canada lynx was designated as threatened on March 24, 2000 (65 FR 16051). This Distinct Population Segment includes lynx inhabiting forested portions of Colorado. No critical habitat for the Canada lynx has been designated in Colorado. The Canada lynx was reintroduced into the state of Colorado between 1999 and 2006 by CPW. Natural history information for the species is described in the BE for the revised White River Forest Plan (USFS 2002b, Final EIS Appendix N).The species' threats, distribution, occurrence on the WRNF, habitat description, and life history information included

in the WRNF BA (USFS 2015a, pp 33-35) is considered valid for this EIS and is hereby incorporated by reference.

Lynx habitat can generally be described as moist boreal forests dominated by conifer trees, primarily species of spruce (*Picea* spp.) and fir (*Abies* spp.), that have cold, snowy winters and a high-density snowshoe hare prey base (USFWS 2014c). For more detailed information on the occurrence and existing conditions of suitable habitat within the WRNF, see the BA (USFS 2015e, pp 33-35) for the 2014 WRNF EIS (USFS 2014a; Final EIS, pp 33-35).

For this EIS, the analysis area for Canada lynx consists of LAUs that overlap with the lease boundaries. LAUs are management areas that contain suitable lynx habitat and approximate the size of a female home range**.** The analysis area is approximately 510,804 acres and the LAUs included in the analysis area include:

- Aldrich Lakes
- Battlement
- Crystal West
- Divide Creek
- Huntsman Mountain
- Ruth Mountain
- South Mamm Peak

Lynx habitat conditions found within the analysis area are summarized in Table 3.7-9. Denning and winter forage habitat is self-explanatory. Denning and denning/winter habitats are considered areas of concern for this analysis. According to the Forest Service, denning habitat is also considered suitable as winter foraging habitat, however, there are additional areas of designated winter habitat that do not overlap with denning habitat (USFS 2015e, pp. 50). "Other" lynx habitat is defined as "lower quality habitats other than those considered to be suitable for denning or winter foraging. These are forest habitats with open canopy closures, young aspen/mixed conifer stands, lodgepole pine pole stands, and willow, sagebrush, and pure aspen stands within 500 meters of lynx denning and winter foraging habitats." Unsuitable habitat is classified as previously suitable habitat which is now not suitable due to human activities and non-habitat is classified as not being suitable habitat for lynx currently or in the past.

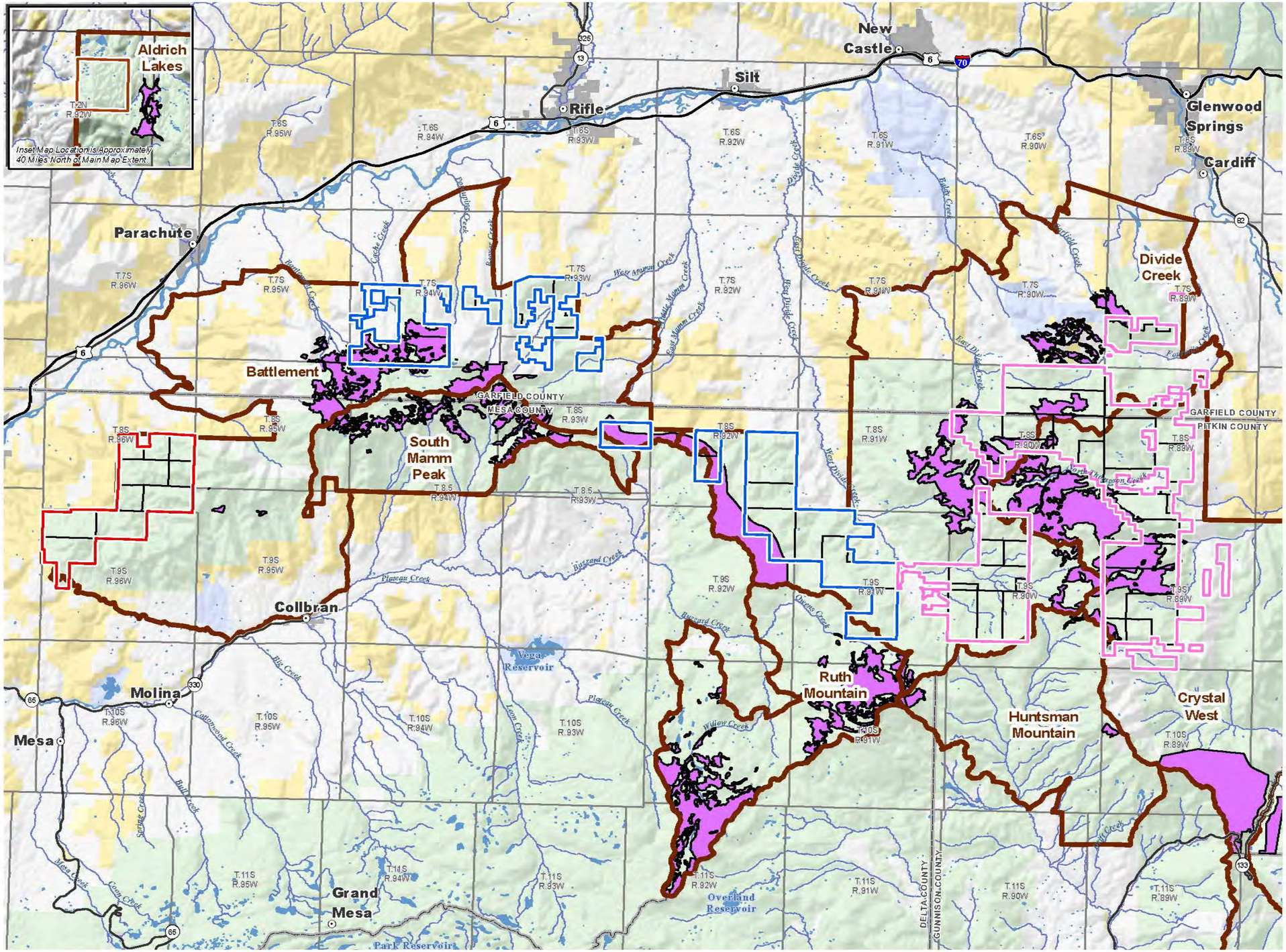
The Battlement Mesa linkage area was also identified as an area of concern for the WRNF for this analysis. The Forest Service and USFWS delineated these important areas to manage lynx movement corridors between larger blocks of lynx habitat (USFS 2015e, pg. 35). These linkages also may provide landscape connectivity for other wildlife species utilizing similar habitats (USFS 2015e, pg. 35). Approximately 6,000 acres of the Battlement Mesa linkage area has been identified as an area of concern by the WRNF within the Canada lynx analysis area.

Table 3.7-9 Habitat Conditions within the Canada Lynx Analysis Area

LAU	Lynx Habitat (acres)				
	Denning	Denning/ Winter	Linkage Area	Other	Winter Forage
Aldrich Lakes	3525		721	18	732
Battlement	5,737	219	5,274		115
Crystal West	9,365				
Divide Creek	7,174	125			1,157
Ruth Mountain		8,303			
South Mamm Peak		3,029			
Huntsman Mountain		467			
Grand Total	25,801	12,143	5,995	18	2,004

Source: USFS 2013c.

Habitat conditions identified as areas of concern for the conservation of the species include a combination of denning and denning/winter habitat and linkage areas identified by WRNF biologist in consultation with the BLM. Based on the WRNF approach for identifying potential lynx habitat of concern (USFS 2015e, pg 50), these habitat conditions from the GMUG were identified and incorporated into the WRNF potential lynx habitat of concern data. Table 3.7-10 details the amount of these habitats for lynx by zone within the lease area. Only Zones 2 and 3 contain lynx habitat conditions of concern. Of the two linkage areas, only the Battlement Mesa linkage area is found within the lease boundaries. As shown in the table, the leases contain 21 percent of all available denning and denning/winter habitat and 29% of the linkage areas within the analysis area. Figure 3.7-7 identifies the LAUs that comprise the Canada lynx analysis area and lynx habitat in and near the leases.



Legend

Project Features

Lease Zones
- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Lease Boundary

Lynx Habitat
- Lynx Habitat
- Lynx Analysis Unit

Boundaries
- County Boundary
- Township/Range
- Urban Area

Hydrology
- Stream/River
- Lake/Reservoir

Highways
- Interstate
- Highway

Surface Ownership
- Bureau of Land Management
- Bureau of Reclamation
- Local
- Private
- US Forest Service

0 2 4 8 Miles
0 3 6 12 Kilometers
N

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Figure 3.7-7 Canada Lynx Analysis Area and Lynx Habitat In and Near the Leases

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Table 3.7-10 Habitat Conditions of Concern by Zones and Leases

Zone	LAU	Lease No.	Habitat (acres)		
			Denning Denning/Winter	Linkage Areas	Grand Total
2	Battlement	COC 067543	764		764
		COC 070014	1,017		1,017
		COC 070015	507		507
		COC 070016	19		19
		COC 066724		550	550
		COC 070013		716	716
		COC 070361		194	194
		COC 072157		292	292
	Battlement Total		**2,306**	**1,751**	**4,057**
	Ruth Mountain	**COC 066917**	**1**		**1**
	Ruth Mountain Total		**1**		**1**
3	Crystal West	COC 066692	209		209
		COC 066696	203		203
		COC 066697	1,224		1,224
		COC 066698	1,197		1,197
		COC 066701	15		15
		COC 066702	123		123
		COC 066707	28		28
		COC 066708	25		25
		COC 066709	76		76
		COC 066711	32		32
		COC 066712	11		11
		COC 066909	45		45
		COC 066913	137		137
	Crystal West Total		**3,327**		**3,327**
	Divide Creek	COC 066687	129		129
		COC 066698	25		25
		COC 066706	583		583
		COC 066707	129		129
		COC 066708	910		910
		COC 066709	351		351
		COC 066711	104		104
		COC 066913	15		15
	Divide Creek Total		**2,245**		**2,245**

Table 3.7-10 Habitat Conditions of Concern by Zones and Leases

Zone	LAU	Lease No.	Habitat (acres)		
			Denning Denning/Winter	Linkage Areas	Grand Total
Total Acres within the Lease Boundaries			7,87**9**	1,751	9,6**30**
Total Acres within the Canada Lynx Analysis Area			**37,944**	5,995	31,796
Percent of the Designated Habitat Impacted by the Lease Boundaries			**2**1%	29%	30%

Source: USFS 2013c.

3.7.6.2 Forest Service Sensitive and Management Indicator Species

A variety of special status wildlife species are associated with habitats found within the special status wildlife analysis area. **Table 3.7-11** lists the special status (Forest Service Sensitive and Forest Service MIS) mammal, bird, and insect wildlife species and their associated habitat groups. Special status amphibian species are covered in Section 3.8, Aquatic Systems.

Table 3.7-11 Forest Service Sensitive Species with the Potential to Occur in the Analysis Area

Species Scientific Name	Species Common Name	Status	Habitat(s)	Eliminate from Further Consideration
Mammals				
Cervus elaphus	Elk	USFS - MIS	All	No, see big game section.
Corynorhinus townsendii	Townsend's big-eared bat	USFS – S, MIS	B,*E,F	No
Euderma maculatum	Spotted bat	USFS - S	B,*E,F, G	No
Gulo gulo	American wolverine	USFS – S	A,D	No
Lasiurus cinereus	Hoary bat	USFS - S	A,C,D,F	No
Lontra canadensis	River otter	USFS – S	C	Yes, suitable habitat is not found within the lease boundaries.
Martes americana	Marten	USFS - S	D	No
Myotis thysanodes	Fringed myotis	USFS – S, MIS	B,*D,G	No
Ovis canadensis canadensis	Rocky Mountain bighorn sheep	USFS - S	B,E	No, see big game section.
Sorex hoyi	Pygmy shrew	USFS - S	C,D	No
Birds				
Accipiter gentilis	Northern goshawk	USFS - S	A,D	No
Aegolius funereus	Boreal owl	USFS - S	D	No
Amphispiza belli	Sage sparrow	USFS - S	E	No
Buteo regalis	Ferruginous hawk	USFS - S	E, *E	No
Centrocercus urophasianus	Greater sage-grouse	USFS - S	E	No
Circus cyaneus	Northern harrier	USFS - S	C,E	No
Contopus cooperi	Olive-sided flycatcher	USFS - S	A,C,D	No

Table 3.7-11 Forest Service Sensitive Species with the Potential to Occur in the Analysis Area

Species Scientific Name	Species Common Name	Status	Habitat(s)	Eliminate from Further Consideration
Cypseloides niger	Black swift	USFS - S	B	Yes – Suitable habitat is not found within the lease area.
Falco peregrinus anatum	American peregrine falcon	USFS – S	B	Yes – This species may forage or occur as a migrant only through the lease area.
Haliaeetus leucocephalus	Bald eagle	USFS - S	C	Yes – No nest or winter roost sites occur within or adjacent to the lease boundaries. This species may forage or occur as a migrant through the lease area.
Lagopus leucerus	White-tailed ptarmigan	USFS - S	H,I	No
Lanius ludovicianus	Loggerhead shrike	USFS - S	E	No
Melanerpes lewis	Lewis' woodpecker	USFS - S	C,D	No
Otus flammeolus	Flammulated owl	USFS - S	A,D	No
Progne subis	Purple martin	USFS - S	A,C	No
Spizella breweri	Brewer's sparrow	USFS – S, MIS	E	No
Tympanachus phasianellus columbianus	Columbian sharp-tailed grouse	USFS – S	E	Yes, the overall range for this species does not overlap with any lease boundaries.
Oreothlypis virginiae	Virginia's Warbler	MIS	F, G	No
Insects				
Speyeria nokomis nokomis	Great Basin silverspot	USFS - S	C	Yes, this species is not known to occur on the WRNF.

Status Key: USFS – S: **Forest Service** Sensitive Species; USFS – MIS: **Forest Service** Management Indicator Species

Habitat Key: A=Aspen B=Caves/Cliffs/Waterfalls C=Wetland/Riparian/Stream & River Systems D=Conifer Forest *D low elevation conifer; E=Sagebrush/Grassland; *E semi-desert shrubland; F=Pinyon Juniper; G=Mountain Shrub; H=Alpine; I=Willow Carr

Source: USFS 2014a,e; 2013a,c; 2009; USFWS 2015b.

A terrestrial biological evaluation (BE; see USFS 2014e) for Forest Service Sensitive Species was prepared to support the 2014 Final EIS for Leasing on the WRNF (USFS 2014a). The BE provides natural history, habitat requirements, background information on the Forest Service terrestrial sensitive species to be analyzed in this EIS. Groups of similar species may be discussed together in some cases, if habitat requirements and behavior are similar.

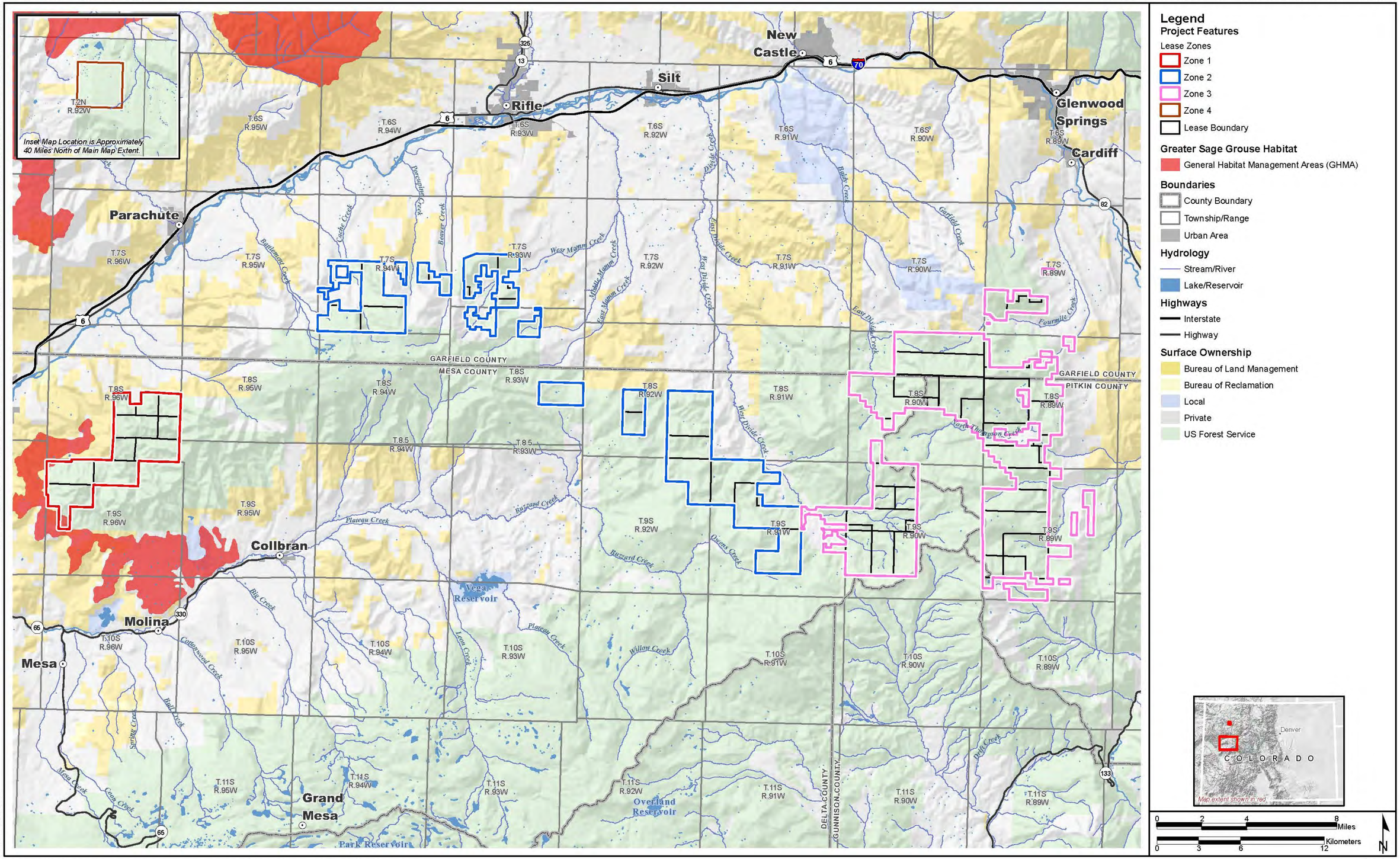
According to the BE for the 2014 WRNF EIS (USFS 2014a), the WRNF has never had the wide expanses of sagebrush necessary to support large, viable populations of sage-grouse. For more detailed information on the occurrence and existing conditions of suitable habitat within the White River National Forest, see the BE for the 2014 WRNF EIS (USFS 2014a; Final EIS, pg 52). Similarly, the analysis area for greater sage-grouse for this EIS lies within the Colorado Plateau Management Zone (MZ VII) as designated within the Greater Sage-grouse Comprehensive Conservation Strategy (Stiver et al. 2006), which does not contain core populations of greater sage-grouse or have the highest reported densities. However, the recent release of the 2015 Northwest Colorado Greater Sage-grouse Proposed Land Use Plan Amendment and Final EIS (BLM and USFS 2015) designates management areas critical to the

conservation and improvement of greater sage-grouse habitat that were not addressed in the BE for the 2014 WRNF EIS (USFS 2014a). As defined above, the analysis area for the greater sage-grouse includes any PHMA and GHMA crossed by the lease boundaries as classified by CPW. CPW uses a combination of mapped grouse occupied range, production areas, and modeled habitat (summer, winter, and breeding) to delineate these areas. Per the 2015 Northwest Colorado Greater Sage-grouse Proposed Land Use Plan Amendment and Final EIS (BLM and USFS 2015), PHMA is defined as areas that have been identified as having the highest conservation value to maintaining sustainable Greater Sage-grouse populations; these areas include breeding, late brood-rearing, and winter concentration areas." GHMA is defined as "Areas of seasonal or year-round habitat outside of priority habitat." According to range data provided by CPW, 255 acres of GHMA habitat for the greater sage-grouse overlaps with leases located in Zone 1 (**Table 3.7-12**). No PHMA is located within the analysis area. Further, no known lek sites exist within the analysis area or within four miles of the lease boundaries in all zones. **Figure 3.7-8** identifies overall habitat in and near the lease area.

Table 3.7-12 Acres of Overall Habitat (GHMA) by Lease and Zone

Zone	Lease No.	Acres
1	COC 066733	62
	COC 066926	193
Grand Total		**255**

Source: USFS 2013c.



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Date: 9/17/2015

Figure 3.7-8 Greater Sage-grouse Overall Habitat in and near the Leases

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