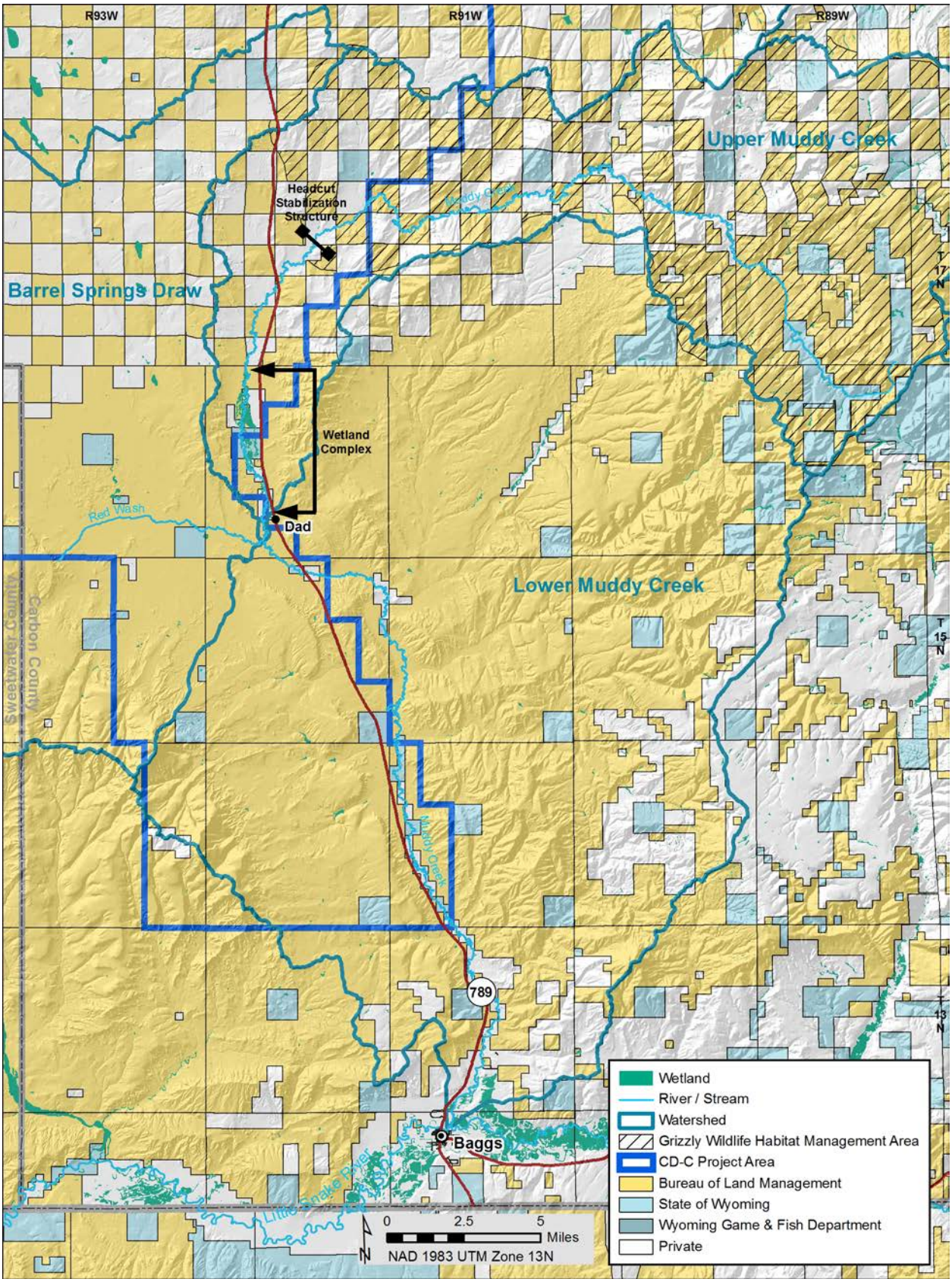


Map 3.9-4. Muddy Creek and Barrel Springs Watersheds

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

The Colorado River cutthroat trout, which is a native game fish, has been re-introduced into Muddy Creek upstream of the project area and into Littlefield Creek, a tributary to Muddy Creek, upstream of the project area. Before the introduction was made, all fish in these segments of these creeks were eliminated and a fish barrier was installed on Muddy Creek immediately upstream of McKinney Creek to prevent non-native fish from gaining access to the stream. In addition to the Colorado River cutthroat trout, the WGFD is planning to re-introduce all native species into the segment of Muddy Creek upstream of the barrier. Colorado River cutthroat trout also occur downstream from the project area in the Little Snake River (Baxter and Stone 1995). This species had been petitioned for listing as Threatened or Endangered; however, the decision "not warranted to list" was made in June 2007.

Besides Muddy Creek, all of the other streams in the project area are ephemeral or intermittent and therefore do not have the potential to support BLM Wyoming State sensitive fish species on a year-round basis. Studies indicate that the non-game, native species may ascend ephemeral tributary streams to spawn (USFWS 1985, Maddux and Kepner 1988, Weiss *et al.* 1998). Thus, ephemeral drainages fed by runoff from the project area may provide habitat for sensitive fish on a seasonal basis.

Bluehead sucker. Present in the Little Snake, Green, Snake, and Bear River basins in Wyoming (Baxter and Stone 1995, WGFD 1998, WGFD 2004a), the bluehead sucker occupies habitats similar to that of the roundtail chub. This species is considered rare in Wyoming in comparison with other sucker species. This species occurs in the Little Snake River and is found in Muddy Creek upstream of and within the project area (Baxter and Stone 1995, WGFD 1998, WGFD 2004a, Bower 2005, Beatty 2005, Compton 2007, WGFD 2007a). It has hybridized with non-indigenous white suckers (*Catostomus commersoni*) in Muddy Creek (Compton 2007, WGFD 2007a).

Colorado River cutthroat trout. This is the only trout native to the Green River and Little Snake River drainages in Wyoming (Baxter and Stone 1995). Historical records indicate it was present in Muddy Creek in the mid-1800s (Fowden, WGFD, personal communication). Historically, this subspecies inhabited clear-water tributaries of the Colorado River in Colorado, Utah, Wyoming, and probably also in New Mexico and Arizona (Behnke 1992). This species now occupies only a fraction of its former range. Some of the most genetically "pure" of the remaining populations of this trout subspecies are found in the Little Snake River upstream of the project area in Carbon County, Wyoming (Baxter and Stone 1995). Colorado River cutthroat trout have been re-introduced into Littlefield Creek and Muddy Creek upstream of the project area. Therefore, this species occasionally may occur within the project area, although suitable habitat is not present to sustain it. The species is generally associated with steep, clear, cold-water streams around rocky areas, riffles, deep pools, and near or under overhanging banks and logs (Binns 1977). Colorado River cutthroat trout have been extirpated from much of their original range through competition with brook trout, rainbow trout, and brown trout, and hybridization with rainbow trout (Binns 1977).

Flannelmouth sucker. One of the most abundant and widely distributed sensitive fish species of the tributaries and mainstream portions of the Upper Colorado River Basin, the flannelmouth sucker is found primarily in the Yampa, Little Snake, Colorado, Green, and Gunnison River. It is also common in Muddy Creek in Carbon County, Wyoming, upstream of and within the project area (Bower 2005, Beatty 2005, Compton 2007, WGFD 2007a). There is limited information on the life history of this species. The available information suggests that flannelmouth suckers utilize habitats in medium to large rivers and are seldom found in smaller creeks, doing poorly in impoundments (Lee *et al.* 1980, Baxter and Stone 1995, and Colorado Water Resources Research Institute [CWRRI] 2000). Causes for their decline include construction of mainstream dams, altered river flows and water temperatures, and hybridization with the white sucker (Minckley 1973). The species has hybridized with white suckers in Muddy Creek (Compton 2007, WGFD 2007a).

Roundtail chub. The roundtail chub is a close relative of the federally Endangered humpback chub and bonytail. Its habitat consists of warm streams and larger rivers, usually in areas with slow-flowing water

adjacent to areas of faster current (CWRRI 2000). This species is common within the Little Snake River drainage and is found in Muddy Creek upstream of and within the project area (Baxter and Stone 1995, WGFD 1998, WGFD 2004a, Bower 2005, Beatty 2005, Compton 2007, WGFD 2007a).

3.9.2.3 Sensitive Plant Species

The four BLM sensitive plant species that potentially occur within the CD-C project area are listed in **Table 3.9.3**. Two of the species, meadow milkvetch and persistent sepal yellowcress, are known to occur within the project area (Heidel 2008). While habitat suitable for Gibben's beardtongue and Cedar Rim thistle is found in the project area, the presence of these species has not been confirmed

Meadow milkvetch is a perennial halophytic herb found in moist, salt-accumulating habitats. It is restricted to low topographic positions within the sagebrush zone of valleys and closed-basin drainages in alkaline meadows, playa shorelines, discharge zones, mounds, and shrub patches (Heidel 2008). The species has been documented in three extant occurrences in south-central Wyoming, totaling approximately 8,000 plants within about 187 acres, near the Chain Lakes region of the project area (Heidel 2009).

Persistent sepal yellowcress is generally found along moist, sandy stream banks, stock ponds, and man-made reservoirs near the high-water line. This species was located by HWA near Lost Creek below Eagles Nest Spring during Special Status plant surveys during the 2006 and 2007 growing seasons (HWA 2008a). Results of the surveys indicate the occurrences of persistent sepal yellowcress are mainly associated with the Lost Creek drainage near the Eagles Nest Spring site in the northern portion of the project area.

Gibben's beardtongue. In Wyoming, the known occurrences of Gibben's beardtongue are confined to extreme southwest Carbon County and extreme southeast Sweetwater County near the state line. This plant has been documented approximately 9 miles west of the southern tip of the project area (WYNDD 2007) and it has the potential to likely occur within the project area. Gibben's beardtongue may occur in grass-dominated sites with scattered shrubs, semi-barren fringed sagebrush/thickspike wheatgrass communities with 15–20 percent vegetation cover, or on ashy slopes amid *Cercocarpus montanus*. It may also occur on outcrops of the Green River Formation on steep yellowish sandstone-shale slopes below caprock edges.

Cedar Rim Thistle is endemic to the Wind River and Green River basins of central Wyoming. This plant has the potential to occur in the project area; however, the species has not been found within the project area (WYNDD 2007).

The following species are located within the RFO; however, they are not located nor do they have habitat within or near the CD-C project area: Laramie columbine, Trelease's milkvetch, many-stemmed spider-flower, dune wild rye, limber pine, and Laramie false sagebrush.

3.10 WILD HORSES

The RFO maintains and manages wild horses (*Equus caballus*) in herd management areas (HMAs) and establishes an appropriate management level (AML) for each HMA. There are no wild burros within the project area and there will be no further discussion concerning wild burros in this EIS. The AML is the population objective for the HMA that will ensure an ecological balance for all users and resources of the HMA (e.g., wildlife, livestock, wild horses, vegetation, water, and soil). The current AMLs were established in 1994 from a process that included five years of focused and intensive monitoring, evaluation of data, public input, and environmental analysis (BLM 2005b).

The RFO has the responsibility to protect, manage, and control wild horses in its resource area pursuant to the Wild Horse and Burro Act of 1971 (Public Law 92-195). The wild-horse program is responsible for monitoring both the land and the herds, removing excess animals, and preparing animals for adoption.

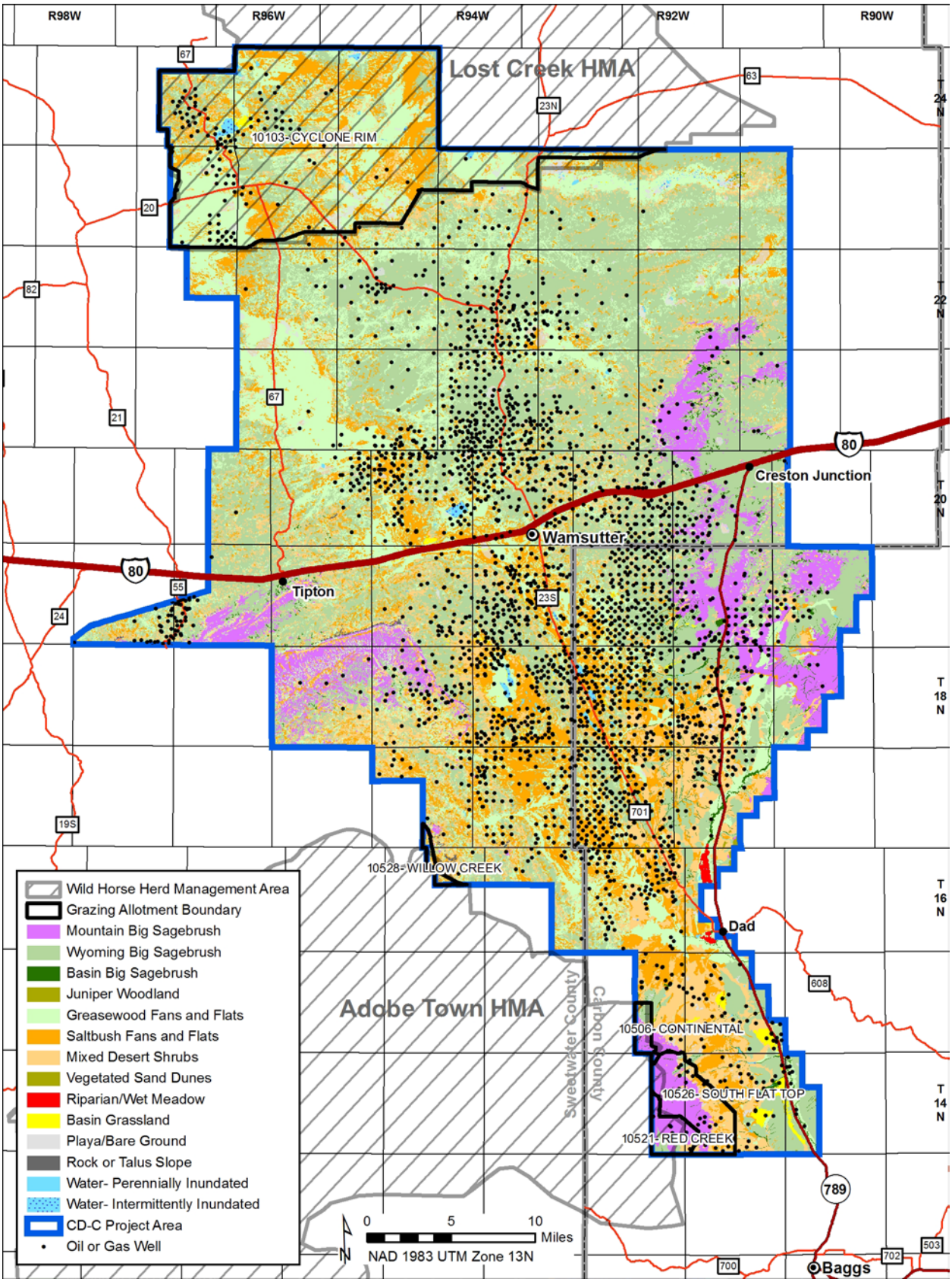
The RFO manages three HMAs, two of which are partially located within the CD-C project area: the Lost Creek HMA and a small portion of the Adobe Town HMA (**Map 3.10-1**). The Lost Creek HMA encompasses approximately 251,000 acres, of which 235,000 are BLM-administered public lands. Of the BLM-administered total, approximately 119,600 acres of the HMA are located within the project area, virtually all of that acreage within the Cyclone Rim Grazing Allotment. The Lost Creek HMA is located within the closed Great Divide Basin.

The current AML for the Lost Creek HMA is 60 to 82 horses which represents the high and low AML targets to maintain a thriving natural ecological balance as identified in the Rawlins RMP. The current population estimate for the Lost Creek HMA is 91 adult animals (Smith 2013). It was last gathered in the fall of 2011. The Lost Creek HMA is partially fenced from the checkerboard lands to the south. The Antelope Hills HMA adjoins the Lost Creek HMA to the north and is administered by the Lander Field Office.

The Adobe Town HMA is located approximately 20 miles west of Baggs, within Carbon and Sweetwater counties. The HMA encompasses approximately 472,812 acres, of which 444,744 acres are BLM-administered public lands. Of the BLM-administered total, approximately 5,826 acres of the HMA—1.2 percent of the total—are located within the CD-C project area (**Map 3.10-1**), including portions of the Continental, South Flat Top, Red Creek, and Willow Creek grazing allotments in the southwestern portion of the project area. The current AML for this HMA is approximately 610 to 800 horses which represents the high and low AML targets to maintain a thriving natural ecological balance as identified in the Rawlins RMP (BLM 2005b, updated June 2011). The Salt Wells HMA, managed by the Rock Springs Field Office (RSFO), adjoins the Adobe Town HMA to the west and both share a common, unfenced border. Past capture, census, and distribution data collected by both the RFO and RSFO indicate considerable movement and interchange takes place among the horses of these two HMAs (BLM 2005b). Consequently, both the RSFO and RFO work cooperatively to manage the two HMAs in the most efficient manner. The most recent gather of the Adobe Town/Salt Wells Complex was conducted in the fall of 2014.

In the majority of cases, wild horses have no natural enemies and population growth rates have been shown to be capable of 16- to 25-percent annual increases. This can result in a doubling of the wild-horse population every three to five years (BLM 2005b). Where predation is not a factor, as is the case for these two HMAs, natural causes such as starvation, dehydration, disease, and injury are the primary wild-horse mortality agents. In a typical Rawlins wild-horse population, the highest mortality rates are for the young in their first winter (BLM 2005b).

Wild horses generally prefer perennial grass species as forage. Shrubs are more important during the fall and winter. On the CD-C project area, the species of grasses preferred depends on the season of the year. Needle-and-thread and Indian ricegrass are most important during the winter and spring, and wheat grasses during the summer and fall (BLM 2005b). Crane *et al.* (1997) determined that wild horses in south-central Wyoming spent about 61 percent of their daytime hours feeding and selected stream-sides, bogs/meadows, and mountain big sagebrush habitats over low sagebrush habitats. Sedges (*Carex* sp.) were an important component in the horses' spring/summer diet. This study concluded that palatability and abundance of graminoid vegetation and proximity to preferred habitats seemed to be the primary influences on habitat selection by wild horses within their study area.



Map 3.10-1. Wild horse herd management areas within the CD-C project area in relation to major land cover types and affected grazing allotments

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Several studies address the question of direct competition (displacing a species when they arrive) and indirect competition (use of the same resources). Olsen and Hanson (1977) conducted a study to determine dietary overlaps and composition between wild horses, cattle, elk, sheep, and pronghorns in the Wyoming Red Desert. The percent of season dietary overlaps were most noticeable between wild horses, cattle, and elk. The study also showed that wild horses, cattle, and elk seemed to be tolerant of feeding on the same plants in different seasons and the strategy of grazing differed among species. Although this study only focused on the Red Desert area, there was enough variation in selection of diets between the different species that there was minimal overlap for the same resources.

In a similar study conducted in southeastern Oregon, McInnis and Vavra (1987) found that at least 88 percent of the mean annual diets of feral horses and cattle consisted of grasses. The researchers concluded that because dietary overlap between horses and cattle was high each season (62–78 percent), a strong potential existed for exploitive competition under conditions of limited forage availability (e.g., extended drought effects). McInnis and Vavra (1987) also determined in this two-year study that dietary overlap between horses and pronghorn varied from 7 percent (summer) to 26 percent (winter). Overlap between pronghorn and cattle varied from 8 percent (winter) to 25 percent (spring), suggesting that non-competitive coexistence (indirect competition) between pronghorn, wild horses, and cattle was possible at this level of dietary overlap. It is important to remember that even if species have the same diets, as long as there are adequate resource supplies there will be no competition. Only when resources are limited does direct competition occur.

Animal sizes vary and forage requirements change with the size of the animal. Similarly, different classes of livestock and different species of wildlife have varying requirements depending on size and maturity. Animal unit equivalents (AUEs) have been calculated that relate the forage requirements of various kinds of livestock and wildlife to the forage represented by one animal unit month; thus, the mature sheep animal unit equivalent of 0.20 means that its forage requirements are 20 percent of an animal unit month. **Table 3.10-1** shows some commonly used AUEs. A mature horse has an AUE of 1.25 meaning that it has 125 percent of the forage requirements of one animal unit month.

Table 3.10-1. Commonly used Animal Unit Equivalents

Class of Animal	Animal Unit Equivalent (AUE)
Cow, 1,000 lbs, dry	0.92
Cow, 1,000 lbs, with calf	1.00
Bull, mature	1.35
Cattle, 1 year old	0.60
Cattle, 2 years old	0.80
Horse, mature	***1.25***
Sheep, mature	0.20
Lamb, 1 year old	0.15
Goat, mature	0.15
Kid, 1 year old	0.10
Antelope, mature	0.20
Bison, mature	1.00
Deer, white-tailed, mature	0.15
Deer, mule, mature	0.20
Elk, mature	0.60
Sheep, bighorn, mature	0.20

■ HUMAN ENVIRONMENT

3.11 VISUAL RESOURCES

3.11.1 Visual Resources Characteristics

As described in **Section 3.1.1 Geology**, the CD-C project area is part of a semiarid desert dominated by patches and thickets of sagebrush. Along larger drainages, grasses, greasewood, brush, lichens, cottonwood, and other plants accompany the sagebrush stands. Colors of gray, brown, and olive characterize the vegetation, with grasses and forbs changing to shades of brown as they cure in the summer and fall. Soils and rock strata are shades of red, gray, and brown.

The project area is wholly within the Intermountain Semi-Desert Province of Southwestern Wyoming. North of Wamsutter, the project area lies within and comprises a large part of the Great Divide Basin section as a whole. The rest of the project area is almost entirely within the northeastern part of the Washakie Basin subsection of the Green River Basin section (Reiners and Thurston 1996). Rolling plains cover the Great Divide Basin part of the project area. The landscape is generally unbroken, so visual contrast draws attention wherever it occurs. Dune fields and playas (dry lakebeds) break up the sagebrush plain north of I-80. Elsewhere, cuestas (rims), occasional escarpments, and eroded streambeds create some visual contrast.

West of the Red Desert Road (BLM 3207) is a feature known as the Red Desert Basin; this area possesses a pebbly soil with a distinctive reddishness that shows through the scattered sagebrush. The sand dunes of the northern part of the project area are part of a widespread dunes complex; dunes in the project area are mostly vegetated in contrast to the active, mostly bare dunes at Killpecker Creek, which is north of Rock Springs and far to the west of the project area.

The Chain Lakes WHMA is part of a large playa complex located in the northeastern part of the project area. Panoramic views of this area to the north of Chain Lakes Rim show these seasonal wetlands, which dry out to white alkaline flats. The occasional springs of Battle Springs Flat, west of Chain Lakes, support considerable greenery.

The extended Delaney Rim-Wamsutter Rim cuesta-and-valley complex divides the northern Great Divide Basin section of the project area from the Washakie Basin in the south. Panoramas of the central and northern portion of the project area present themselves from Delaney Rim, and the rim complex itself is the most prominent geologic feature visible from I-80 as the highway crosses the Great Divide Basin.

Eroded streambeds occur in the southern part of the project area; a key example is the deeply entrenched gully system in the lower reach of Muddy Creek. Little Robbers Gulch Reservoir, an agricultural pond far to the south within the project area, is a “social” recreation site (undeveloped and unmanaged) where usage fluctuates with the water level. Flat Top Mountain in the far south of the project area includes North Flat Top peak, the high point in the project area. This feature, Little Robbers Gulch, and The Bluffs are prominent geologic features visible from WY 789, the major north-south road through the southern part of the project area.

Human modification in the project area includes open disturbance, disturbed areas that are undergoing reclamation but do not yet blend into the landscape, and many structures. Visible in many parts of the project area are infrastructure (roads, power lines, and buried pipeline corridors), ranch improvements (homesteads, shearing sheds, fencing, and water impoundments) and oil and gas development (active drill sites and production and transportation facilities).

Oil and gas development, ongoing since the 1940s, comprises more than 4,400 natural gas wells in the project area. This surface disturbance is currently 49,218 acres (4.6 percent of the project area) of which 8,472 acres (0.8 percent) remain unvegetated and in use over the long term for facilities such as roads,

well-production facilities, and pipeline facilities. The most common type of disturbance—more than 26,000 acres, or 2.4 percent—is from pipelines crossing the project area. An additional 10,958 acres have been disturbed for development other than oil and gas; this includes mainly federal, state, and county highways and roads, in addition to ranching activities and agricultural improvements.

The scenic quality that is potentially affected is currently rated low to moderate overall. Disturbance due to oil and gas development has negatively affected scenic quality in seven of 15 identified landscape-rating units that are contained wholly or in part within the project area. This is generally because oil and gas development disturbs existing vegetation and introduces structures, with unnatural forms, lines, colors, and textures that contrast with the natural landscape character. In one of the seven landscape rating units found in the project area, the contrast introduced by existing oil and gas development is seen, attracts attention, and "in places is fairly dominant visually" (BLM 2011a).

I-80 bisects the project area from east to west. Because of high traffic volumes, I-80 is the vantage point from which potentially the most viewers see the project area. Views from I-80 are mainly of the Great Divide Basin portion of the project area, with the isolated mountains, uplands, and rims (among them Delaney Rim, as noted above) in the middle-ground, background, and skyline. Foreground and middle-ground views from the highway often contain residential, commercial, or industrial structures. Through travelers and trucks are the predominant users of I-80, and high prevailing speeds mean that motorists see any given part of the landscape for a short time.

Historically, WY 789 from Creston Junction to Baggs, Wyoming and Craig, Colorado, offered opportunities for pleasure driving and recreational access in the southern part of the project area. WY 789 may not have the traffic that I-80 has; however, the vehicles traveling on it are in view of the project area for a longer period of time. In the past five years, truck traffic on WY 789, mostly attributed to gas-field and interstate pipeline development, has grown almost twice as fast as other types of traffic. The Wyoming Department of Transportation (WYDOT) (**Section 3.16 Transportation**) now rates the traffic stream on WY 789 at less than "free-flowing." Such traffic characteristics may discourage use of WY 789 for pleasure driving and sightseeing.

The principal county road through the project area—the Wamsutter–Dad/Wamsutter–Crooks Gap Road South (Carbon County Road [CCR] 701/Sweetwater County Road [SCR] 23S)—is now primarily a natural gas industry access road. This two-lane gravel road is busier than any other road serving the project area except I-80. It receives high levels of heavy and overweight vehicle use, with truck traffic often moving at high speed and creating considerable dust (**Section 3.16 Transportation**). These characteristics now discourage use of this road for casual recreational use except as an access to other interior roads.

As described in **Section 3.16 Transportation**, almost all of the county and BLM roads in the project area were originally intended for agricultural use, with consumptive wildlife recreation also being a common use that is traditionally related to agricultural landscapes and lifestyles. In recent years, the many BLM roads have seen increasing use for natural gas industry access. Only three of the roads maintained and managed by the BLM possess right-of-way agreements for all of the private lands that the roads cross. These are Road 3207 (Red Desert Road), Road 3316 (Robbers Gulch Road) and Road 3321 (Little Robber Road). Therefore, recreation is a historical and current use of the BLM roads in the project area, but use of the BLM roads is subject to private landowner decisions regarding access.

Because of the extensive road network, all land within the project area is in the foreground or middle ground of major or other roads (BLM 2011a). Increasing use by oil and gas workers lowers the level of sensitivity of many interior roads because of the low to moderate concern for scenic quality of most users in the context of low to moderate total use (BLM 2011a). For VRM sensitivity ratings, foreground and middleground are treated alike and represent a distance of up to 3 to 5 miles (BLM 2011a).

The Overland Trail corridor through the project area is an exception because the trail corridor is identified as a special management area in the RFO's RMP. The corridor has high sensitivity to scenic quality by

definition because of its special area status and because of the interest it attracts as part of the most important historic trail in southern Wyoming (BLM 2011a). The trail corridor is described in **Section 3.14 Cultural and Historical Resources**.

3.11.2 Visual Resource Management

Visual resources in the project area fall under the BLM's visual resource management (VRM) system. Guidance to manage visual resources is found in the BLM's Land Use Planning Handbook H-1601-1, Appendix C (BLM 2005c). Land use planning decisions mandate the BLM to manage visual resource values in accordance with VRM objectives, which directly correspond to the assignment of all land to a VRM class. The BLM designates VRM classes for all land by inventorying the visual resources and by taking into account management considerations for other land uses. VRM classes may differ from Visual Resource Inventory (VRI) classes because of management priorities for land use (BLM Land Use Planning Handbook H-1601-1, Appendix C, Page 11).

The BLM VRM classification system recognizes four VRM classes (Classes I through IV) based on scenic quality, visual sensitivity levels, and viewer distance zones, and management decisions in the RMP. Each VRM classification has a management objective, as described below:

Class I. The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activities. The level of change to the characteristic landscape should be very low and should not attract attention.

Class II. The objective of Class II is to retain the existing character of the landscape. The level of change to the landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes to the landscape must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III. The objective of Class III is to partially retain the existing character of the landscape. The level of change to the landscape should be moderate. Management activities may attract the attention of the casual observer but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV. The objective of Class IV is to provide for management activities that require major modifications to the existing character of the landscape. The level of change to the landscape can be high. The management activities may dominate the view and may be the major focus of viewer attention. Every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of the basic visual elements of form, line, color, and texture.

3.11.3 Visual Resources Management Class Designations

VRM classes for the RFO were proposed by the Rawlins Proposed RMP/Final EIS issued in December 2007. During preparation of the Approved RMP, a protest was lodged concerning the VRI and visual resource values within the RFO. As a result, the BLM-preferred VRM decisions in the Proposed RMP/Final EIS were remanded, in accordance with guidance in the BLM Land Use Planning Handbook, H-1601-1.

As a result of the remand, the RFO is in the process of amending the VRM classes in the RMP in order to be consistent with the 2011 VRI (see below, **Section 3.11.4)**. Until that process is complete, the RFO must continue using the VRM classification described in the No Action Alternative (Alternative 1) of the Proposed RMP/FEIS. Once the RMP amendment is complete, VRM in the project area will conform to the new decisions. **Map 3.11-1** displays the VRM as it applies to the project area based on the No Action Alternative of the Proposed RMP/FEIS, and is consistent with the VRM classifications in the 1990 Great Divide Resource Management Plan (GDRMP) (BLM 1990).

Map 3.11-1 compares oil and gas development extant in the project area as of 2009 to the VRM classification set by the 1990 GDRMP. **Map 3.11-1** illustrates why there is a potential for conflict in jointly managing oil and gas development and visual resources in the RFO. The potential was identified by the BLM in the GDRMP FEIS:

> The widespread development of petroleum, natural gas, and coal in the RMPPA (RMP project area) is creating direct, negative visual impacts within the RMPPA. Currently, visual mitigation of this activity is preventing mineral development activities from exceeding the established VRM objectives within these areas. The trend toward continued expansion of natural resource development is creating areas of potential conflict between this activity and the established VRM class objectives . . . Utilities are also having an increasing visual impact in the RMPPA. Even buried fiber-optic lines leave obvious visual effects. …Although visual sensitivity is clearly not the highest priority for many residents and visitors, as increasing numbers of sightseers and persons seeking various types of recreational opportunities pass through the RMPPA, an awareness of scenic values and the existing scenic quality grows for some residents and visitors.

As **Map 3.11-1** shows, the project area has mixed land-ownership. This means that some state and private land within a given VRM classification is not subject to BLM administration, which applies only where the federal government manages the surface or the mineral rights. This distinction is reflected in the analysis of the land within the project area as presented in **Table 3.11-1**. About 60 percent of the total project area is VRM Class III; the remainder is VRM Class IV. However, BLM's authority to manage visual resources is limited to an estimated 62 percent of the total land area in VRM Class III and 55 percent of the total land area in VRM Class IV. The remainder of the land in each class is exempt from BLM VRM management objectives because the surface and minerals are private or state owned.

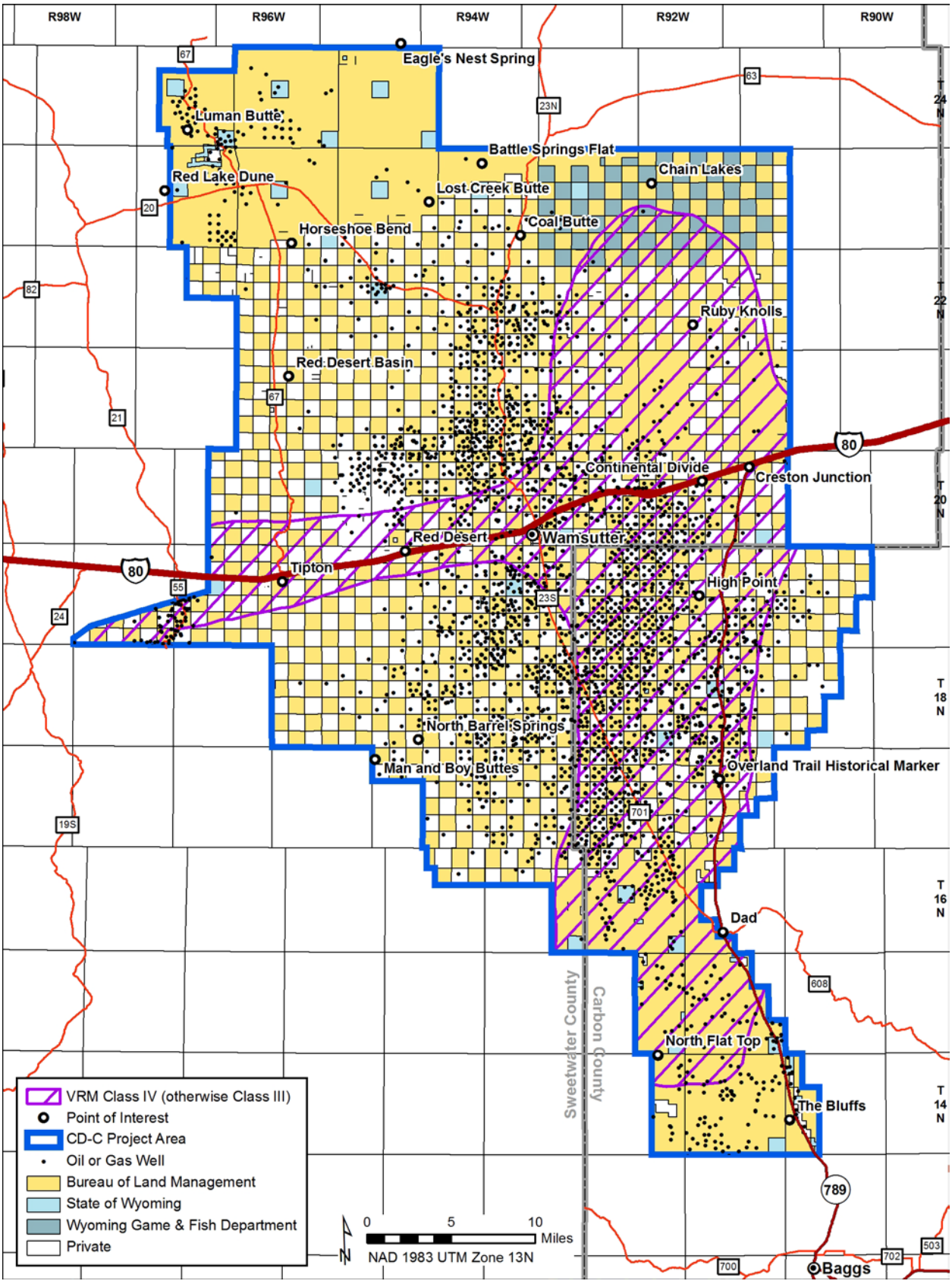
Table 3.11-1. Total and BLM-administered land area in the project area by VRM Class

VRM Class Designation	Land Area (thousands of acres)	VRM Class Share of Total Land Area	BLM-Administered Land (thousands of acres)	Share of BLM-Administered Land within Class
Class III	639	60%	393	62%
Class IV	431	40%	237	55%

3.11.4 Visual Resource Inventory of February 2011

The RFO began the process of updating its VRM objectives with a formal visual resource inventory (VRI) prepared in compliance with BLM Manual 8400, Visual Resource Management (VRM), and BLM Manual 8410, Visual Resource Inventory and in conformance with the proposed RMP/FEIS remand. The results of the completed inventory were published in January of 2011 (BLM 2011a). The publication of the updated VRI completes the first step of the process called for by the administrative remand described in **Section 3.11.3** above. The RFO is in the process of amending the RMP to reflect the January 2011 VRI.

Information from the published VRI (BLM 2011a) has been used in this section to describe and characterize the affected visual resource environment of the CD-C project area as it exists now. However, the evaluations found in the inventory are not to be considered a VRM classification now or even, perhaps, the VRM classification that may be enacted in the future. No re-classification may occur until the RFO completes the entire RMP amendment process. Until then, as noted in Section 3.11.3, the RFO must use the 1990 VRM classifications.



Map 3.11-1. Current VRM Classification of land within the CD-C project and existing oil and gas development

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3.12 RECREATION

3.12.1 Recreation Resources

The main recreation resource of the project area is the public land managed by the BLM and the WGFD. This section discusses their use primarily for hunting and secondarily for pleasure driving to view wildlife, especially wild horses. No developed recreation sites exist within the CD-C project area. Dispersed recreational activity occurs wherever resources and access afford the opportunity. There is one undeveloped recreation site near the southern boundary of the project area, Little Robbers Gulch Reservoir, which has been historically used as a group hunting camp and fishing hole.

The project area is entirely within the Western Extensive Recreation Management Area (ERMA), a management classification of the RFO established by the Rawlins RMP. For the Western ERMA, the Rawlins RMP directs management to consider three recreation objectives: (1) provide for the health and safety of visitors, (2) prevent or mitigate resource damage resulting from recreation uses, and (3) coordinate with other programs to minimize conflicts and adverse impacts on recreational opportunities.

The project area is not part of any of the Special Recreation Management Areas otherwise designated by the Rawlins RMP. This means that none of the areas with a high priority for recreation management in the RFO are to be found in the project area. The only feature in the project area that has a recreational aspect, and for which there is an explicit management directive in the Rawlins RMP with implications for recreational use, is the undeveloped recreation site at Little Robbers Gulch Reservoir.

One prescribed management action is targeted towards undeveloped recreation sites, such as Little Robbers Gulch Reservoir: the action opens a recreation site and its surrounding quarter-mile area to future oil and gas leasing with a “no surface occupancy” (NSO) stipulation. This means development of minerals directly under the restricted area may be undertaken by locating the necessary surface facilities outside of the restricted area. Although this primarily agricultural reservoir historically has been used as a hunters’ camp and fishing hole, it has recently been used less than in the past because of fluctuation in the water level.

BLM considers most of the project area to be Front Country, where improved roads are generally within 1/2 mile of recreation activity. This character prevails because of numerous improved roads in the Western ERMA that have been developed for oil and gas. Front Country is the second-most abundant class of recreation lands in the RFO according to the Rawlins RMP (BLM 2008a). Management affecting the Front Country recreation settings in the project area is guided by the objectives and actions enumerated in the Rawlins RMP as described above. Indirectly, the recreation setting is affected by the VRM objectives established for the project area by the Rawlins RMP because the visual quality of an area is an important physical and social attribute of a recreation setting. (The Affected Environment for Visual Resources is described in **Section 3.11** and Environmental Consequences for Visual Resources are described in **Section 4.11**.).

3.12.1.1 Wildlife Resources

The existing environment for wildlife in the project area is discussed in **Section 3.8 Wildlife**. The big game wildlife resource supports hunting, which is the main recreation use of the project area. Hunting in the project area is mainly for pronghorn, but hunters also pursue mule deer and elk. Wild-horse viewing is another wildlife recreation use in the project area.

Commercial hunting guides using BLM land in the project area do so by obtaining a Special Recreation Permit (SRP) from the RFO. Nineteen hunting guides who hold permits to hunt on the WGFD Hunt Areas that overlap the project area also hold SRPs in the RFO. The project area is likely to be a small percentage of the total area upon which these hunting guides base their commercial operations. Information for determining the amount of use by these guides in the project area is unknown at this time.

A main hunting resource in the northern part of the project area is the Chain Lakes WHMA about 32 miles northwest of Rawlins. The Chain Lakes WHMA provides winter habitat and a seasonal migration corridor for pronghorn. Agreements provide hunter access throughout the WHMA despite its location in the "checkerboard," the area of alternating one-square-mile sections of public and private land. By agreement with the WGFD, the Rawlins RMP opens the WHMA to future oil and gas leasing but with intensive management of surface-disturbing and disruptive activities. The wildlife resources of the northern part of the project area also include a block of about 135,000 acres of contiguous public land northwest of the WHMA (WGFD 2007b).

Wildlife resources in the southern part of the project area include the WGFD Carbon County Walk-In Area #1 located six miles southeast of Creston Junction. The WGFD walk-in program allows hunters to enter private land sections in the checkerboard without prior permission. The CD-C project area contains 15 sections of Walk-In Area #1 (9,600 acres), about half of which are privately owned. The remainder is outside of the project area, where it adjoins the 25,600-acre Red Rim-Daley WHMA, also located in the checkerboard of intermingled public and private land. Ready access for recreation is also available in the southern tip of the project area where there is another large, continuous block of public land. This block of public land includes upland habitat in the Flat Top Mountain range and its larger drainages, Blue Gap Draw, Robbers Gulch, and Little Robbers Gulch. Little Robbers Gulch also contains the undeveloped recreation site used as a hunters' camp at Little Robbers Gulch Reservoir, as described above.

3.12.1.2 Other Recreation Resources

A network of small roads and two-tracks covers the project area. Increasingly, traffic has come to be dominated by vehicles related to oil and gas field-development and maintenance, but the roads continue to be used for range management and recreation. Full public access for all uses, including recreation, is available on I-80, WY 789, and Carbon and Sweetwater County roads. The BLM interior road network comprises 27 numbered routes in the project area. However, casual use is limited to three roads where the BLM possesses full right-of-way agreements. These include Road 3207 (Red Desert Road), Road 3316 (Robbers Gulch Road) and Road 3321 (Little Robber Road).

Recreational OHV use occurs in the project area; however, such OHV use is typically for the scouting activity that is ancillary to big game hunting rather than it being a primary recreation activity.

Non-consumptive use, which is mostly driving the roads to view wild horses or the Red Desert landscape, is much less common than hunting. The resources that support these activities are located north of I-80 and are accessed from SCR 67 (Tipton-North Road) and BLM Road 3207 (Red Desert Road). Flat Top Mountain in the project area south of I-80 also attracts some recreation because of the visual resource (sightseeing, painting and photography of the mountain and from the overlooks it provides) and by the recreational setting (OHV, snowmobiling, and non-motorized snow recreation).

The Overland Historic Trail runs east and west across the southern part of the project area. Signage calls attention to a turnout with an interpretive plaque on WY 789 about 20 miles south of Creston Junction. This turnout and plaque is the only public access to the trail corridor in the project area, and it may attract sightseeing visitors.

3.12.2 Recreational Use

The BLM estimates recreation usage at the field-office level, so there are no data available on recreation participation and recreation visitor days specific to the CD-C project area. Relying on experience, field-office personnel characterize recreation use in the project area as low overall and seasonal during the year, with most recreational use occurring during the fall big-game hunting seasons.

The BLM generally views the project area as serving a statewide market for undeveloped recreation, especially the market comprising residents of Carbon County and nearby counties. However, there is considerable use of the area by non-resident hunters, especially pronghorn and mule deer hunters who are

23 percent and 27 percent non-residents, respectively. The project area also occasionally attracts non-resident recreation users with special interests such as wild horses, the Red Desert landscape, and historic trails. Recreation in the project area is shown on **Map 3.12-1**.

Table 3.12-1 presents data on hunting activity that indicate the level of hunting potentially occurring within the project area. The table shows the totals for the Hunt Areas that include the project area because the WGFD does not have information on sub-areas within Hunt Areas (WGFD 2010b).

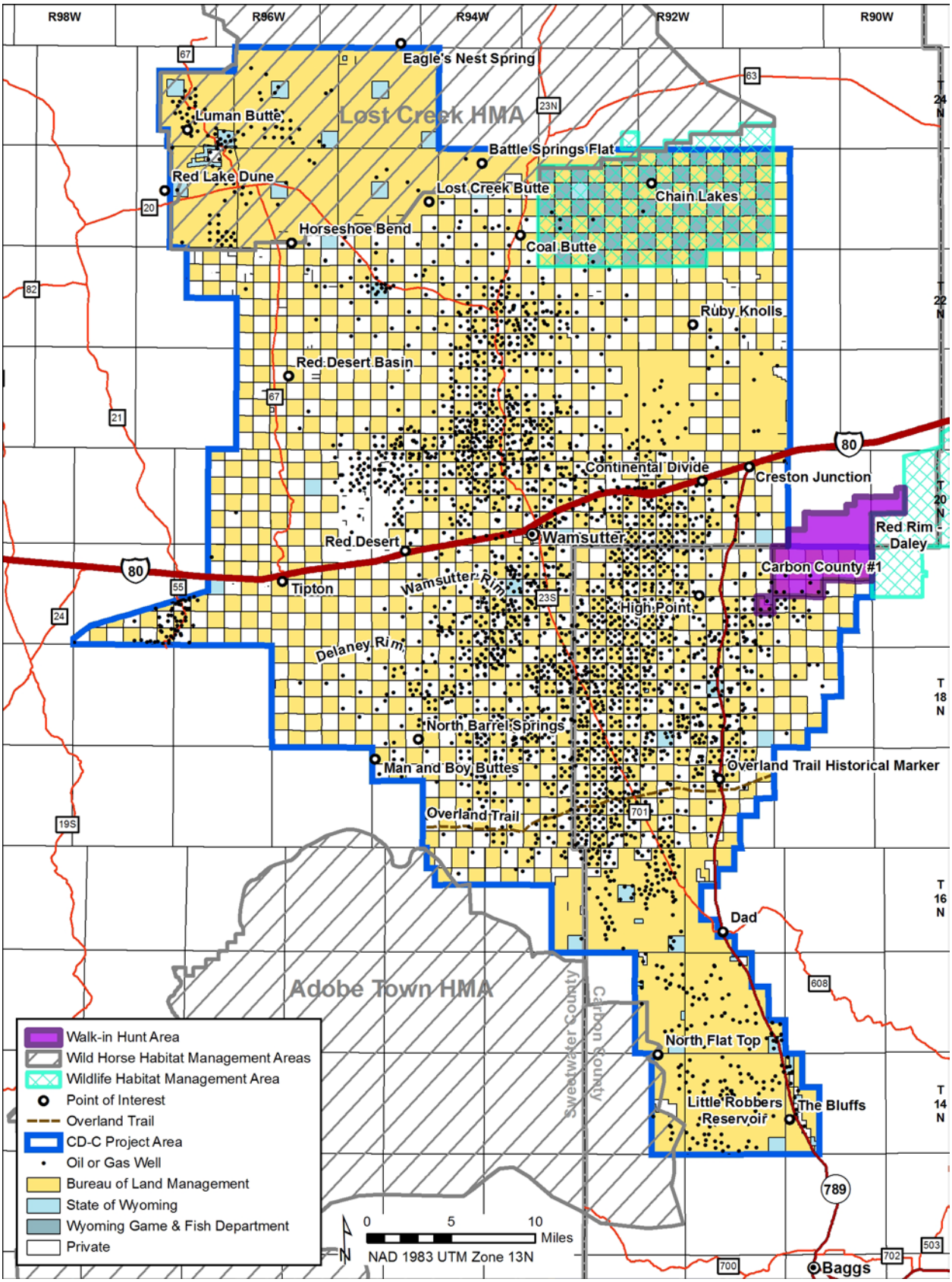
Table 3.12-1. Indicators of hunting activity by species in WGFD Hunt Areas that include the CD-C project area, 2009

Game Species	Hunt Areas Involved (% of Hunt Area overlapping the project area)	Total Active Hunters	Average Non-Resident Hunters	Average Hunter Success	Average Days per Hunter	Number of BLM-Permitted Commercial Outfitters[1]
Pronghorn Antelope	53 Baggs (2%) 55 Red Rim (28%) 57 S. Wamsutter (38%) 60 Table Rock (33%) 61 Chain Lakes (31%)	694	23%	92%	2.6	55
Mule Deer	82 Baggs (2%) 84 Atlantic Rim (19%) 98 Chain Lakes (31%) 100 S. Wamsutter (38%) 131 Steamboat (13%)	4,646	27%	45%	4.1	55
Elk	21 Baggs (2%) 100 Steamboat (14%) 108 S. Rawlins (19%) 118 Shamrock Hills (31%) 124 Powder Rim (23%)	3,057	16%	47%	5.9	55

[1] *Typical number of SRPs for the RFO. This number changes year to year and an exact number is not known due to the fact that other field offices hold permits for this area and little data was kept for any permit issued before 2007.*

Source: WGFD Annual Report of Big & Trophy Game Harvest 2009 (WGFD 2010b). RFO for Number of BLM-permitted Commercial Outfitters. Analysis by Lloyd Levy Consulting LLC.

An estimate based on map analysis is provided of the percentage of each Hunt Area that overlaps the CD-C project area. In terms of acreage, the project area contains about 28 percent of the involved Hunt Areas and 22 percent of the involved Herd Units for pronghorn (the Baggs, Bitter Creek, and Red Desert Herd Units). Similarly, the project area contains about 20 percent of both the involved Hunt Areas and Herd Units for mule deer (the Baggs, Chain Lakes, and Steamboat Herd Units) and about 18 percent of the involved Hunt Areas and 16 percent of the involved Herd Units for elk (the Sierra Madre, Shamrock, Petition, and Steamboat Herd Units). These percentages roughly indicate the project area's contribution to hunting activity based on these game populations. Additionally, the project area contains only about 2 percent of the Baggs Hunt Area, which attracts by far the most hunters of all three big-game animals among the areas overlapping the project area. The Hunt Areas are similar to the Herd Units (**Maps 3.8-1, 3.8-3, and 3.8-5 in Section 3.8.1**).



Map 3.12-1. Recreation in the CD-C project area

No warranty is made by the BLM for use of the data for purposes not intended by the BLM

The total number of active pronghorn hunters using the Hunt Areas that overlap the project area rose from 1,034 in 2002 to 1,955 in 2006 (up 89 percent). Following a modest drop in 2007, pronghorn hunters declined dramatically in 2008 to 620, then rose to 694 in 2009. Deer hunters in the relevant Hunt Areas rose to 4,918 in 2007—up 15 percent from 2002—then dropped slightly in 2008 (4,098) and 2009 (4,646). Elk hunters rose to 3,767 in 2007—up 7 percent from 2006 but down 6 percent from 2002—then declined again to 3,057 in 2009—down 8 percent from 2007. **Table 3.12-2** presents the total active hunters for each species from 2002 to 2009.

Table 3.12-2. Number of active hunters by species in WGFD Hunt Areas that include the CD-C project area, 2002–2009

Game Species	Hunt Areas Involved (% of Hunt Area overlapping the project area)	2002	2003	2004	2005	2006	2007	2008	2009
Antelope	53 Baggs (2%) 55 Red Rim (28%) 57 S. Wamsutter (38%) 60 Table Rock (33%) 61 Chain Lakes (31%)	1,034	1,113	1,221	1,499	1,955	1,697	620	694
Deer	82 Baggs (2%) 84 Atlantic Rim (19%) 98 Chain Lakes (31%) 100 S. Wamsutter (38%) 131 Steamboat (13%)	4,280	4,487	4,048	4,070	4,834	4,918	4,098	4,646
Elk	21 Baggs (2%) 100 Steamboat (14%) 108 S. Rawlins (19%) 118 Shamrock Hills (31%) 124 Powder Rim (23%)	4,027	3,928	3,278	3,356	3,505	3,767	3,105	3,057

Source: Wyoming Game and Fish. Harvest Reports (annual). Analysis by Lloyd Levy Consulting LLC.

3.12.3 Recreation Trends

Apart from long-term trends in popularity, the main factor determining the number of hunters using a particular Hunt Area is WGFD's allocation of hunting licenses in response to demand and to game-management policies that balance the demand for hunting with the supply of game. BLM personnel have observed that recreational use in the RFO area in general appears to be steady or in a slight upward trend. If favorable conditions for wildlife were sustained in the future, then hunting throughout the RFO would likely continue near current levels. A similar trend may be expected in the CD-C project area.

OHV use in the project area that occurs in connection with hunting is limited to existing roads and two-tracks by the OHV designations published in the Rawlins RMP, although travel off-road up to 300 yards is permitted to retrieve a downed game animal or to access a campsite.

According to a survey in the Carbon County Comprehensive Land Use Plan (CCCLUP) as amended in 2012, fishing, hunting, overnight camping, and nature appreciation are the four most important outdoor recreational activities to Carbon County residents. The plan notes that important outdoor recreational activities occur at facilities or on lands that are developed or managed by other agencies, so the plan encourages coordination to allow substantive input by the county into agency planning (CCCLUP 2010). The CCCLUP contains no specific recreation plans for development within the project area.

Recreation is mentioned in the Sweetwater County Comprehensive Plan. The plan states that Sweetwater County goals and objectives relating to public lands and resources include a goal of promoting [public land management] agency awareness of County issues and interests: "These include, but are not limited

to, natural resource exploration and development, multiple-use land and resource management practices, agriculture/ranching and recreation, and adequate public access to and across public lands" (Sweetwater County 2002).

3.13 LANDS WITH WILDERNESS CHARACTERISTICS

Lands with Wilderness Characteristics are blocks of public land possessing sufficient size, naturalness, and outstanding opportunities for either solitude or primitive and unconfined recreation, as defined in BLM Manual Section 6310 (BLM 2012f), Conducting Wilderness Characteristics Inventory on BLM Lands and Section 6320 (BLM 2012g), Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process.

A roadless area of more than 5,000 acres of contiguous BLM land is generally the minimum for consideration as a Land with Wilderness Characteristics; smaller roadless areas of contiguous BLM land may be considered when they are adjacent to an area already formally determined to have wilderness character or potential. These BLM manual sections define current policy on Lands with Wilderness Characteristics, directing the BLM to:

1. Continue to conduct and maintain inventories regarding the presence or absence of wilderness characteristics; and
2. Consider identified lands with wilderness characteristics in land use plans and when analyzing projects under NEPA.

The policies stated in BLM Manual Sections 6310 and 6320 do not encompass wilderness areas already designated by Congress or formally identified Wilderness Study Areas (WSAs) that are pending before Congress and are managed as wilderness until a decision is made. Within the RFO, there are five WSAs, one of which—the Adobe Town WSA—is near the southwest boundary of the CD-C project area but does not overlay the project area. There are no designated wilderness areas in the RFO.

Specifically to comply with BLM Manual Section 6320, the RFO is tiering this analysis of the CD-C project to the approved Rawlins RMP issued in 2008 (BLM 2008a and b). The RFO conducted inventories to determine whether the lands within the RFO possess the wilderness characteristics of sufficient size, naturalness, or outstanding opportunities for primitive, unconfined recreation or solitude, and found two areas located adjacent to existing WSAs that possess one or more of these characteristics. However, neither of the two areas—Adobe Town Fringe and West Ferris Mountains—lies within the CD-C project area (see Rawlins RMP Draft EIS Map 2-45, Areas with Wilderness Characteristics, viewable online at http://www.blm.gov/wy/st/en/field_offices/Rawlins/LWCI.html.

The RFO continues to review and document relevant data for maintaining the wilderness characteristics of the field office, as required by Manual 6310, Conducting Wilderness Characteristics Inventory on BLM land. All new information regarding Lands with Wilderness Characteristics would be considered by the RFO in the future along with other resource information in developing and revising land use plans and when making subsequent project-level decisions.

3.14 CULTURAL AND HISTORICAL RESOURCES

3.14.1 Cultural Chronology of the Area

Archaeological investigations in the Great Divide Basin and the Washakie Basin indicate that the area has been inhabited by people for at least 12,000 years from Paleoindian occupation to the present. The accepted cultural chronology of the Great Divide and Washakie basins is based on a model for the Wyoming Basin by Metcalf (1987) and revised by Thompson and Pastor (1995). The prehistoric chronology of the Wyoming Basin, which includes the Great Divide and the Washakie basins, is documented in **Table 3.14-1**.

Table 3.14-1. Prehistoric chronology of the Wyoming Basin

Period	Phase	Age (B.P.)[1]
Paleoindian	--	12,000–8500
Early Archaic	Great Divide	8500–6500
Early Archaic	Opal	6500–4300
Late Archaic	Pine Spring	4300–2800
Late Archaic	Deadman Wash	2800–2000/1800
Late Prehistoric	Uinta	2000/1800–650
Late Prehistoric	Firehole	650–250

[1] Before Present
Source: Metcalf (1987), as modified by Thompson and Pastor (1995)

Paleoindian Period

The Paleoindian period is the oldest period for which there is archaeological evidence. It began ca.12,000 years B.P. and ended around 8500 B.P. This is the transitional period from the Wisconsin ice advance during the terminal Pleistocene to the warmer and drier climatic conditions of the Holocene. A savannah-like environment with higher precipitation than occurs today was prevalent in southwestern Wyoming. Understanding paleo-environmental conditions operating at the end of the Pleistocene and into the Holocene provides insights into the articulation between human populations and the environment (Thompson and Pastor 1995). Paleoindian sites are rare in southwestern Wyoming. Eighty-one sites have been documented to contain Paleoindian cultural material in the project area. One site includes a feature (a hearth) that dates to the Late Paleoindian period at 8840 ± 90 B.P. No cultural material was found with the hearth.

Isolated surface finds of Paleoindian projectile points are not uncommon and suggest that site preservation may be a major factor affecting the number of known sites. Paleoindian lithic technology is distinctive with projectile points serving as chronological/cultural indicators within the period. Paleoindian tool assemblages include lanceolate points, gravers, and end-scrapers (Thompson and Pastor 1995). Radiocarbon analysis of a mammoth tusk at one site dates the site to 11,000 B.P.

Archaic Period

Settlement and subsistence practices in southern Wyoming remained largely unchanged from the end of the Paleoindian period through the Archaic and continued until at least the introduction of the horse or even until historic contact. Reduced precipitation and warmer temperatures occurred ca. 8500 B.P. The environmental change at the end of the Paleoindian period led to a pattern of broad-spectrum resource exploitation, which is reflected in the subsistence and settlement practices of the Archaic period. The resource exploitation became more diverse during the Archaic period. Large side- and corner-notched dart points and housepits are found during the Archaic period, and the presence of groundstone implements suggests a greater use of plant resources during this period. Faunal assemblages from Archaic components document increased use of small animals (Thompson and Pastor 1995).

Late Prehistoric Period

The Late Prehistoric period (2000-650 B.P.) is subdivided into the Uinta and the Firehole phases. Large-scale seed processing and an increase in the number of features including roasting pits is noted in the Late Prehistoric period, as is the presence of pottery and the introduction of bow-and-arrow technology. A characteristic of the Uinta phase is clusters of semi-subterranean structures dating to ca. 1500 B.P. At least two different types of structures have been identified: a more substantial cold-weather habitation and a less substantial, warm-weather structure serving more as a windbreak. The Firehole phase is distinguished from the preceding Uinta phase by a dramatic decline in radiocarbon dates, possibly related to a decline in population density.

Proto-Historic Period

The Proto-Historic period begins sometime after 300 years B.P. with the first European trade goods to reach the area, and ends with the development of the Rocky Mountain fur trade 150 years ago. The Wyoming Basin was the heart of Shoshone territory during this period, with occasional forays into the area by other groups such as the Crow and Ute (Smith 1974). The most profound influence on native cultures during this time was the introduction of the horse, enabling Native Americans to expand their range. All forms of rock art denoting horses, metal implements, and other Euro-American goods are associated with the Proto-Historic period. Metal projectile points have been recovered from both surface and subsurface contexts in southwest Wyoming.

Historic Period

Historic use of the area is limited. Steep canyons, inadequate water supply, badlands, and escarpments make the area inhospitable for settlement with only limited ranching activities present. Historic site types include linear properties such as trails, railroads, and highways and associated sites such as stage stations, rail stations, and sidings. Other historic site types include cabins, historic inscriptions, mines, cemeteries, historic cairns, ranches, corrals, stock-herding sites, post offices, small towns, debris and trash dumps, monuments, and bridges. No homesteads have been documented in the project area. The Homestead Act of 1862 gave 160 acres to anyone who could pay a $10 registration fee and pledge to live on the property and cultivate the land. The Grazing Homestead Act of 1916 allowed grazing homesteads to file for 640 acres of land. The Act was intended to help cattlemen. The federal government retained the mineral rights to the land. In 1934, the Taylor Grazing Act and associated EO 6910 ordered lands withdrawn from further homesteading claims. These laws ensured the federal government would be the largest single landowner in Wyoming (Gardner and Johnson 1989). Several ranches or ranch-associated activities have been documented in the project area. Fur trapping and trading was not an important occurrence in the study area due to the lack of perennial streams.

Linear historic sites are found within the study area. The Overland Trail crosses the mid-portion of the study area trending east to west. The Cherokee Trail transects the southern portion of the study area, trending east to west. The Rawlins–Baggs Road transects the southeastern portion of the study area, trending generally north to south. The road is located south of I-80 and east of WY 789. The Lincoln Highway and the original UPRR grade transect the project area trending east-west, generally paralleling south of the I-80 corridor.

Table 3.14-2. Historic chronology, Great Divide Basin and Washakie Basin

Phase	Age A.D.
Proto-Historic	1720 – 1800
Early Historic	1800 – 1842
Pre-Territorial	1842 – 1868
Territorial	1868 – 1890
Expansion	1890 – 1920
Depression	1920 – 1939
Modern	1939 – Present

Source: Massey 1989

3.14.2 Summary of Extant Cultural Resources

The project area encompasses approximately 1,680 sections of land for a total area of 1.1 million acres. The State of Wyoming Cultural Records Office in Laramie provided information on the previous work conducted and sites recorded in the project area. Records at Western Archaeological Services were also consulted. A total of 7,469 cultural resource projects (archaeological investigations, including pre-disturbance surveys) were conducted and 5,292 sites recorded in the project area prior to April 12, 2013. The inventoried area is comprised of 173,077 block acres. The site density is 0.03 sites per acre. Many of the projects have been Class III cultural resource inventories for roads, pipelines, well pads, power lines, and seismic projects. A Class III inventory is an intensive field survey conducted by professionals through pedestrian survey of an entire target area. Target areas are often block surveys, which can include wells, compressor stations, and general block inventories.

Other types of projects in the area have included Class I data reviews and Class II sampling surveys. Class I inventories are completed with the use of existing data from cultural resource inventory files maintained by both the BLM and the Wyoming State Historic Preservation Office (SHPO). Class II inventories are statistically-based sample surveys designed to aid in characterizing the probable density, diversity, and distribution of cultural properties in the area, to develop and test predictive models, and to answer appropriate research questions. Projects have included monitors, and open-trench inspections; reclamation; range improvements; test excavations; data-recovery excavations; examination of ethnographic records; and historic record research. The total numbers of open-trench inspections and monitors conducted in the project area have not been consistently recorded through the years. However, a total of 435 open-trench inspections and blading monitors have been documented.

In southwest Wyoming, sand deposits (sand dunes, shadows, and sand sheets), alluvial deposits along major drainages, and colluvial deposits along the lower slopes of ridges are recognized as areas of higher archaeological sensitivity. Cultural resources are also likely to be found around internally drained playa lakes.

Many of the historic and prehistoric sites within the project area are located in eolian sand deposits with increased site density near playa lakes and springs. An extensive sand dune complex is located within the CD-C project area which has been designated Site 48CR5784. This area differs from other eolian sand dunes in the project area in that the eolian deposits are relatively stable and continuous for a nine-square-mile area. Very little development has occurred in this sand dune complex and the integrity of any cultural deposits has not been assessed.

3.14.3 Site Types

Of the total of 5,292 sites recorded 2,713 were located in Sweetwater County and 2,579 in Carbon County. Site types included: prehistoric sites (4,624), historic sites (301), and prehistoric/ historic sites (365) and unknown types (2). The total percentage for site types is: prehistoric sites (87 percent), historic sites (6 percent), and sites with prehistoric and historic components (7 percent). Of the recorded cultural

resources, 0.04 percent have been listed on the National Register (2 sites; 1 has been destroyed), 22 percent (1,180) are recommended eligible for nomination to the NRHP, 51 percent (2,720) are recommended not eligible for nomination to the NRHP, 26 percent (1,354) remain unevaluated, and 0.6 percent (36) have been destroyed. Cultural resources documented in the project area include prehistoric open camps, prehistoric lithic debris scatters, historic sites, and prehistoric/historic sites. The types of sites that have been previously identified or predicted to be in the project area are discussed below.

3.14.3.1 Prehistoric Sites

Prehistoric site types identified in the project area include sites dating to all time periods, burials, housepits, rock art, hunting blinds, stone circles, rock alignments, rock shelters, cairns, pottery sites, prehistoric camps, milling/vegetable-processing sites, butchering/bone-bed sites, lithic scatters, quarries, and primary and secondary procurement sites. Many of these sites have undergone data recovery and/or test excavations.

Prehistoric camps contain evidence of a broad range of activities including subsistence-related activities. Cultural remains include formal features such as fire hearths, stone rings, cairns, rock art, lithic debris, chipped stone tools, quarries, evidence of milling/vegetable-processing activities including ground stone, and pottery. Single as well as long-term occupations are represented.

Lithic scatters consist of sites containing lithic debris such as debitage or stone tools. No features or feature remnants are found at the sites. The sites are interpreted as representing short-term activities.

Quarries are sites where lithic raw material was obtained and initially processed. Primary and secondary lithic procurement areas are geologic locations where chert and quartzite cobbles have been redeposited and later used by prehistoric inhabitants for tool manufacture. Archaeological landscapes are secondary lithic procurement sites identified within the project area. Landscapes are by definition not eligible to the National Register.

Human burials, rock art (both pictographs and petroglyphs), rock alignment sites, and rock shelters have been identified as sensitive or sacred to Native Americans. Few such sites have been located in all of southwestern Wyoming. Numerous stone circle (62) and/or cairn sites (118, including 36 historic, 24 multi-component, 57 prehistoric, and one unknown) have been identified in the project area. Prehistoric cairns are usually found along ridges overlooking seasonal drainages. Three rock shelters have been documented in the project area. One site in the study area contains prehistoric and historic rock art (Romanowski 1998), where two separate panels were identified. The southeast-facing panel contains a prehistoric zoomorphic figure near the top, similar to a horse or buffalo. Also noted were vertical scratches representing claw marks. The same panel contains a historic figure near the base. The second panel faces east and contains historic and modern petroglyphs.

A total of 14 housepit sites have been documented in the study area. Housepits are found throughout the study area. Radiocarbon analysis dated two internal features in one of the housepits to 5900 B.P.

Pottery/ceramic sites (31) have been documented in the project area as well as numerous pottery sites in southwestern Wyoming and northwestern Colorado. Small sherds from unknown vessel types were recovered from most of the sites, and one nearly complete corrugated pot was collected.

Prehistoric/historic site types (313) include prehistoric camp/historic debris scatters and prehistoric lithic scatters/historic debris scatters. These multi-occupation sites exhibit mixed surface components. Generally the historic components of these mixed sites are associated with transportation or sheep-herding activities.

Numerous sites (22) have recently been excavated in the study area, and a data synthesis was compiled for the Rawlins RMP, greatly increasing the knowledge of hunter/gatherer subsistence strategies in the area. One site excavated as a result of the CIG Uinta Basin Lateral pipeline dates between 9300–1730 B.P. (Pool 2000). Five components have been identified at the Salamander site ranging from the Early

Archaic period through the Late Prehistoric period (Fleming 2004). Other excavated sites in the project area have dated to the Late Archaic period and the Late Prehistoric period.

3.14.3.2 Historic Sites

A total of 301 historic sites have been documented in the project area. Site types include historic trails, stage roads, stage stations, ranches, cairns, and debris. Eligible historic linear sites that cross portions of the project area include the Overland Trail, the Cherokee Trail, the Rawlins–Baggs Road, the Lincoln Highway, and the UPRR. The Overland Trail crosses the south-central portion of the project area, the Cherokee Trail crosses the southern portion, and the Rawlins–Baggs Road transects the southeastern portion of the project area. The Lincoln Highway and the UPRR (original grade) trend east-west through the central portion of the project area and are located within an area known as the "Southern Corridor." As part of planning for the project area, the Lincoln Highway and original grade of the UPRR were identified and evaluated. BLM has accepted the evaluation with SHPO concurrence.

Several sites are associated with the UPRR including sidings, rail camps, bridges, a culvert, and variations on the original grade. Five railroad sidings have been documented. Six railroad stations have been reported. Four bridges have been documented along the UPRR mainline. Other sites associated with the railroad include foundations, camp debris, a shed, and a dugout.

Towns and post offices played a part in the settlement of the project area. Towns were located along the UPRR and the Lincoln Highway. A post office, ranch, and stage stop were located at Dad, along the Rawlins–Baggs Road. Recorded communities along the tracks or highway include Tipton, Red Desert, Wamsutter, and Creston Junction. A "truss bridge" crossing Muddy Creek is considered eligible for nomination to the National Register.

The Cherokee Trail, which is recommended eligible for nomination to the NRHP, was used in the 1850s by members of the Cherokee Tribe moving from the Oklahoma Reservation to the California gold fields. A southern variant of the Cherokee Trail trends southwest, crossing Savery Creek, and staying south of Ketchum and Five Buttes. The trail crosses the South Fork of Cherokee Creek and then Smiley Draw, remaining south of Cherokee Creek. The road continues west, with Wild Horse Butte to the south, descending to the Muddy Creek drainage and continuing west through Blue Gap Draw. The Cherokee Trail through the project area was identified and evaluated as part of this project (Johnson 2006). As with any of the westward migratory trails of the mid-1800s, variants have been documented. Reasons for variations in routes include inaccessibility at certain times of year or members of the group may have traveled the route previously and found an easier or more direct avenue to water.

The Cherokee Trail has received a great deal of attention by writers and even the film industry. LeRoy Hafen, in his work *The Overland Mail,* contends that the pioneering efforts of the Cherokee Indians led to the eventual development of the Overland Trail. The net result of the combined effort of novelists, historians, and the media has been to create a highly romanticized trail that is still not well understood in terms of the people who used it and the location of the actual route taken by Cherokees traveling west from Oklahoma to California in 1850 (Gardner 1999).

Excerpts from a Cherokee Trail diarist found in *Cherokee Trail Diaries* (Fletcher *et al.* 1999) document stops along the southern variant of the Cherokee Trail. Mitchell (1850):

> "June 30 Sunday . . . frosty and plenty of ice We took an object west [possibly Five Buttes] at a great distance west to travel to and had great trouble in getting to it Too many bluffs & bad branches in the way In the evening we got out of the mountains & got to a bad Swamp creek runing south [This is Muddy Creek north of Baggs, WY] Supposed to be a for of elk head [Little Snake] 7 of our men were dissatisfied with the corse we were travling & left us taking a more South corse"

The Overland Trail is recommended as eligible for inclusion on the NRHP. The Overland Trail goes through the project area, traversing the checkerboard land pattern, and has been previously evaluated with BLM and SHPO concurrence (Johnson *et al.* 2005). This evaluation included the associated stage

stations. Duck Lake Stage Station, Coal Gulch Stage Station, and the Washakie Stage Station were stops along the Overland Trail. Gardner *et al.* (1993) states: "Construction of stage stations at Sulphur Springs, Washakie, and Duck Lake more than likely took place in 1862." This time frame coincides with Ben Holladay beginning his Overland Stage venture to connect Denver, Colorado, with Salt Lake City, Utah. "Home" stations offered travelers more amenities than "swing" stations where a change of horses occurred and travelers' meals were offered. Robert Foote, giving testimony to Senator Cameron during a request for reimbursement for destruction caused by Native Americans, stated that "Stations from Sulphur Springs west to Fort Bridger were built from stone." (Gardner *et al.* 1993) Along with the construction of the stage stations was the stringing of the telegraph wires. Freighters as well as emigrants used these routes.

The Rawlins-to-Baggs Stage Road is an eligible freight and stage road. Mail, goods, and passengers followed the road on freight wagons and the Overland Stage. The road is first documented in 1881 and there were subsequent stage stations built along the route. Only the southern tip of the project area overlaps the Rawlins-to-Baggs Stage Road. The entire segment of the stage road through the project area has been previously determined as not contributing to the overall eligibility of the road (Rosenberg 2006).

Seven historic rock-art inscriptions have been documented in the project area. The Overland Rock contains inscriptions associated with the Overland Trail and is listed on the National Register. Three sites are documented to contain historic rock inscriptions associated with sheep ranching. Nine historic ranches are documented within the project area and several additional buildings, foundations, corrals, and fences are ranch-associated. The ranches are generally associated with raising sheep. In Wyoming, large-scale sheep ranching did not appear until the latter decades of the 1800s; by 1920, however, it was one of the pillars of the state's economic base. Ranching families promoted economic wealth with hard work and by taking chances, such as expanding across the desert of southwest Wyoming. Ranching/stock-herding sites in the area are generally sheepherder camps exhibiting hole-in-top cans and purple glass. Refuse left behind from tending herds is usually located on terrain with water as well as a good view to watch over the herds. One historic log cabin has been documented in the study area. Also reported at the cabin site are a tipi ring and two fire pits. A wild-horse trap is reported in the project area.

Historic cairns, often associated with sheep-herding, are located on ridges or high points, sometimes overlooking seasonal drainages.

Historic debris/trash sites are found distributed throughout the project area. These scatters usually include trash associated with emigration and ranching/herding activities—condensed-milk cans, food cans, baling wire, glass, and milled wood. The sites are usually found on ridge tops in areas with vegetative cover conducive for forage and bedding.

One historic mine has been reported in the project area. The Bugas Mine is a small subsurface coal mine where low-grade coal was extracted, probably between 1950 and 1964. Gardner and Johnson (1991) recorded its location on a northeast-facing slope overlooking Hansen Draw, approximately one-half mile south of the UPRR and 2.5 miles northeast of Wamsutter. It is accessed by a faint two-track road. The surface extent of the Bugas mine includes a 1.06-mile-long trench with a mine portal at the west end that is partially blocked with earth. At the east end of the trench is a broad, flat tailings pile of low-grade coal with some mica cut fragments mixed in. Some low-grade uranium ore was noted in the mica cut-bank of the trench. It is unknown if any reclamation work has been conducted at the mine since the initial recording in 1991. The site is recommended not eligible for nomination to the NRHP.

One grave, the Divide Burial, has been documented in the project area. The grave of a male Caucasian was located during the construction of a telecommunication line. The grave was located on Union Pacific land. Analysis of the human remains and associated coffin and grave goods indicate the male was about 23 years of age and was probably a railroad worker. His remains were moved to the Rock Springs, Wyoming, cemetery.

3.14.4 Summary

Based on information derived from the data review, it is evident that prehistoric cultural resources are found along the major ephemeral drainages and along the lower benches of escarpments that dominate the terrain in the project area. Sensitive areas include drainages such as Muddy Creek, and other locales where water was or is present—natural springs, playa lakes, and the larger ephemeral washes that provide intermittent water sources. The numerous springs in the project area would be likely to contain cultural resources. Seasonal drainages flow into the project area from several escarpments such as Flat Top Mountain, North Flat Top Mountain, Baldy Butte, Pine Butte, Chain Lakes Rim, Ruby Knolls, Coal Butte, High Point, Sugarloaf, Horse Butte, Luman Butte, Horseshoe Bend, Siberia Ridge, Lost Creek Butte, Delaney Rim, Wells Bluffs, Wamsutter Rim, and Big Hill. Certain topographic settings have higher archaeological sensitivity: eolian deposits (sand dunes, shadows, and sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges.

Two areas within the study area are identified by the RFO as especially sensitive. The first consists of approximately 127 cairns along a ridge system in the southern portion of the study area, and the second consists of a dune complex that spans nine sections. A sensitivity model and treatment plan for the dune complex was compiled as part of the CD-C project.

The subsistence and settlement patterns in the project area reflect a hunter-gatherer lifeway. Information about the Paleoindian period is sparse and is not well understood. Research into the subsistence and settlement patterns used during the Archaic period indicates summer occupations in the mountains, winter occupations in the foothills, and spring and fall movements utilizing all available zones (Creasman and Thompson 1997). Subsistence patterns in the Archaic period and the Late Prehistoric period are similar in that they are based on seasonal movement throughout the basins and foothills in response to the availability of floral and faunal resources (Creasman and Thompson 1997). A broad diet is evident in extensive procurement and processing of small mammals by 450 B.P. (Shimkin 1947), or possibly earlier (Bettinger and Baumhoff 1982). Numic-speaking Shoshonean groups occupied the Wyoming Basin and continued to reside there until Euro-American expansion relegated them to reservations beginning in 1868.

Historic use of the project area was limited by terrain and lack of perennial water sources. Ranches, limited irrigation, grazing, and limited ranching activities are identified by the historic debris scatters and historic record. Sheep ranching was an important industry historically, and continues today. Historic trails and stage stations are located within the project area including the Overland Trail, the Cherokee Trail, the UPRR (original grade), the Lincoln Highway, the Rawlins-to-Baggs Road, the Wamsutter-to-Baggs Road, and the Red Wash Wagon Road. Stage stations are associated with the Overland Trail and the Rawlins-to-Baggs Road.

3.15 SOCIOECONOMICS

This section describes recent and current social and economic trends and conditions in and near the CD-C project area, the geographic area that would be primarily affected by the Proposed Action or alternatives. Information for this section was derived from a variety of published documents and from interviews with local officials and service administrators. A Baseline Socioeconomic Technical Report (STR) was prepared in 2008 (available on the BLM website at http://www.blm.gov/wy/st/en/info/NEPA/documents/rfo/cd_creston.html), which examined a wide range of socioeconomic conditions and trends in and near the project area. These trends have been monitored over time, and updated information is included in this section of the EIS.

Natural gas development has been ongoing in the project area for more than 50 years but the pace of such development accelerated between 1999 and 2004, then remained high through 2007/2008, contributing to an economic expansion in Carbon and Sweetwater counties during that same period. Natural gas development activity in the region was subsequently curtailed in the wake of the national economic recession that began in December 2007, the repercussions of which continue at the time of this assessment (mid-2011).

Figure 3.15-1, which displays the total number of wells (which are mostly natural gas wells) in production in Carbon and Sweetwater counties between 2000 and 2010, illustrates the high levels of natural gas activity in the early to mid-years of the decade and the subsequent leveling-off of development in 2008–2009. Development began to accelerate again in Sweetwater County during 2010, but remained fairly stable in Carbon County.

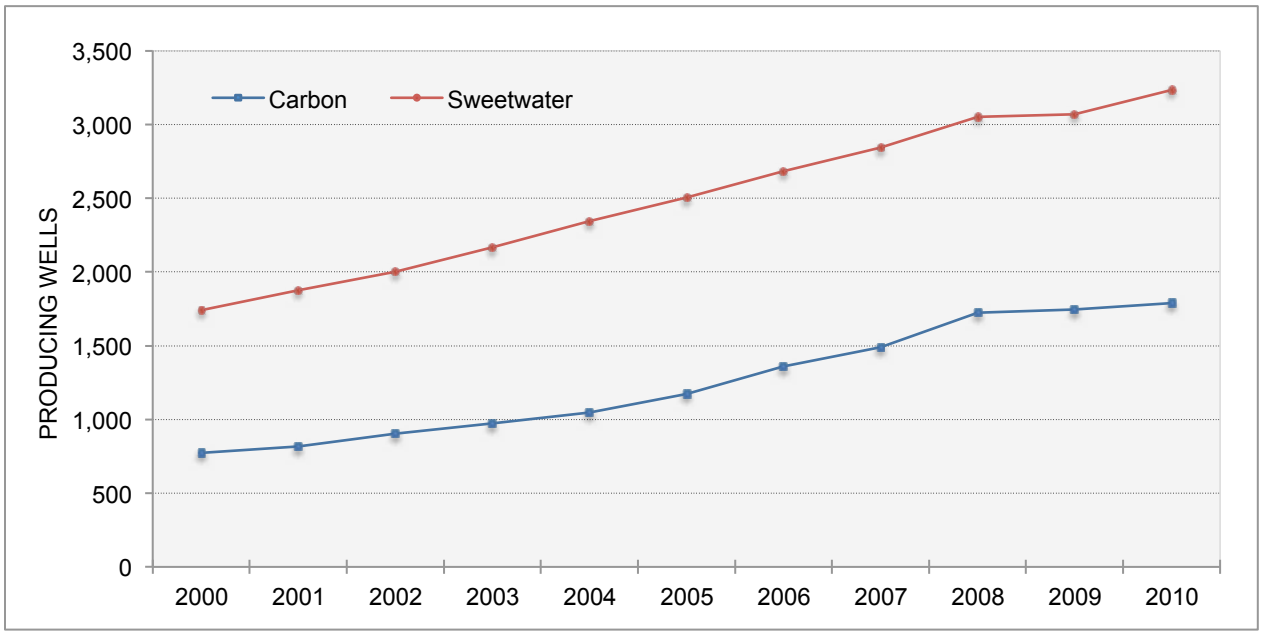


Figure 3.15-1. Producing oil and gas wells in Carbon and Sweetwater Counties, 2000–2010

Socioeconomic effects of historic and ongoing oil and gas development in the project area and the two-county area are included in this Affected Environment section, as information about these effects provides valuable insight into the potential effects of the Proposed Action and Alternatives and the historic and cumulative contexts in which they would occur. The socioeconomic effects of the recent energy-related economic expansion and subsequent contraction are particularly illustrative of potential future socioeconomic effects of similar occurrences. This section also discusses the often cyclical nature of oil and gas development and the effects of those expansion and contraction cycles on socioeconomic conditions within the study area.

The project area is located in western Carbon and eastern Sweetwater Counties in south central Wyoming (see **Map 3.15-1**). Five communities are likely to be primarily affected by natural gas development and production in the project area: Rawlins and Baggs in Carbon County and Wamsutter, Rock Springs, and Green River in Sweetwater County. The Town of Wamsutter is near the geographic center of the project area and is the only incorporated community within the project area. Although sharing some economic and social characteristics, each community is unique.

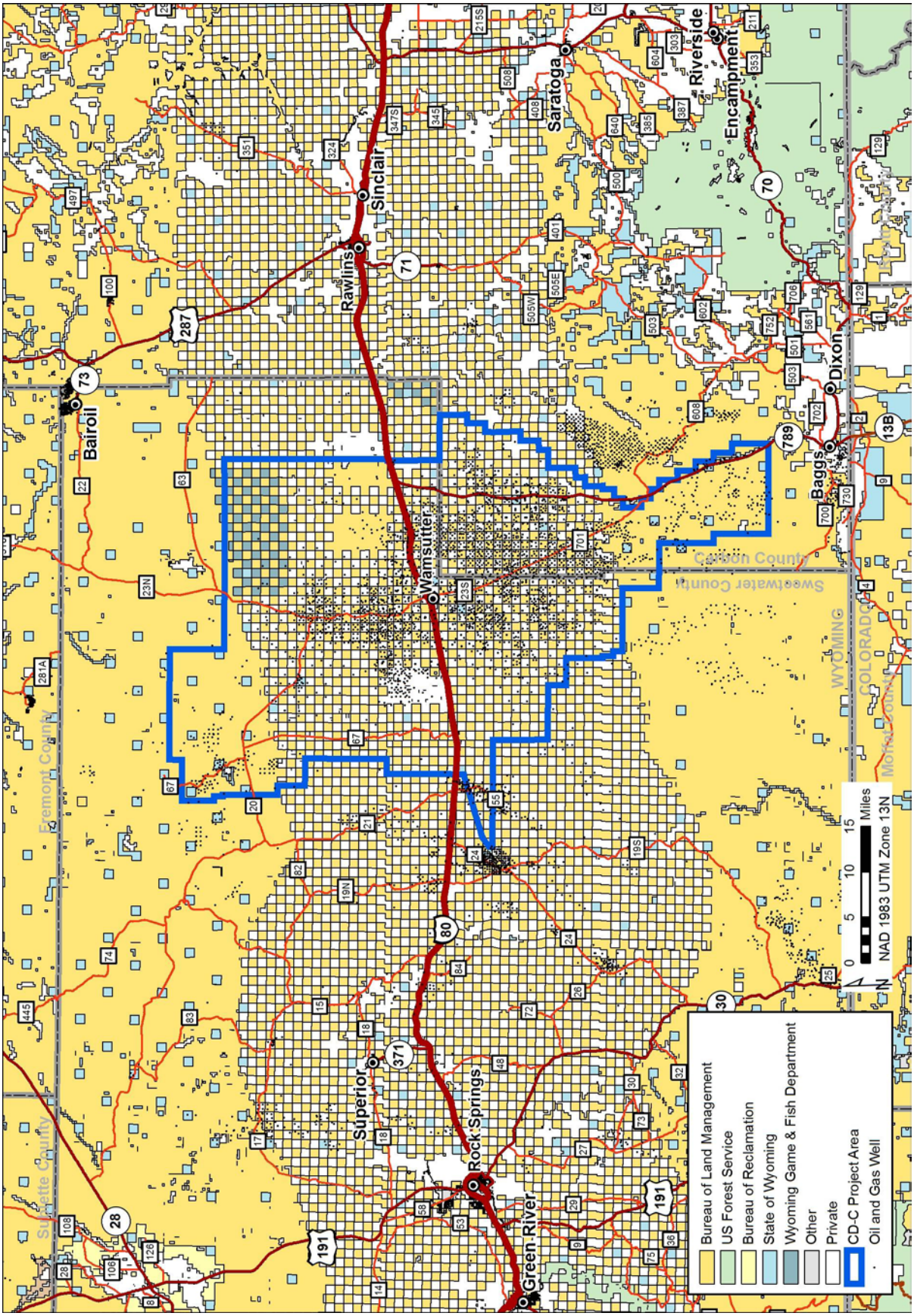
The project area is about 40 miles across from east to west, and extends 20 to 25 miles north and up to 45 miles south of I-80, being somewhat keyhole-shaped in general form (**Map 3.15-1**). I-80 bisects the project area along an east-to-west alignment. Along I-80, the eastern boundary of the project area is about 25 miles west of Rawlins, the Carbon County seat. The western boundary of the project area is about 40 miles east of Rock Springs in Sweetwater County. Approximately 80 percent of the total project area is located in Sweetwater County, and approximately 60 percent is within the "checkerboard" of federal/private ownership pattern created by federal land grants to the railroad to promote development of the transcontinental railroad.

The project area is sparsely populated; there are few permanently occupied residences outside of Wamsutter, although some ranch facilities and a few rural cabins and privately owned lots are occupied on a seasonal basis, the latter by the owners who park recreational vehicles (RVs) or camp. Green River, the Sweetwater County seat, lies about 50 miles west of the project area along I-80.

The Carbon County town of Baggs lies about 8 miles southeast of the project area.

The town of Saratoga (about 70 miles east of the CD-C project boundary via I-80 and WY 130) and other communities in the Upper North Platte Valley in Carbon County could experience some secondary and cumulative effects of energy development in the CD-C project area and elsewhere in the RFO area.

Six other communities—the towns of Dixon, Sinclair, Riverside, and Encampment in Carbon County, and the Sweetwater County towns of Bairoil and Superior—may also be minimally affected by the Proposed Action and Alternatives. The size of these communities, their distance from the project area, limited temporary housing—and in the case of Sinclair, limited private land availability—indicate that substantial growth or other socioeconomic effects of the CD-C project would be unlikely.



No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

Map 3.15-1. CD-C project area and surrounding area

3.15.1 Economic Conditions

Economic conditions and trends for the study area were identified based on data from the U.S. Census Bureau, the U.S. Bureau of Economic Analysis, the U.S. Bureau of Labor Statistics, the *Economic Profile System*, from Headwaters Economics, available online at: <http://headwaterseconomics.org/tools/eps-hdt> and from other federal, state, and local sources as cited in the text.

Local economic development and diversification efforts, coupled with expansion in mining, energy resources, and the local trade and services industries, brought about a period of economic stability through the 1990s with total employment fluctuating around 35,000 jobs (**Figure 3.15-2**).

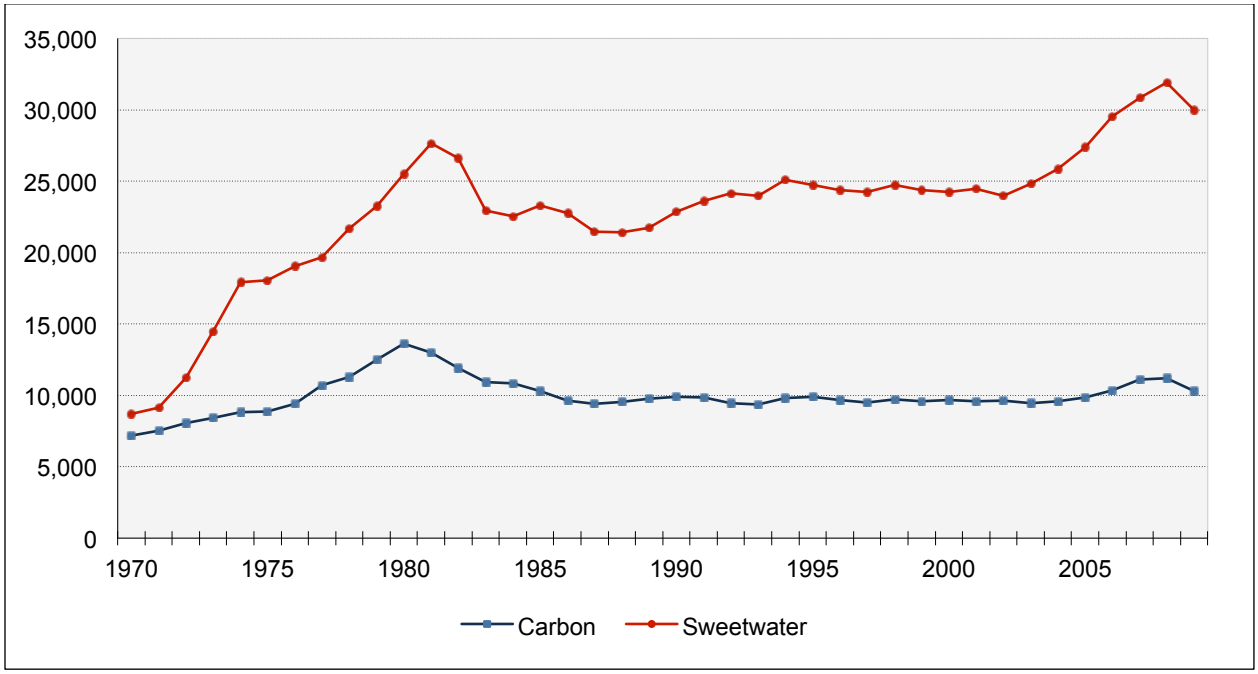


Figure 3.15-2. Total full-time and part-time jobs, 1970–2009

Source: U.S. Bureau of Economic Analysis, 2011.

In 2002/03, natural gas development again became a driving economic force in Sweetwater County, prompted by national energy policy, record-high energy prices, and other factors. From the 2002 level of 23,989 jobs, over 3,400 jobs were added through 2005, with about 4,700 additional jobs added through 2008. Available data indicate a net loss of more than 2,400 wage and salary jobs in 2009, or about 7.5 percent of all such jobs, with a modest increase of approximately 500 jobs in 2010 (U.S. Bureau of Economic Analysis 2011, Wyoming Department of Employment 2011).

In Carbon County, employment also climbed dramatically in the early 1970s, primarily due to energy resource development (coal, uranium, and oil and gas). The net gain of 6,437 jobs between 1970 and 1980 represented a 90-percent increase in total employment. Like neighboring Sweetwater County, much of the gain in Carbon County was transitory as nearly 4,200 jobs were lost during the early/mid-1980s as the local coal and uranium industries both contracted. Thereafter the local economy remained relatively stable through 2004, at least in terms of employment. More than 200 new jobs were added between 2002 and 2005, and nearly another 1,500 jobs added through 2008. Approximately 1,000 wage and salary jobs were lost in Carbon County in 2009, nearly 10 percent of all jobs in existence at the beginning of the economic recession in late 2007, with a further loss of about 200 jobs in 2010. Although the recession figured in some of the job cutbacks, a substantial number of the losses were associated with the scheduled

completion of a major facility upgrade at the Sinclair Refinery (U.S. Bureau of Economic Analysis 2011, Wyoming Department of Employment 2011).

Table 3.15-1 displays the current composition of the local economies in terms of covered employment. Mining, construction, and transportation/warehousing are the primary sectors in Sweetwater County's economic base. In addition to oil and gas development, the mining industry includes two active coal mines and four trona mines. Trade, hospitality services, health care, education, and public-sector employment are also important local economic sectors.

The mining sector has historically been important to Carbon County, but despite the level of recent and ongoing energy resource development in the region, the mining sector currently plays a more limited role in the Carbon County economy than that of its western neighbor. Pipeline and wind-energy facility construction, state government, health care, and the trade, accommodations, and food-service industries have also been important to the Carbon County economy.

Table 3.15-1. Full-time and part-time covered employment, by industrial sector, 2009

Industrial Sector	Carbon County		Sweetwater County	
	Number	% of Total	Number	% of Total
PRIVATE				
Agriculture, Forestry, Fishing, and Hunting	198	2.7%	13	0.1%
Mining	290	4.0%	5,446	22.3%
Utilities	75	1.0%	NR	n/a
Construction	533	7.3%	1,685	6.9%
Manufacturing	NR	n/a	1,314	5.4%
Wholesale Trade	62	0.8%	761	3.1%
Retail Trade	759	10.4%	2,408	9.9%
Transportation & Warehousing	235	3.2%	1,278	5.2%
Information	82	1.1%	219	0.9%
Finance & Insurance	149	2.0%	434	1.8%
Real Estate & Rental & Leasing	83	1.1%	439	1.8%
Professional & Technical Services	136	1.9%	532	2.2%
Management of Companies and Enterprises	NR	n/a	NR	n/a
Administrative and Waste Services	119	1.6%	418	1.7%
Educational Services	NR	n/a	45	0.2%
Health Care and Social Assistance	445	6.1%	1,019	4.2%
Arts, Entertainment, and Recreation	79	1.1%	131	0.5%
Accommodation and Food Services	859	11.8%	2,304	9.4%
Other Services, Except Public Administration	154	2.1%	600	2.5%
Subtotal private	**4,715**	**64.5%**	**19,545**	**80.0%**
GOVERNMENT	2,134	29.2%	4,375	17.9%
Total reported	**6,849**	**68.8%**	**19,545**	**81.7%**
Not Reported (NR) due to disclosure guidelines	457	31.2%	4,375	18.29%
TOTAL	**7,308**	**100.0%**	**23,920**	**100.0%**

Source: Wyoming Department of Employment, 2011.

Labor Market Conditions

Local labor markets are reflective of the underlying economic and demographic conditions. From 1990 through 2002, the pool of residents employed or actively seeking work remained relatively steady in Sweetwater County. Fueled by expanded economic opportunities associated primarily with natural gas development, migration, and increases in labor-force participation among residents, the local labor force

has since expanded by almost 3,700 individuals, or 19 percent in five years. In Carbon County, the local labor force underwent a slow but protracted decline from 1990 through 2004, shrinking by nearly 1,200 individuals or 14 percent. This period is also characterized by steady out-migration of former residents.

Labor demand tied largely to the increase in natural gas development spawned a reversal in trends, attracting more than 700 current and immigrating individuals into the Carbon County work force between 2004 and 2008. During the same period, the resident labor force in Sweetwater County expanded by more than 3,200 individuals, approximately 14 percent (**Figure 3.15-3**). More recently, weaker labor demand brought about by the recession and associated impacts on natural gas development in the region resulted in labor force contractions.

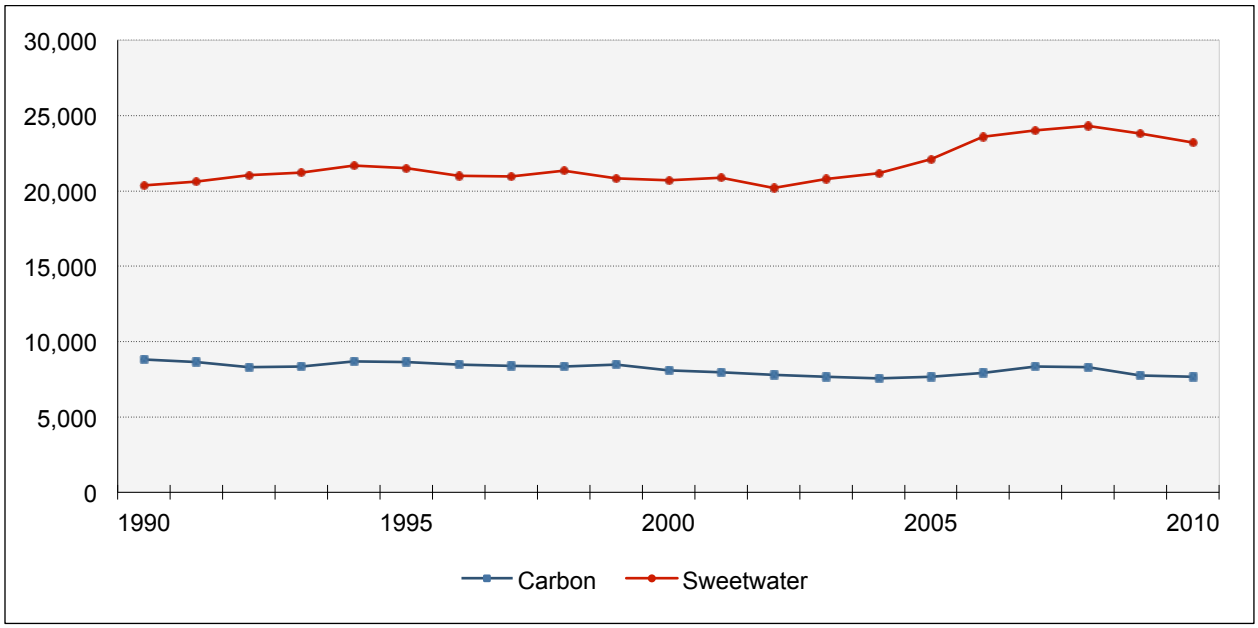


Figure 3.15-3. Local labor force: 1990–2010

Source: U.S. Bureau of Labor Statistics, 2011.

Unemployment in the region since 1990 had generally been between 5.0 and 6.5 percent, on par with or slightly above the statewide average (**Figure 3.15-4**). Migration and commuting play important roles in moderating local unemployment rates. Local unemployment rates dropped sharply in 2000, with a more protracted decline between 2004 and 2008. During the recent expansion, labor markets were tight across the state due to the high demand for labor associated with ongoing energy development. In Sweetwater County average annual unemployment dropped to a record low of 2.3 percent in 2007, representing fewer than 600 individuals unable to find work, or temporarily between positions. Carbon County also had record low unemployment in 2007, averaging just over 250 unemployed, representing 3.0 percent of the local labor force (U.S. Bureau of Labor Statistics 2010). The effective unemployment rate was likely even lower as the estimates of the local labor force used to calculate unemployment rates may not capture all non-resident laborers working in the area but living in motels, RV parks, and other temporary housing.

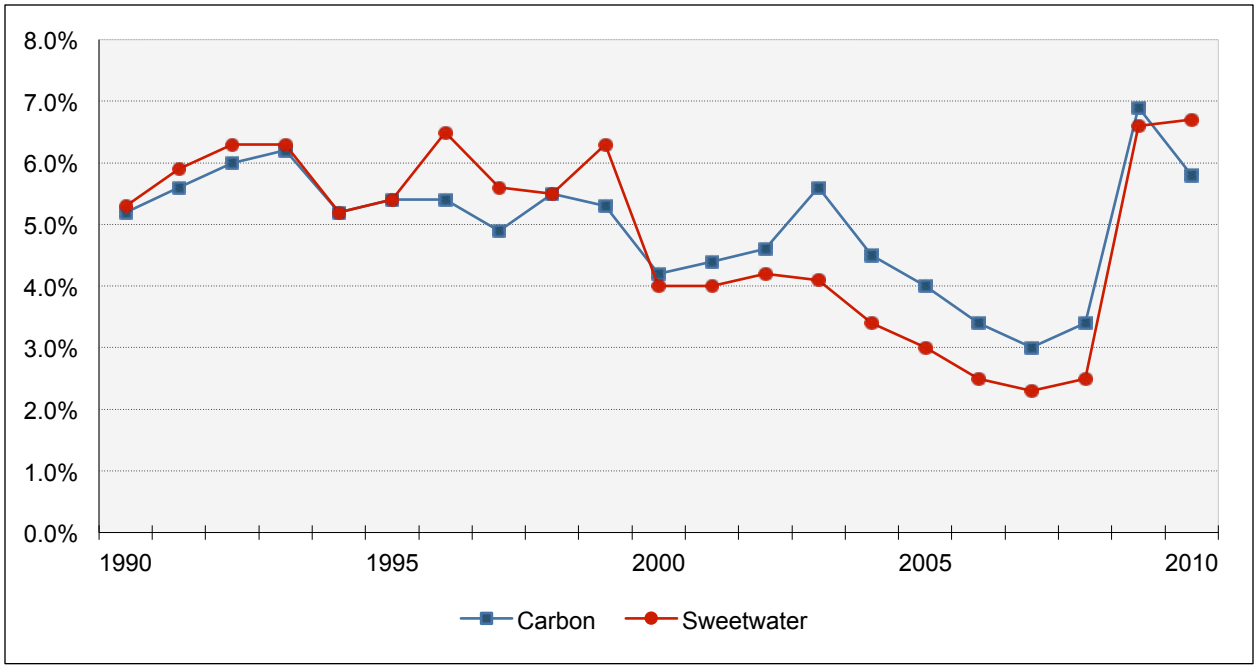


Figure 3.15-4. Local unemployment rates (average annual): 1990–2010
Source: U.S. Bureau of Labor Statistics, 2011.

The tight labor market was reflected in across-the-board labor shortages in Carbon and Sweetwater counties. All economic sectors appear to be affected by the high demand for workers. The labor shortage resulted in higher wages, bonuses, and per-diem payments in the natural gas industry. High wages in the natural gas industry resulted in job shifts and worker loss in other sectors of the economy, creating upward pressure on wages for employees across the private and public sectors. Even with the increase in wages, local and state government and private businesses were frequently short-staffed and experienced high employee turnover during 2007 and 2008 (Derragon 2008, Rader 2007, Spicer 2007). Shortages of affordable housing in Carbon and Sweetwater counties (discussed in **Section 3.15.5**) impeded recruitment of non-local workers, who frequently had difficulty competing for housing with higher-paid gas-industry workers. Natural gas service companies were required to develop or contract for temporary housing for employees, many of whom were rotated in and out of the area on a temporary basis.

Employers in other sectors of the economy were in some cases constrained from expanding their business because of labor shortages. Some retail and service businesses had to limit business hours and, in at least one case, temporarily cease operating because of their inability to attract or retain employees.

A slowdown in the pace of natural gas development, combined with the effects of the recession and the housing mortgage crisis, resulted in substantial economic dislocation and job losses in the region. Unemployment and unemployment rates more than doubled between 2008 and early 2010, peaking at 7.3 percent and 564 unemployed in Carbon County. Peak unemployment in Sweetwater County topped 2,000 individuals in early 2010, representing 8.8 percent of the labor force. More recently, local unemployment has declined, to 5.3 percent and 392 unemployed in Carbon County and 5.6 percent and 1,345 unemployed in Sweetwater County in April 2011 (U.S. Bureau of Labor Statistics 2011).

Sections 3.3 through 3.5 of the Baseline STR describe recent trends in key sectors of the Carbon and Sweetwater County economies including agriculture; minerals; and tourism, travel, and outdoor recreation. Section 3.6 of the STR discusses energy development effects on retirement migration and non-location-dependent businesses. Key findings of these sections are discussed below.

Agriculture

Farm employment has been trending downward in Carbon and Sweetwater counties since 1970. Carbon County farm employment decreased from 741 in 1970 to 564 in 2000, a 23-percent decrease over the two decades. Farm employment continues to trend downward in Carbon County, falling below 400 in 2005 and to 369 in 2009.

Sweetwater County farm employment decreased from 552 to 201, a 63.5-percent decrease in the same period (Headwaters Economics 2007a and 2007b). Farm employment has since trended upward, to 266 in 2009.

A total of 287 individual farms and ranches, operating on nearly 2.2 million acres of land, were recorded in Carbon County in the 2007 Census of Agriculture. Both totals represent slight declines relative to the corresponding totals tallied in the 2002 Census of Agriculture. In 2007, a total of 244 farms and ranches, operating nearly 1.5 million acres of land, were tallied in Sweetwater County (USDA 2009).

In 2008, local ranches and farms in the two counties reported total cash receipts of $60.5 million in agricultural products, with livestock sales the primary source of agricultural revenue in both counties. Gross annual agricultural sales in Carbon County in 2008 were nearly four times the level in Sweetwater County during that year. Cash receipts from livestock and crop sales in Carbon County declined by approximately 20 percent over the past five years, but increased slightly in Sweetwater County (U.S. Bureau of Economic Analysis 2011).

Minerals

Mining employment in both counties reflect the period of intensive energy and minerals development in the late 1970s and early 1980s and the ensuing slowdown as world energy prices fell. Current and historical mining activity in the study area includes trona mining in Sweetwater County, and coal, uranium mining and oil and natural gas production in both counties. Mining employment in Carbon County peaked at 3,563 in 1980, declined to a low of 180 in 2003 and subsequently increased to 621 in 2008. Sweetwater County mining employment declined from its peak of 7,811 in 1981 to a 2000 low of 3,736,[1] climbing to 6,717 in 2008 (U.S. Bureau of Economic Analysis 2011). Recession related job losses in mining from 2008 to 2010 are estimated at about 200 in Carbon County and 500 to 600 in Sweetwater County (Wyoming Department of Employment, 2011).

Assessing recent mining-sector employment in the study area is complicated by the nature of employment practices in the natural gas industry. Acute labor and housing shortages within the study area during the boom years, coupled with the mobile nature of many natural gas drilling and service company operations, hampered the reporting and tracking of natural gas industry employees. Shortages of local labor resulted in many workers relocating to the study area on a temporary basis, working at job sites located in several counties while staying in temporary lodging near the work site, and then returning home for extended periods. Consequently their employment may not be recorded in the county where they are actually working, or if their employer is located outside the study area, these workers may not be recorded within the affected counties at all.

Oil and natural gas exploration and production have been important but volatile elements of the Carbon and Sweetwater County economies for well over 30 years. According to the WOGCC, Carbon County natural gas production increased from 75,851 million cubic feet (MMcf) in 1995 to 128,395 MMcf in 2009, or 69 percent. Production then declined by 4 percent, to 122,755 MMcf, in 2010. Carbon County oil production approached 1.82 million bbls (bbls) in 2009, about 38 percent higher than the 1995 level of 1.3 million bbls, but then declined to 1.59 million bbls in 2010. During 2007, there were 1,620 total

[1] Mining employment for 2001 through 2004 was not reported by the U.S. Bureau of Economic Analysis due to disclosure restrictions. Mining employment may have fallen even lower in 2001; however the current natural gas expansion began in 2002.

producing oil and gas wells in Carbon County, and the county produced 5.9 percent of total gas produced in Wyoming and 3.4 percent of total oil. By 2010, the number of producing wells had climbed to 1,791, with another 425 wells idle. Annual oil production had declined to about 1.6 million bbls. The production declines from 2009 to 2010 occurred in part due to the sharp decline in new wells completed in 2009 (WOGCC 2011b).

Annual natural gas production in Sweetwater County decreased from 238,000 MMcf in 1995 to 192,000 MMcf in 2000, but subsequently increased to 235,316 MMcf in 2007. Sweetwater County production accounted for about 12 percent of all natural gas produced in Wyoming and about 11 percent of all oil during 2007. The county had 3,234 producing oil and gas wells in 2010, compared to 3,089 in 2007. Total production of 240,144 MMcf of natural gas and 5.35 million bbls of oil occurred in Sweetwater County in 2010 (WOGCC 2011b).

The Sweetwater County economy is affected by oil and gas activity occurring beyond its borders. Over the last decade, Rock Springs has emerged as a natural gas service center for southwestern Wyoming. A number of oil and gas service companies that service the entire region have established major service centers in the Rock Springs area. Halliburton, Schlumberger, and BJ Services have all established major yards in the Rock Springs area and, according to the Sweetwater Economic Development Authority (SWEDA), employed a total of 1,360 employees in early 2007 (SWEDA 2007).

Historically, natural gas sales prices in Wyoming were substantially lower than prices received for gas in other markets. This "price differential," resulting from constraints in natural gas transmission capacity to markets outside of Wyoming, was usually expressed as the difference between average Wyoming sales prices, e.g., prices at the Opal Hub, Cheyenne Hub, or some combination of the two, and those at Louisiana's Henry Hub. The Henry Hub is one of several reference pricing points for natural gas. Between January 2000 and December 2007, the price differential between Wyoming gas and national averages ranged from just a few cents to $5.00 during the summer of 2007 (Wyoming Pipeline Authority 2008). The price differential effect fluctuated based on such factors as gas supply in Wyoming and weather and other demand factors.

This price differential is important for state and local government because it affects revenues from ad valorem and severance taxes and royalty payments and also affects gas company development decisions. Extension of the Rockies Express Pipeline to Midwestern markets in 2008 and 2009 saw some moderation of the price differential, and the completion of the Bison pipeline in northeastern Wyoming in early 2011 also had an effect. Further narrowing of the price differential is expected as additional gas transmission capacity comes online: the Ruby pipeline, which was completed in mid-2011 and transports gas from the Opal hub to Oregon; and two expansions of the Kern River pipeline, also originating in southwestern Wyoming, which were completed in April 2010 and October 2011 (Kern River 2012, Ruby Pipeline LLC 2011, Wyoming Pipeline Authority 2010).

Travel and Tourism, Including Outdoor Recreation

Travel and tourism in the region, including non-residents engaged in outdoor recreation in the two counties, generate important contributions in the local economy. In addition to the economic benefits, outdoor recreation, including hunting and fishing, is also an important contributor to the quality of life of many local residents.

Much of the tourism and travel in Carbon and Sweetwater counties is traffic passing through the region on I-80 which supports the lodging, dining, and entertainment sectors. These sectors also benefit from energy workers residing in the area on a temporary basis. An economic analysis of travel in Wyoming in 2006 estimated annual tourism and travel spending by non-residents of $166.7 million and $142.6 million in Sweetwater and Carbon counties, respectively. That spending supported an estimated 2,020 jobs in Sweetwater County and 1,560 jobs in Carbon County (Dean Runyan Associates 2010). Travel and tourism were also affected adversely by the economic recession. In 2009 estimated annual travel spending by non-residents in Sweetwater County was more than $22 million lower than in 2006, with a

corresponding decline of 330 travel/tourism-related jobs. In Carbon County, the corresponding changes were $12.6 million in lower spending and a loss of 300 jobs (Dean Runyan 2010).

Analysis of the seasonal variations in employment in the accommodations and food service sectors, and the comparative growth in spending in recent years, indicate that a noteworthy portion of those totals reflect travel in the I-80 corridor and the impacts of energy workers residing temporarily in the communities, rather than more traditional destination-type tourism.[1] Local observations about the tourism and recreation economy in Carbon and Sweetwater counties help illuminate the findings of the Dean Runyon studies. Sweetwater and Carbon counties do not have major tourism attractions such as Yellowstone and Grand Teton National Parks that attract large numbers of destination visitors. Rather, the visitor economy in Carbon and Sweetwater counties is based on outdoor recreation, including hunting and fishing by non-residents, and non-local participation in local events such as historic/cultural celebrations, competitions, conventions, and conferences (Radar 2007, Spicer 2008).

The strong pace of natural gas development in Carbon and Sweetwater counties between 2000 and 2008 had both beneficial and adverse effects on tourism and recreation-related businesses. In addition to the general across-the-board increase in business, the beneficial effects of the gas expansion included increases in customers and occupancy rates during the traditional winter and spring off-seasons, which increased the year-round profitability of businesses catering to travelers. High demand also resulted in an increase in the number of lodging and dining establishments, which in turn increased the lodging and dining base for tourism and recreation visitors. High occupancy rates for lodging establishments also resulted in a dramatic increase in lodging tax revenues; lodging tax revenues increased from $110,000 to $362,000 between fiscal year (FY) 2002 and FY 2008 in Rawlins, and from $254,000 to $615,000 in Rock Springs during the same period. Local tourism and recreation organizations have used these revenues to develop promotional materials and to promote events that bring visitors to the area and increase the average length of stay. Reductions in lodging tax revenues in the ensuing two years, to $278,000 (-23 percent) in Carbon County and $422,000 (-31 percent) in Sweetwater County, provide another measure of the recessionary effects on natural gas development and tourism in the area (Wyoming Dept. of Administration and Information, various years).

Adverse effects of natural gas and other energy development on the travel and tourism industry included the high energy-worker occupancy rates in lodging establishments, particularly during summer months, which reduced lodging availability for recreationists, event attendees, and travelers on I-80. Travel and tourism businesses, like most businesses in the study area, reported difficulty in recruiting and retaining employees during the boom years (Radar 2007, Spicer 2008).

Energy Development Effects on Retirement Migration and Non-Location-Dependent Businesses

Many communities view local economic diversification as a goal to help achieve economic stability. Recently, some groups and organizations have highlighted the importance of retirees and other sources of non-labor income, service and professional occupations, and non-location-dependent businesses as key to economic diversification in western communities. A number of recent studies espouse the potential role of amenity values, including those on public lands, in attracting retirement migration and non-location-dependent businesses to rural communities in the West and serving as a foundation of overall economic development strategy for rural western communities. Public comments during the scoping for this EIS and on other natural-resource-development actions in the region have expressed concern about the

[1] "Travel" for the purposes of that analysis includes both business and pleasure travel by residents and non-residents that was more than 50 miles from the traveler's home. In the study area this would include spending by all travelers on I-80, as well as that by non-resident workers employed in the area on an extended basis but staying in local motels, hotels, and campgrounds. Although not explicitly addressed in the Runyan Report, the spending estimates likely capture some spending by non-local hunters and anglers.

potential effects of energy development on the amenity values of public lands and the resultant detrimental effects on retirement migration, non-location-specific business attraction, and tourism/recreation visitation. Adverse effects on other sectors of the economy such as recreation and grazing, effects on environmental amenities, and general boom conditions such as scarcity and high cost of housing and labor shortages are also viewed as having the potential to dampen economic diversity in communities within the study area.

Section 3.6 of the Baseline STR examines retiree migration, non-location-specific business attraction, and tourism/recreation in Carbon and Sweetwater counties using an analytical framework combining comparative cross-sectional and time series analysis involving 198 rural counties in six western states.[1,2] Among the findings of this analysis are the following:

Retirees

- Per-capita personal income growth in Carbon and Sweetwater Counties outpaced that of the 198 rural western counties, climbing to 119 percent of the average in Carbon County in 2005; and from 126 percent to 146 percent of the overall average between 1990 and 2005.
- Dividends, interest, and rent (DIR) and personal current transfers (PCT)[3] are two measures of non-earned income typically correlated with retirees. The growth in per-capita DIR in Carbon and Sweetwater Counties between 1990 and 2005 substantially exceeded the rural western county average and the growth in PCT generally paralleled the rural average during that period. The latter is noteworthy given the high labor force participation in Sweetwater County and the large non-working population in Carbon County associated with the Wyoming State Penitentiary, suggesting that energy development did not prompt any relatively disproportionate out-migration of retirees or deter in-migration of new retirees.
- Anecdotal information and census data suggest that absent energy development, relatively few retirees would choose to relocate to the study area parts of Carbon and Sweetwater County from outside these counties. Some retirees move from smaller communities and ranches within these counties to Rawlins, Rock Springs, or Green River, and some retirees have accompanied family members relocating for employment purposes, but most of the growth in the retirement sector in these communities appears to be associated with the aging of the resident workforce (Ducker 2007, Archer 2007).

These trends suggest little or no adverse effects of energy development with respect to influencing retirement income or migration within the study area when compared to all rural counties.

Non-Location-Dependent Businesses

- Carbon County has experienced more rapid growth in the number of non-farm proprietors and such proprietors account for a larger share of employment when compared to the peer group of all rural counties. Because of the presence of large trona and coal mines, soda-ash and fertilizer manufacturing plants, and large electric-power generating plants, Sweetwater County has had relatively fewer proprietors and has seen lower growth in the number of non-farm proprietors, a substantially lower share of employment accounted for by such proprietors. Also, the recent location of large oil and gas service companies in Rock Springs would contribute to the latter.
- Average annual income for non-farm proprietors in Carbon County, historically lower than the peer group, is now on par. However, the average income for non-farm proprietors in Sweetwater County is more than twice the average for all rural counties, and even higher than the averages for the urban

[1] There are 249 counties in the six states. Of these, 198 were considered rural for the analysis; 43 were excluded as urban counties and eight were excluded as winter-resort communities that are fundamentally atypical from other counties in the region.

[2] This analysis has not been revised since the original STR.

[3] Personal current transfers (PCT) include unemployment, income maintenance, and retirement receipts.

and resort counties. The differences may indicate a higher tendency for part-time proprietors in rural areas as compared to Sweetwater County, or differences in the industries and activities in which non-farm proprietors are active in Sweetwater County.

While the non-farm proprietor data reveal differences between Carbon and Sweetwater counties as compared to the peer group, they are inconclusive with respect to whether or not energy development stimulates or adversely affects the recruitment or operations of location-independent non-farm proprietors.

Influence of Environmental Amenities

The project area is located some distance from the major population centers in both counties and has been the site of ongoing oil and gas development for over 40 years. Much of the project area has been affected by development, adversely affecting some outdoor amenities including wildlife and wildlife habitat, scenic vistas, and areas that provide opportunities for solitude.

Although no major regional scenic and recreation attractions are located within the project area, scoping comments indicate that several features in and near the project area are important to some residents and non-residents alike, including a Sage-Grouse lek complex southeast of Creston, a small portion of the Red Lake Dunes Citizens' Proposed Wilderness located in the northwestern part of the project area, and the Chain Lakes WHMA located in the northeast portion of the project area The importance of these and other environmental amenities located in and adjacent to the project area for attraction of retirees and non-location-dependent businesses to communities in the study area is not known. However, given the number of more widely known scenic and recreation attractions within the region, the distance to major communities, and the historic level of gas development activity and disturbance, the importance is likely low. It is not known if existing development within the project area adds to the existing cumulative effects on environmental amenities within the region and to the way the region is viewed by potentially relocating retirees and non-location-dependent businesses.

3.15.2 Population and Demographics

Figure 3.15-5 displays population statistics for Carbon and Sweetwater counties between 1970 and 2010. These statistics show the population effects of the mining and energy expansion, which began in the early 1970s, peaked in the early 1980s in both counties, and then began to decline. Carbon County population increased 69 percent between 1970 and 1982 and Sweetwater County population increased 149 percent during that period. Sweetwater County experienced a brief resurgence of the boom in the mid-1980s during construction of the Exxon La Barge gas-sweetening plant, expansion of the Jim Bridger power plant, construction of the Chevron Phosphate plant east of Rock Springs, and expansion of Western Wyoming College.

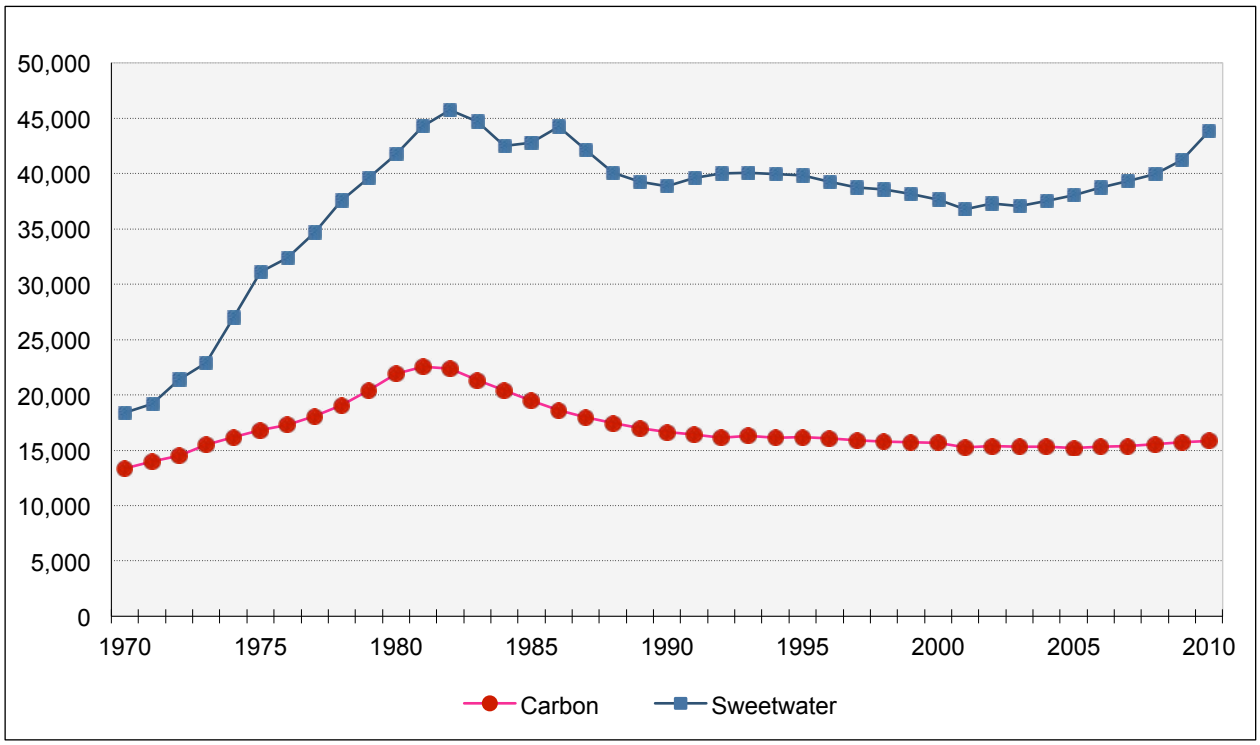


Figure 3.15-5. Population, Carbon and Sweetwater Counties: 1970–2010

Compiled from Wyoming Department of Administration and Information, Economic Analysis Division and U.S. Census Bureau reports. 1970, 1980, 1990, 2000 and 2010 populations are Census data.

Sources: U.S. Census Bureau, 2010 and 2011; WEAD 2009.

Sweetwater County's population climbed moderately in the 1990s in conjunction with a number of construction projects and ongoing maintenance of mining and energy facilities. The county's recent natural gas-related growth surge began in 2004, though population in 2010 was still about 4 percent below the 1982 peak, according to 2010 Census counts. Carbon County continued its downward trend for much of the 1990s, and has fluctuated between 15,000 and 16,000 over the past decade.

Table 3.15-2 displays recent population estimates for selected communities in Carbon and Sweetwater counties. As shown, most of the communities within the study area experienced substantial growth during the past decade. Although Rawlins grew by 9 percent between 2005 and 2010, the net gain over the last decade was 3 percent as a result of population loss earlier in the decade.

Table 3.15-2. Population of selected Carbon and Sweetwater County communities: 2000–2010

	2000		2005	2006	2007	2008	2009	2010	Change 2000-2010	% Chg
CARBON COUNTY										
Rawlins	8,969		8,503	8,534	8,651	8,723	8,791	9,259	290	3%
Sinclair	421		399	399	403	404	406	433	12	3%
Baggs	348		347	363	388	403	423	440	92	26%
Dixon	79		79	79	81	81	82	97	18	23%
Saratoga	1,726		1,683	1,700	1,737	1,759	1,777	1,690	-36	-2%
Balance of County	4,096		4,040	4,090	4,137	4,194	4,241	3,936	-160	-4%
County total	**15,639**		**15,051**	**15,165**	**15,397**	**15,564**	**15,720**	**15,855**	**216**	**1%**
SWEETWATER COUNTY										
Rock Springs	18,589		18,474	18,956	19,629	20,160	20,905	23,036	4,447	24%
Green River	11,806		11,528	11,702	12,047	12,115	12,411	12,515	709	6%
Wamsutter	260		261	262	270	272	310	451	191	73%
Bairoil	97		95	95	97	96	98	106	9	9%
Superior	243		235	235	240	237	242	336	93	38%
Balance of County	6,618		6,738	6,767	7,037	7,062	7,260	7,362	744	11%
County total	**37,613**		**37,331**	**38,017**	**39,320**	**39,942**	**41,226**	**43,806**	**6,193**	**16%**

Sources: U.S. Census Bureau, 2010 and 2011.

Sweetwater and Carbon County officials believe that U.S. Census population estimates do not fully reflect the population growth during the energy expansion years. SWEDA developed population estimates for the county and its incorporated municipalities, based on residential electric accounts and an average persons-per-household estimate (2.58) obtained from the Wyoming Division of Economic Analysis. The SWEDA Sweetwater County population estimate of 48,000 for 2007 was over 20 percent higher than the 2007 Census estimate and the population estimate was 128 percent higher for Wamsutter (SWEDA 2007). Although they did not prepare their own estimates, Rawlins and Baggs officials also believed that the U.S. Census Bureau estimates during the 2006–2008 period substantially underestimated population in their communities, based on increases in utility hook-ups and building permits (Derragon 2008, Corners 2007).

Not shown in **Table 3.15-2**, the components of population-change statistics show a net out-migration of approximately 400 residents from Carbon County between 2000 and 2009, with a net in-migration of approximately 300 residents to Sweetwater County during the same period (U.S. Census Bureau 2010). These statistics may not fully capture the many temporary workers in both counties that accompanied the surge in natural gas development.

Based on the 2010 Census, residents of Carbon County tended to be somewhat older than those in Sweetwater County, but were similar in age to the population of the State of Wyoming and the United States overall. In Carbon County, nearly one of eight residents was 65 years or older, as compared to about one in 12 in Sweetwater County. The median age has stayed about the same in the last ten years in Carbon County (38.9 years), while the median age in Sweetwater County has dropped from 34.2 to 32.8 (U.S. Census Bureau 2011).

The largest shares of population in both counties are working age adults aged 18 to 64 years. In Carbon County, the number of persons aged 18 to 64 increased just slightly between 2000 and 2010, accounting for 63.5 percent of all residents in 2010. In Sweetwater County, the number of persons aged 18 to 64 increased by more than 4,500 individuals (19.2 percent) from 2000 to 2010. The number of young

persons under age 17 and the number of persons 65 years and older in Sweetwater County also increased. Increases in the number of working-age persons in these counties can be correlated to recent increases in jobs, particularly in the mining sector, which attracts a high portion of working adults. Also consistent with this pattern is the number of natural gas-related jobs attracting younger male workers who are unmarried or married but not accompanied by school-age children. In addition, the number of mining-sector jobs has increased noticeably in Sweetwater compared to Carbon County, which is also reflected in the major increase in working-age adults in Sweetwater County as compared to Carbon County.

The racial and ethnic compositions of the local populations reflect the influences of historical settlement patterns and economic factors, including substantial labor migration in response to the relative abundance of economic opportunity. According to the 2010 Census, Carbon County's resident population was 79.8 percent white and not Hispanic or Latino, with 20.2 percent of the population being made up of persons of other races, multiple races, and/or of Hispanic or Latino ethnicity. The minority population in Carbon County increased from 17.6 percent in 2000 to 20.2 percent in 2010. Sweetwater County has a slightly larger share of the population that is white and not Hispanic or Latino, with 80.9 percent of the population as non-Hispanic white and 19.1 percent of the population being made up of persons of other races, multiple races, and/or Hispanic or Latino ethnicity. Though the percentage share of racial and ethnic minorities in these two counties is higher than for the State of Wyoming as a whole, it is much lower than that for the United States. The minority population in Sweetwater County has increased from 13.1 percent in 2000 to 19.1 percent in 2010. The largest racial and ethnic minority group in both counties is Hispanic and Latino, making up 16.8 percent of the Carbon County population and 15.3 percent of the Sweetwater County population.

The Economic Analysis Division of the Wyoming Department of Administration and Information—Economic Analysis Division (WEAD) prepares population forecasts for Wyoming and its counties and municipalities. The forecasts available at the time of this assessment, which pre-date the availability of 2010 Census results, anticipated Carbon County's population increasing by about 5 percent over the next ten years, from 16,350 in 2011 to 17,230 in 2020 and then decreasing slightly to 17,140 by 2025. The forecasts show Sweetwater County population trending upward, increasing from 42,420 in 2011 to 47,220 in 2025—an increase of 11 percent during the 15-year period (WEAD 2008).

3.15.3 Housing

This section provides information about conventional and temporary housing resources in the study area. A shortage of housing during the boom period, particularly affordable housing, is a key issue routinely cited by the local officials, service administrators, and local residents interviewed for this assessment.

Table 3.15-3 displays housing information from the 2010 census.

Table 3.15-3. 2010 Census housing status by county and community

	CARBON COUNTY			SWEETWATER COUNTY			
	Total	Rawlins	Baggs	Total	Rock Springs	Green River	Wamsutter
TOTAL HOUSING UNITS							
2000	8,307	3,860	197	15,921	8,359	4,426	148
2010	8,576	3,960	223	18,735	10,070	5,002	286
Change (%)	3.0%	3.0%	13.0%	18.0%	20.0%	13.0%	93.0%
OCCUPANCY DATA, 2010							
Total Occupied Units	6,388	3,443	183	16,475	8,762	4,642	189
Home-owner Occupied Units	4,552	2,346	122	11,872	5,952	3,454	98
Renter-Occupied Units	1,836	1,097	61	4,603	2,810	1,188	91
Total Vacant Units	2,188	517	40	2,260	1,308	360	97
Home-owner Vacancy Rate	3.4%	3.0%	2.4%	2.8%	3.2%	2.5%	3.8%
Rental Vacancy Rate	16.5%	16.6%	17.1%	16.8%	19.1%	11.0%	17.1%
Vacant for Seasonal Use	1,070	36	6	295	79	35	31

Source: U.S. Census Bureau, Census 2000; US Census Bureau, 2010.

3.15.3.1 Carbon County

According to 2010 Census housing counts, total Carbon County housing units increased from 8,307 units to 8,576 units, or about 3 percent over the decade. The number of total housing units increased between 2000 and 2010 in every community in the study area except Dixon, which lost three units.

Carbon County's housing stock expanded dramatically in the late 1970s and early 1980s in conjunction with the previous economic expansion. Given the subsequent contraction, few permits for new residential construction were issued until a brief surge in residential permits occurred in the mid to late 1990s. Strong housing demand associated with the more recent local economic expansion prompted considerable new residential construction over the past decade, particularly between 2004 and 2008. According to the Wyoming Housing Database Partnership (WHDP), Carbon County issued 334 residential building permits during the five years 2004 through 2008. Building permit applications fell sharply in Carbon County during 2009 to 24 units, just 36 percent of the annual average for the previous five years, and to 18 in 2010 (WHDP 2011 and U.S. Census Bureau 2011). It is likely that the recession resulted in the cancellation of construction of some units that had been planned and for which building permits had been issued.

In recent years several large, temporary living facilities were built for workers near the gas fields in Carbon County. Two temporary living facilities were developed along WY 789 north of Dad and a third camp was proposed. Currently only one temporary living facility is operating in the area. The permitted capacity of the facility has been reduced to accommodate a total of 86 individuals (Carbon County Planning and Development 2012).

City of Rawlins

The 2010 Census tallied 3,960 total housing units in Rawlins in 2010, a 3 percent increase over the housing inventory in 2000. The net change understates the amount of traditional housing development that occurred in the city because it reflects both demolitions (Mika 2007) and decreases in the number of mobile homes during the past decade. Of the 2010 total of 3,443 occupied units, about 59 percent were owner-occupied and the remaining 41 percent were renter-occupied.

Information about housing conditions in Rawlins during the recent natural gas expansion was obtained from the 2007 Rawlins Housing Assessment (Kirkham & Associates LLC 2007). The housing assessment was intended to assist city officials, community leaders, and developers in planning for infrastructure and housing development in response to the growth that was occurring and anticipated at that time.

Between 2001 and 2007, 106 single-family residential building permits and no multi-family permits were issued in Rawlins. Rawlins has 11 apartment complexes with a total of 439 units. The newest of these is an 85-unit complex built in 1997. The 2007 Housing Assessment estimated that the city needed 170 additional multi-family units, of which 100 should be rent-assisted.

At the time of the 2007 housing study, Rawlins had 19 mobile-home parks. In recent years, three mobile-home parks with a total of 146 pads were converted to lot ownership where the mobile-home owner also owns the lot. The 2007 Housing Assessment projected demand for three new mobile-home parks in Rawlins by 2010. During 2010 Rawlins had 16 mobile home parks with 639 pads (MHPS 2010).

Housing availability in Rawlins has been volatile in recent years. The 2007 Housing Assessment estimated rental housing vacancies at less than 1 percent in December 2006. According to that assessment, there were virtually no apartment vacancies in mid 2007 and most complexes had waiting lists. Rental housing and apartment vacancies increased during 2008 and early 2009 due in part to the reduction in the construction work force at the Sinclair refinery (Mika 2009). The WHDP estimated overall vacancy rates at 16 percent during the second half of 2009 (WHDP 2010).

According to the Carbon County Visitors Council (CCVC) Rawlins has 23 motels with a total of over 1,252 rooms (CCVC 2010). Some motels offer weekly or monthly rates and typically host energy industry and construction workers. Rawlins also has three RV parks with a total of 303 pads, although one RV park is not winterized (Stolns 2010). The CCVC conducted an informal telephone survey of motels and RV parks during August 2010. The CCVC reported that the newer, nationally affiliated motels in Rawlins averaged 95 to 98 percent occupancy, while the older and smaller motels, which were more likely to accommodate construction and gas-field workers on a weekly or monthly basis, averaged 75 to 80 percent occupancy. Local RV parks averaged 80 to 85 percent occupancy (CCVC 2010).

Baggs

Total housing units in Baggs grew from 197 to 233 units between 2000 and 2010, an increase of 13 percent. During that period, Baggs approved a 16-lot subdivision and a 6-lot subdivision. Most housing in the Baggs area is manufactured housing and mobile homes (Corners 2007). There is little available rental housing and rents have increased substantially in recent years.

In the Baggs area, temporary housing resources include two motels with a total of 64 rooms and a 26-space mobile home park equipped to accommodate RVs and mobile homes. Within the park there are several mobile homes for rent, but these are rarely vacant. There are also two RV parks on WY 789 north of town (CCVC 2010).

Saratoga and the Upper North Platte Valley

There are a total of 344 rooms in hotels, motels, bed and breakfast establishments, and rustic cabins in the Upper North Platte Valley. Saratoga has a total of 174 rooms, 122 rooms of which are in the town's three largest motels. There is one 30-space private RV park in Saratoga that typically hosts longer-term recreation visitors and has also hosted some energy and construction workers working in the town, in Sinclair, and elsewhere in the surrounding region. The town operates a 25-space campground at Saratoga Lake, but it typically caters to tourists, as does a 33-space campground in Riverside.

Competition for motel rooms and RV spaces from recreation visitors is strong during summer months (Crimmins 2008). The August 2010 CCVC survey found that motels in Saratoga averaged 75 to 80 percent occupancy and the RV parks averaged 95 to 100 percent occupancy (CCVC 2010). Saratoga has two mobile home parks with 102 pads, 40 of which were vacant in August of 2010.

3.15.3.2 Sweetwater County

According to the 2010 Census, total housing units in Sweetwater County increased from 15,921 to 18,735, an 18 percent increase over the preceding decade. Much of that growth occurred between 2004 and 2008, when Sweetwater County issued 2,150 building permits (WEAD 2011). Sweetwater County issued a total of 2,651 building permits from 2001 to 2010. Of those, 70 percent were issued during the 2003 to 2008 period. Building permits fell from the 2008 level of 321 to 160 in 2009, but have increased to 213 in 2010. (Kot 2011).

As with Carbon County, the effects of the natural gas-related economic expansion and contraction are evident in the housing statistics. The WHDP estimated rental housing vacancy rates below 1 percent in Sweetwater County in December 2006. The tight housing market was reflected in rising rents; the average apartment-rental rate rising from $512 in the second quarter of 2005 to $684 in the second quarter of 2006, an increase of almost 34 percent in one year. Average rental rates of detached single-family homes increased approximately 21 percent during the same period while the average monthly rent for mobile homes increased almost 13 percent and the average monthly rent for a mobile home lot rose by 11 percent. As elsewhere in southwestern Wyoming, the shortage and high cost of rental housing was a constraining factor on employee relocation and on the ability of people on low or fixed incomes to acquire and retain rental housing.

During 2009 and 2010, rental vacancy rates in Sweetwater County rose to between 5 and 7 percent. Average monthly apartment rental costs fell from the second quarter 2009 high of $779 to $691 per month in the second quarter of 2010, a decrease of 11 percent. Monthly rates for rental housing fell by almost 18 percent between fourth quarter 2008 and fourth quarter 2010 (WHDP 2010).

During the height of the boom, ESS Support Services, under contract to BP, developed a 250-bed temporary living facility with food service, housekeeping, and recreation facilities just north of Wamsutter. The Wamsutter Base Camp was open to both BP employees and gas-field contractors. The facility was permitted for 500 beds, providing flexibility to expand as demand emerged (Van Rensburg 2007). As yet another reflection of the curtailment in development activity during the recession, that facility has now been closed and removed from the site.

City of Rock Springs

Rock Springs has seen dramatic changes in housing conditions in recent years, driven primarily by the increase in demand associated with natural gas development. The 2010 Census counted 10,070 housing units in Rock Springs, 20 percent more than the 2000 Census count of 8,359 units.

The City of Rock Springs issued a Final Housing Plan (Housing Plan) in September 2007 to inform the community about anticipated housing needs and potential housing development opportunities in the city (City of Rock Springs Housing and Community Development 2007). The Housing Plan identified 1,560 acres of land used for residential purposes and 8,899 housing units located within the city during January of 2007. **Table 3.15-4** displays the distribution of housing, by unit type, within the city at that time. Single-family units were the predominant form of housing with 60 percent of all housing being single-family detached units.

Table 3.15-4. Rock Springs total housing units by housing type: January 2007

Housing Unit Type	# Housing Units	Percent of Total
Detached single-family	5,319	60
Attached single-family	886	10
Mobile homes	1,447	16
Apartments	1,247	14
Total	8,899	100

Source: City of Rock Springs Housing and Community Development 2007.

The number of housing units in Rock Springs grew by about 8 percent, or 685 units, between 2004 and January 2007 according to the Housing Plan. This generally coincides with the period of intensified natural gas development in the region.

The City approved 33 new subdivisions between January 2004 and May of 2007. Of those, 25 subdivisions were for residential development with the potential to create over 2,000 residential lots. A January 2007 inventory conducted for the Housing Plan identified 705 vacant residential lots, but noted that not all of these lots were available for sale and development.

Residential development in Rock Springs continued during 2008 through early 2011, despite the economic slowdown. A total of 1,235 residential occupancy permits were issued by the city between January 2007 and April 15, 2011. Of the total occupancy permits issued, 40 percent were for single-family homes, 36 percent for apartments and 19 percent for duplexes. Rock Springs approved 14 residential subdivisions with a combined capacity for 399 units between January 2007 and April 15, 2011 and the Planning Department estimates that that there were 134 vacant residential lots within city limits as of April 15, 2011 (McCarron 2011).

The average price of an improved residential property (a lot with a house) in Rock Springs during 2006 was $175,500, about 28 percent higher than the 2004 average of $137,500. The average price for unimproved residential property (a vacant building lot) increased from $48,958 in 2004 to $160,989 in 2006, or 229 percent. According to the Housing Plan, these increases can largely be attributed to a shortage in available housing inventory and strong housing demand from an incoming workforce. In 2010, the average sales price for residential properties was $174,257, virtually the same as 2006 (SWEDA 2011).

Although not establishing an affordable housing threshold, the Housing Plan suggested that given the relatively high per-capita personal incomes in Rock Springs ($38,039 in 2005), many local workers in Rock Springs could have afforded an average-priced home, if it were available.[1] In addition, given the relatively large number of two-income households (43 percent in 2000), many households with members earning below-average incomes could have also afforded the average-priced home, if it were available.

The Housing Plan forecasted future demand for housing units for purchase based on the plan's population projections for the 2007–2017 period, the 2000 average household size of 2.48 persons per household, and various assumptions concerning housing preferences. The Housing Plan forecasted demand for 1,539 new housing sales units and 1,100 new rental units by 2017. The Housing Plan also forecasted increased demand for senior housing, housing for persons with disabilities, and low-income households. This demand was based on a Rock Springs population forecast of 27,113 persons by 2017, contrasted with the WEAD forecast of 21,474 persons by 2017 (Rocks Springs' 2010 population was 23,036 according to the 2010 Census).

[1] Housing affordability and the ability to qualify for home mortgages are subject to other criteria in addition to earnings.

Rock Springs has a total of 1,638 motel rooms (Sweetwater County Joint Travel and Tourism Board 2009).

Green River

The U.S. Census Bureau counted 5,002 housing units in Green River in 2010, 13 percent more than the 2000 census count of 4,426 units. A total of 159 of the total housing units were constructed between 2000 and May of 2007. As of June 2011, there were only 39 available residential lots within Green River. However, two subdivisions with a total of 224 units were nearing final approval at that time (Brown 2011).

Green River has a total of 256 motel rooms (Sweetwater County Joint Travel and Tourism Board 2009).

Wamsutter

According to the 2010 census, the housing inventory in Wamsutter has nearly doubled over the past decade, growing from 148 units in 2000 to 286 units in 2010, an increase of 93 percent. Wamsutter had no available rental units during the summer of 2007 and very few vacancies during the summer of 2010. Temporary housing resources in Wamsutter include seven mobile home/RV parks with a total of 160 spaces. Some drilling and gas-service contractors have put dormitory units in these mobile home parks. There are two motels in Wamsutter, one with 24 units, the other with 4 units, with a new 120-unit motel in the planning stages (Colson 2010).

3.15.4 Community Infrastructure and Services

This section describes community infrastructure and services likely to be directly affected by the Proposed Action and Alternatives. The following inventory identifies key public facilities and services including law enforcement, emergency response (fire suppression and ambulance), hospitals, solid-waste disposal, and water and wastewater systems (schools are addressed in a following section). These are the services and facilities that have been and would be most immediately affected by energy development in the project area and elsewhere in the study area. However, all county and municipal services are affected by the demands associated with population growth.

The experiences of the past decade illustrate both the benefits and the challenges that oil and gas development present for local government service delivery, particularly when that development is regional in nature. Although oil and gas development has been ongoing in southwestern Wyoming for decades, the advances in drilling in and producing from tight sands and other unconventional formations led to a surge in development throughout southwestern Wyoming as well as nearby regions of Wyoming, Colorado, and Utah during the early to middle years of the last decade.

Because oil and gas development typically involves multiple companies operating in multiple fields across a region, growth in development activity, employment and, consequently, community population and service demand occurs in a decentralized manner. Communities are uncertain regarding the magnitude of growth and service demand that they may be facing, which hampers planning efforts. And although large-scale oil and gas development generates substantial increases in state and local government revenues, much of that revenue does not accrue until after the growth and increase in service demand has been ongoing for some time, and in the case of Wyoming, key revenue sources such as ad valorem taxes on production are not available to municipalities, where much of the service demand occurs. These factors, coupled with the previously described housing shortages and competition for labor, contributed to challenging times for most of the local governments within the CD-C study area during the energy expansion period of the last decade.

Then, when the sub-prime mortgage crisis, the ensuing global recession and other factors resulted in falling natural gas prices in the latter part of the decade, industry activity and employment experienced a corresponding decrease. Although a reduction in transient workers provided a respite from growth and

service demand, the corresponding drop in natural gas-related revenues presented a fiscal hardship for communities that had added staff and begun infrastructure improvements to accommodate the growth.

Once oil and gas development reaches an equilibrium of relatively constant drilling and field development activities and once development is completed and fields are producing, host counties and nearby communities typically can prosper and use the incremental revenues to improve infrastructure and services and accommodate the relatively stable population. However, the beginning and end of development cycles and the surges and declines resulting from decreases in commodity prices and demand are particularly challenging for affected local governments.

3.15.4.1 Law Enforcement

Law enforcement services are affected by natural gas development and production activities in the project area in terms of demand for law enforcement agency response to accidents and law enforcement incidents within and on highways providing access to the project area, as well as in terms of demand for services from the workforce and population generated by drilling, field-development, and production activities. Affected law enforcement agencies include the Wyoming Highway Patrol (WHP); Carbon and Sweetwater County Sheriff's Departments; and the Rawlins, Baggs, Saratoga, Rock Springs, and Green River Police Departments.[1] The WGFD also provides enforcement of game and fish laws and regulations.

During the boom years, energy development-related effects on local law enforcement agencies included difficulty in recruiting and retaining officers, due in some cases to the higher wages paid by the energy industries and by larger law enforcement agencies, and due in part to the difficulty in finding affordable housing. The time and cost to train and equip an inexperienced officer affected law enforcement agency budgets, particularly when officer turnover was high. Most law enforcement agencies reported substantially increased levels of certain types of offenses associated with the large, temporary, and transient component of the drilling and field-development workforce, which included a high percentage of single-status working-age males. Increases in traffic offenses, alcohol-related offenses and minor assaults were typical. All local agencies report substantial increases in drug-related offenses, particularly methamphetamine (Carnes 2007, Claman 2011, Colson 2009, Corners 2007, Jackson 2007, Lowell 2007, Morris 2010, Reed 2007, Steffen 2007).

The Carbon and Sweetwater County Sheriff's Departments experienced increases in calls for service related to industrial accidents, vehicle accidents, crime, and traffic infractions in remote parts of their respective counties resulting from the intensification of drilling and field-development activities in previously isolated and seldom-visited areas (Claman 2007 and 2011, Colson 2007 and 2010).

Criminal detention facilities in the two counties are operated by the respective Sheriff's Departments. The Sweetwater County Detention Facility has a design capacity of 208 inmates and was designed to allow expansion on the same site while maximizing use of administrative facilities. In 2007, occupancy averaged about 110 inmates and recent (summer 2011) occupancy was slightly higher (110 to 120), in part because the detention facility has been housing inmates from other counties. The Carbon County Detention Facility, which opened in 2004, has a design capacity of 78 beds. During the summer of 2009 the facility's design capacity was exceeded a number of times. Consequently the detention facility appears to have reached its capacity sooner than the 10–15 years anticipated when it was constructed.

Law enforcement and emergency-response dispatch services within the project area are provided by the Carbon and Sweetwater County Sheriff's Departments. The Sweetwater County 911 service is administered by the Sweetwater County Emergency Management Agency, a division of the Sheriff's Department. The Rawlins, Rock Springs, and Green River police departments also provide dispatch

[1] Law enforcement services in Wamsutter are currently provided by the Sweetwater County Sheriff's Department.

services (Carnes 2007, Claman 2011, Colson 2009, Corners 2007, Jackson 2007, Lowell 2007, Morris 2010, Reed 2007, Steffen 2007).

WHP divisions are located in both Rawlins and Rock Springs. Enforcing Wyoming traffic laws and providing law enforcement on the state's highways are among the primary functions of the WHP. As noted in **Section 3.16 Transportation**, traffic and WHP traffic management and enforcement duties increase substantially during periods of intensive oil and gas development.

WGFD game wardens responsible for the CD-C project area are located in Rawlins, Baggs, and Rock Springs. Habitat alteration and poaching are key concerns of the WGFD associated with oil and gas development in the CD-C project area. The development of new roads allows vehicular access to remote areas and the increased human presence provides increased opportunities for vehicle/wildlife accidents and poaching.

3.15.4.2 Emergency Management and Response

Emergency management and response is coordinated in Carbon County by the Carbon County Emergency Management Agency and in Sweetwater County by the Sweetwater County Emergency Management Agency. Both of these agencies coordinate emergency management and response in their respective portions of the project area and have recently established cooperative emergency-response staging locations within the project area, which allows employees working in remote areas to meet emergency responders at predetermined areas to guide them to remote accident locations.

Fire-suppression and emergency-response services in the Carbon County part of the project area are provided by the Carbon County Fire Department (Rawlins and Baggs divisions) assisted as necessary by the Rawlins Fire Department. The Saratoga Volunteer Fire Department is also a division of the Carbon County Fire Department. Fire suppression services in the Sweetwater County part of the project area are provided by the Sweetwater County Fire Department, aided by the Wamsutter Volunteer Fire Department. Rawlins, Rock Springs and Green River also operate fire departments for their communities and surrounding areas.

Ambulance service in the northern and western part of Carbon County including a portion of the project area is provided by Memorial Hospital of Carbon County (MHCC). In the southwestern part of the county, ambulance services are provided by the Little Snake River Rural Health District, which is located in Baggs. South Central Emergency Medical Services (SCEMS) provides ambulance services in eastern Carbon County. The Saratoga Ambulance, which is affiliated with SCEMS, provides emergency medical care and transport for patients throughout the Upper North Platte Valley from the Colorado state line to I-80 in south central Carbon County. The Wamsutter Volunteer Ambulance Service responds to calls along I-80 and to calls within much of the central portion of the project area. Vase Emergency Medical Services provides ambulance services in Rock Springs and along I-80. Castle Rock Ambulance Service provides ambulance services in Green River (Carnes 2007, Carter 2007, Hannum 2007, Jones 2007, Kennedy 2007, Sarff 2007, Valentine 2007, Zabel 2007, Zeiger 2010).

The Rawlins Interagency Dispatch Center provides a central location for reporting all wildland fires in southern Wyoming. Additionally, the BLM RFO and RSFO maintain trained and equipped fire crews that respond to wildland fires on BLM surface and if needed will support other agencies on other federal, state, and private lands.

3.15.4.3 Hospitals and Health Care

Hospital and emergency-room services in the study area are provided by MHCC and Memorial Hospital of Sweetwater County (MHSC). The Saratoga Platte Valley Medical Clinic also operates a community trauma center. MHCC is a 25-bed acute-care facility located in Rawlins and designated as a Community Trauma Hospital by the State of Wyoming. A Community Trauma Hospital must have a surgeon on staff. MHCC's emergency room is staffed 24 hours per day, seven days per week with an emergency-care

physician, a registered nurse and emergency medical technicians. Currently the hospital has staffing and facility capacity to serve substantially more patients than are currently treated. During the summer of 2010, MHCC had eight active medical staff physicians, over 35 courtesy (visiting) physicians and five *locum tenens* physicians who are hired on a temporary, short-term basis to fill in when active medical staff are on leave (Jessop 2010).

MHSC is a non-profit, 99-bed, rural acute-care facility located in Rock Springs. As of 2010, MHSC had a total staff of 363 and 112 physicians, including *locum tenens* and consulting physicians (MHSC 2011). During the peak of the recent gas expansion in southwestern Wyoming, MHSC reported an average 20 percent occupancy rate during 2008 (Wyoming Healthcare Commission 2008). During that period MHSC experienced an increased use of hospital emergency rooms for non-emergency care and increased uncollected debt attributed to the large number of workers who did not have health insurance and an increase in charity-care cases. The increase in emergency-room visits was largely attributed to non-local workers who did not have primary-care physicians in the area (Hawk 2007).

There are medical clinics in Rawlins, Baggs, and Saratoga, and a number of clinics in the Rock Springs/Green River area. Carbon County had 13 licensed practicing physicians during 2007 (the most recent year for which physician data were published) or 0.85 physicians per thousand population, substantially below the Wyoming and national averages of 1.94 and 2.81 per thousand, respectively. Sweetwater County had 39 physicians, or 1.01 per thousand, also below the Wyoming and national averages (Wyoming Healthcare Commission 2008). A lack of affordable housing in the community during the height of the natural gas boom added to the difficulty of recruiting physicians and staff. (Carter 2007, Hawk 2007, Jones 2007).

3.15.4.4 Solid Waste Management

In 2006 the Wyoming legislature passed a law requiring all operating landfills to prepare Integrated Solid Waste Management (ISWM) plans to be submitted to the WDEQ by July 1, 2009. All entities in communities affected by the Proposed Action and Alternatives participated in the ISWM planning process. Three special districts—Baggs Solid Waste and Sweetwater County Solid Waste Disposal Districts (SCSWDD) # 1 and #2—are funded in part by mill levies on property within each district.

Rawlins operates its own landfill, which has a remaining life of several years at the current fill rates. The City is currently seeking to obtain an additional section of land from the BLM to expand the landfill. Rawlins, along with Casper, Douglas, and other east-central Wyoming communities, is a member of the East Central Solid Waste Management Area As of February 2011, Rawlins ceased the disposal of municipal solid waste at the Rawlins landfill and began transporting its solid waste to the Casper Regional Landfill. Construction waste will continue to be accepted at the Rawlins Landfill through year 2016 when a permit extension will be considered. The need for cover material to continue current landfill usage is an ongoing concern for the landfill operation. Disposal fees are designed to cover costs and some construction waste is recycled (City of Rawlins 2011, Stolns 2007 and 2009).

The Baggs Solid Waste Disposal District operates the Baggs landfill, which has considerable capacity at its existing site, but has recently opted to transport baled municipal solid waste and recycled materials to the Casper Regional Landfill. Construction and demolition waste and animal carcasses will still be accepted at the Baggs landfill (Good 2011).

SCSWDD #1 oversees a landfill in Rock Springs, and monitors closed landfills in Reliance, Superior, and Point of Rocks (SCSWDD#1 2007). The district is completing a permit process that will provide the Rock Springs landfill with an estimated 30 years of remaining life at current fill rates and the district owns an adjacent 320 acres, which could provide additional capacity when permitted (Herman 2011, Sugano 2007). SCSWDD #1 is part of the I-80 Solid Waste Management Planning Area along with SCSWDD #2 (Wamsutter/Bairoil), Baggs, Farson, Eden and Green River. The Rock Springs landfill is in the process of becoming a regional landfill. The emerging plan will include the development and operation of transfer stations in some other municipalities and transportation of solid waste to the Rock Springs landfill.

Currently the Sweetwater County communities of Farson and Eden transfer their waste to the Rock Springs landfill.

Green River intends to close its currently operating landfill in approximately four or five years and begin transferring solid waste to the Rock Springs landfill (Herman 2011, Nelson 2007).

SCSWDD #2 serves eastern Sweetwater County from the eastern border of the County to Point of Rocks, including the towns of Bairoil and Wamsutter. District #2's landfill fill rates more than doubled during the boom years and the district's landfill, located just south of Wamsutter, was within several months of its maximum capacity. The district received authorization from DEQ to expand the existing landfill vertically, which provided it five to eight additional years of use at current fill rates. The district has applied for permits to develop a new landfill adjacent to the existing landfill on the remaining 20 acres of the district's 40-acre site, which will give the district an additional 25 years of capacity at current fill rates (Rigano 2007 and 2011, Pilch 2011).

The Saratoga landfill serves the Town of Saratoga and the northern portion of the Upper Platte River Solid Waste Disposal District. The District recently received a permit for a disposal pit expansion for construction waste and plans to begin transferring municipal solid waste to the Casper Regional Landfill in 2015.

Disposal of solid waste from energy development has been of concern to community landfills and solid waste districts in the past. Currently, most solid waste from energy development and operations throughout the I-80 Solid Waste Management Planning Area is transferred to the Rock Springs landfill for disposal. Disposal of waste from drilling reserve pits is a concern for some solid waste districts (Herman 2011).

3.15.4.5 Water Treatment, Storage, and Distribution

Rawlins Water System

The Rawlins water system, which also provides treated water for the town of Sinclair, was developed in the 1970s with a target capacity to serve about 17,000 residents. The system includes an 8-million-gallon-per-day (MGD) treatment plant, which registered a 2006 peak daily usage of 4.45 MGD. Consequently, the water-treatment plant could serve nearly double the current population at current usage rates. The system includes four storage tanks, with a combined capacity of 6 million gallons for the city and a single 0.8-million-gallon tank for Sinclair. There also is a raw-water storage reservoir that feeds the treatment plant. Rawlins has ample water rights in the North Platte River watershed and in springs and wells to serve both current and anticipated future water needs (Stolns 2008).

Baggs Water System

Baggs recently completed a $2 million upgrade to its water treatment plant designed to meet future demand. The system can treat 250 to 300 gpm (up to 0.4 MGD) and is sized for anticipated growth over the next 20 years at historic growth rates of one to two percent. The town obtains water from wells and has 300 ac-ft of water rights in the recently completed High Savery Reservoir; water from the reservoir is transported through the Little Snake River to Baggs. The town cannot begin using that water each year until irrigators call for water from the reservoir (Corners 2008, O'Neill 2007).

Saratoga Water System

Saratoga obtains water from five wells. The water system capacity is 1.5 MGD and total treated water storage is 2 million gallons. Recent peak-day water use was 1.2 million gallons (WWDC [Wyoming Water Development Commission] 2013). The Saratoga water system was designed to accommodate a population of about 3,000. The system currently serves approximately 1,800 people (Bartlett 2014).

Rock Springs Water System

The Green River/Rock Springs/Sweetwater County Joint Powers Water Board supplies water to Rock Springs. The water storage and distribution system could serve a population of about 35,000. Each year the Rock Springs Public Services Department replaces and improves a portion of the water distribution system in the older parts of the city. Water main extensions to neighborhoods on the perimeter of the city are sized to accommodate additional growth (Walker 2007 and 2011).

Green River Water System

Green River obtains treated water from the Green River/Rock Springs/Sweetwater County Joint Powers Water Board treatment plant, located in Green River. Although the system requires certain distribution and treatment improvements, there is capacity to accommodate additional users (Nelson 2007, Michael 2011).

Wamsutter Water System

Wamsutter recently completed a series of improvements to the town's water system; a 400,000-gallon water-storage tank north of town (funded in part by $1,213,000 from capital facilities sales tax revenues), construction of a water main connecting the industrial park to the town's water system (funded by $954,716 from the capital facilities sales tax), and installation of water meters (funded by a $538,000 loan from the Wyoming State Revolving Loan Fund). A new well intended to be Wamsutter's main water source came online in November of 2007; the Town is completing a water-treatment project and has received funding to study the siting of a new water source for the town. The town's water system improvements are designed to accommodate a target population of 1,200 (Colson 2010).

3.15.4.6 Wastewater Collection and Treatment

Rawlins Wastewater System

The wastewater system for Rawlins was designed for a target population of 17,000; recent usage is about half of maximum capacity. The system has three aerated lagoons, two settling lagoons, and two storage lagoons. In order to achieve maximum capacity several lagoons would need to be cleaned and restructured. It is possible that the wastewater treatment system would need to be upgraded to tertiary treatment if substantial growth were to occur. There are currently over 65 miles of wastewater collection lines within the city and recent expansions have extended the collection system to serve additional land along I-80 (Stolns 2007, 2008 and 2010).

Baggs Wastewater System

The Baggs wastewater treatment system includes a four-cell aerated lagoon system and all cells have been in use since 2006. The site includes a location for a fifth cell, but it has not yet been constructed. The system has capacity to treat about 100,000 gallons per day (Corners 2008, O'Neil 2007). Recent wastewater system improvements have included replacement of the pumps at the lagoon, replacement of nearly all of the vitrified clay pipes in the collection system, replacing some damaged PVC wastewater collection mains and up-sizing all mains and installing two additional lift stations (Christopher 2011).

Saratoga Wastewater System

The Town of Saratoga maintains a three-cell aerated lagoon system with treatment capacity of 0.8 MGD for wastewater treatment. The Saratoga wastewater treatment system was designed for a population of 3,000. The system currently serves about 1,800 people (Bartlett 2014).

Rock Springs Wastewater System

The Rock Springs wastewater treatment plant capacity was expanded to 4.2 MGD in 2007. During 2010, the plant processed 2.3 to 2.45 MGD and served a population of about 25,000. The expanded plant has planned treatment capacity for a population of about 50,000 and was designed to accommodate a second plant on the same site, if required (Gaviotos 2007, Conner 2010). Work is currently underway to convert the treatment plant back to an anaerobic system. The Rock Springs Public Services Department replaces and upgrades portions of the wastewater collection system each year in older parts of the city and designs collection system extensions to growth areas of the city to accommodate future growth (Walker 2007 and 2011).

Green River Wastewater System

The Green River wastewater treatment plant has a 1.5-MGD treatment capacity and treated about 1.0 MGD during 2007. Although the plan has capacity to accommodate additional growth, a recent wastewater master-plan study identified a number of areas in the wastewater-collection system requiring improvement to accommodate new growth and more effectively move wastewater to the treatment plant Michael 2011, Nelson 2007).

Wamsutter Wastewater System

Wamsutter recently completed construction of a wastewater-collection main to connect the industrial park and other system improvements to the wastewater system, and conducted a capacity analysis of its wastewater lagoon system to determine short- and long-term needs. The analysis was funded by a $16,500 grant from BP America. The current system is designed to serve a population of about 1,200 and Town staff believes that at peak, the system served about 850. The Town intends to expand and improve the wastewater system to accommodate a population of 2,500. (Carnes 2007, Colson 2010).

3.15.5 Local Government Fiscal Conditions

Natural gas development in the project area would affect certain local, state, and federal government revenues and expenditures. Affected revenues would include ad valorem property tax revenues of Carbon and Sweetwater counties; Carbon County School District (CCSD) #1, Sweetwater County School District (SCSD) #1 and certain special districts; sales and use tax revenues of the State of Wyoming, the two counties, and their municipalities; state severance taxes; and federal mineral royalties (FMR). The two counties and the affected school districts, special districts, and municipalities would also see increases in expenditures to serve development and associated population growth. This section describes existing conditions and trends in the local government jurisdictions that are likely to be affected by the proposed CD-C project.

3.15.5.1 County Fiscal Conditions and Trends

Ad Valorem/Property Tax Trends

Ad valorem taxes, commonly known as property taxes, constitute an important share of the revenue base of Carbon and Sweetwater Counties, and for local school districts. The basis for local property taxes in Wyoming is the assessed valuation of real and personal property, utilities, and mineral production. Driven largely by increases in mineral valuation, the ad valorem tax base has grown substantially over the past decade, despite a sharp drop from 2009 to 2010 (see **Figure 3.15-6**). Sweetwater County total assessed valuation exceeded $2.1 billion in 2010; nearly $900 million lower than in 2009 but still nearly double the $1.1 billion recorded in 2000. Assessed valuation also climbed dramatically in Carbon County over the past decade, from $337 million in 2000 to nearly $800 million in 2010. The net change in Carbon County included jumps of more than $200 million from 2005 to 2006 and from 2008 to 2009, but a sharp decline of more than $450 million from 2009 to 2010.

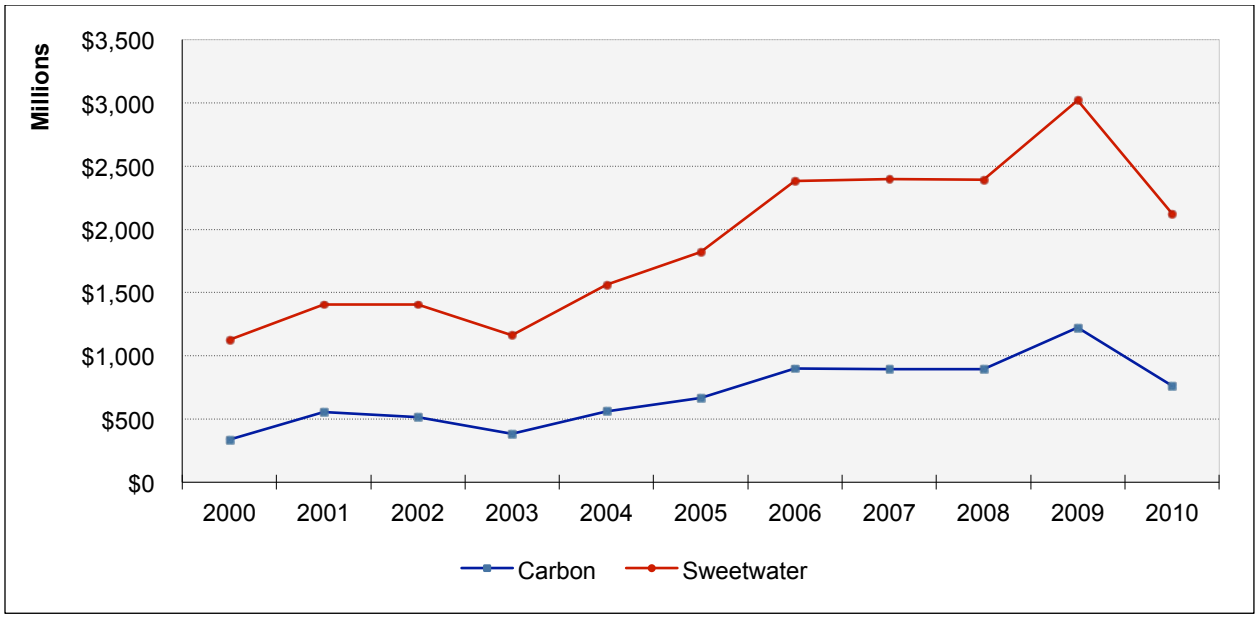


Figure 3.15-6. Total assessed value, Carbon and Sweetwater Counties, 2000–2010

Source: Wyoming Department of Revenue, 2003–2010.

Valuation on oil and gas production has accounted for most of the changes in assessed value, more than quadrupling between 2000 and 2009 in Carbon County and tripling in Sweetwater County. That growth reflected both rising energy prices and increased production. As a result of that growth, the assessed value on minerals currently accounts for approximately 80 percent of the total valuation in both counties. However, as is readily apparent locally, these valuations are subject to substantial year-to-year volatility due to the volatility in global energy prices. Between 2009 and 2010, the assessed value of mineral production in these counties declined by nearly 50 percent in Carbon County and over 40 percent in Sweetwater County.

Sales and Use Tax Conditions and Trends

Another key source of revenue for counties and incorporated communities are sales and use taxes imposed by the state and, when approved by the local electorate, the counties themselves. The state sales and use tax of 4 percent is collected based on the point of sale, a share of which is redistributed back to local governments. The share returned to counties and incorporated municipalities (a statutorily prescribed amount, currently 31 percent of statewide total receipts) is on a population-based formula, irrespective of where the sales were generated. Counties can elect to impose a 1-percent general-purpose local tax and a 1-percent specific-purpose tax for capital improvements. Carbon and Sweetwater Counties currently each impose the general-purpose 1-percent levy and Carbon County imposes the 1-percent special-purpose option tax. The state collects these taxes and distributes the local share based on the above-referenced formula.

Figure 3.15-7 and **Tables 3.15-5** and **3.15-6** summarize the sales, use, and lodging tax distributions by the state to the two counties in recent years. The reported distributions include both the full distribution of local-option taxes and the respective county's proportional share of the state taxes. The tables also show the total amount of sales and use tax receipts collected from each of the counties for activities occurring within their respective boundaries, providing a comprehensive measure of the changes in taxable sales activity over the period.

Figure 3.15-7 displays the general pattern of growth and then decline in recent years in response to the level of natural gas development and related capital investment, for example, in compression and pipeline transmission capacity. Declines of approximately 30 percent occurred in each county between 2009 and

2010; the absolute declines amounting to more than $39 million in Sweetwater County and more than $8 million in Carbon County.

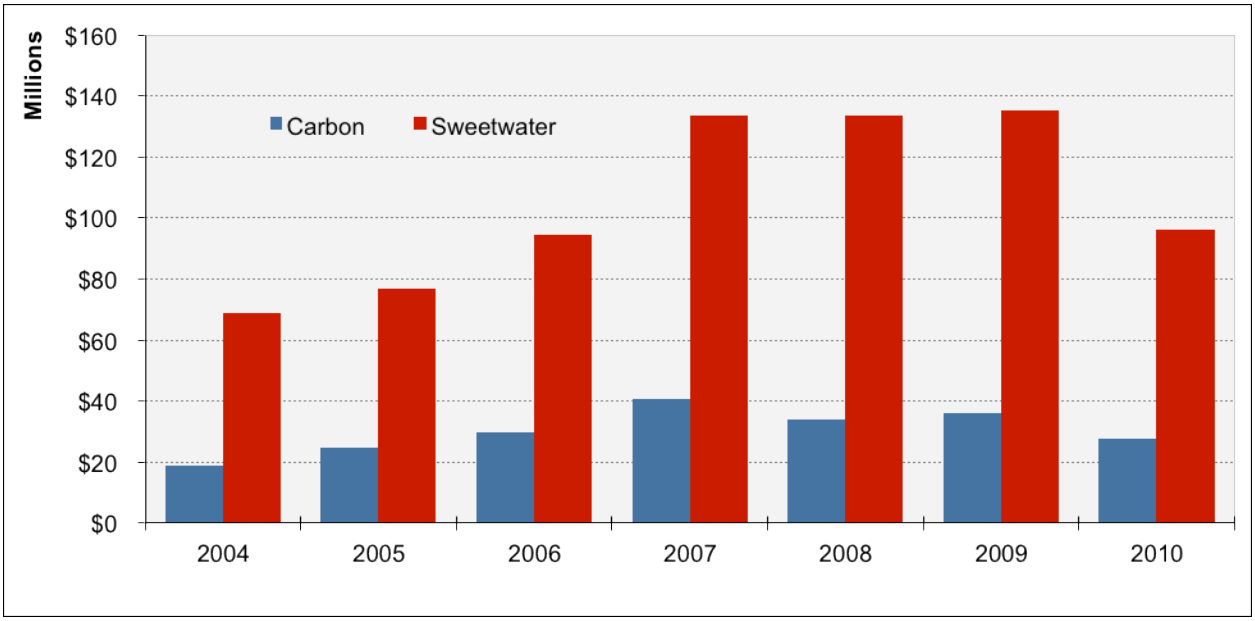


Figure 3.15-7. Annual sales and use tax distributions to Carbon and Sweetwater Counties, FY 2004–2010

Source: Wyoming Department of Revenue, Annual Reports.

As shown above and in **Table 3.15-5**, total sales and use tax revenues distributed to Carbon County, largely reflecting the increase in natural gas development activity, more than doubled from 2004 to 2007, then declined to just over $34 million in 2008 as a 1-percent specific-purpose local-option tax expired. Continuing natural gas development activity, along with construction activities at the Sinclair refinery supported a modest increase in receipts to $36 million in 2009. Completion of the major construction activities at the refinery and the effects of the recession on the statewide and local economies took hold in 2010, resulting in a decline of more than $8 million. The significance of the local-option taxes is readily apparent, generating more than $13.0 million in sales and use tax revenues for Carbon County in 2007. The total local-option tax receipts declined to $9.0 million in 2010.

Table 3.15-5. Annual sales, use, and lodging taxes generated by sales in Carbon County, by levy

Tax Levy	Fiscal Year				
	2006	2007	2008	2009	2010
General-purpose local sales	$4,481,031	$5,466,724	$ 5,625,450	$6,293,772	$3,955,550
General-purpose local use	409,374	1,368,627	1,077,816	717,474	596,977
Specific-purpose local sales	4,450,047	4,879,915	50,200	454,429	3,924,130
Specific-purpose local use	407,808	1,306,446	- 21,491	87,900	598,009
State sales	17,924,890	21,867,275	22,502,258	25,175,135	15,822,251
State use	1,637,544	5,475,415	4,311,431	2,871,311	2,387,907
Lodging	307,846	405,083	472,174	432,060	377,233
Total revenue generated	**$29,618,540**	**$40,769,485**	**$34,017,838**	**$36,032,081**	**$27,662,057**

Sources: Wyoming Department of Revenue, Annual Reports, and WEAD, Wyoming Sales, Use, and Lodging Tax Report, Annual Series 2002–2010.

Sweetwater County sales and use taxes generated by local activity have increased sharply over time. Much of the growth reflects the effects of economic expansion through 2009, although locally levied specific-purpose local-option taxes have generated more than $20 million annually from 2007 to 2009. Sales and use tax revenues declined by $39 million between 2009 and 2010, a 29 percent decline. The high level of sales and use tax attributable to the mining sector in Sweetwater County reflects the trona and coal-mining base within the county as well as oil and gas development (**Table 3.15-6**).

Table 3.15-6. Annual sales, use and lodging tax generated by sales in Sweetwater County, by levy

Tax Levy	FISCAL YEAR				
	2006	2007	2008	2009	2010
General-purpose local sales	$15,520,807	$ 18,621,968	$ 17,756,577	$ 18,886,147	$14,120,339
General-purpose local use	2,813,858	3,571,329	4,385,679	3,561,457	2,915,227
Specific-purpose local sales	1,789,959	18,217,172	17,688,132	18,781,477	8,969,716
Specific-purpose local use	310,554	3,551,219	4,431,882	3,604,861	1,579,204
State sales	62,122,000	74,528,846	71,058,754	75,549,214	56,495,696
State use	11,255,462	14,285,373	17,543,373	14,247,199	11,661,191
Lodging	551,209	691,139	742,203	704,232	516,051
Total revenue generated	**$94,363,849**	**$133,467,046**	**$133,606,600**	**$135,334,587**	**$96,257,424**

Source: Wyoming Department of Revenue, Annual Reports; and Department of Administration and Information, Wyoming Sales, Use, and Lodging Tax Report, Annual Series, 2002–2010.

The mining industry is a major generator of state and local sales and use tax revenues in Carbon County and changes in mining activity, including new oil and gas development, translate into differences in tax receipts. The receipts yield fiscal benefits statewide through various redistribution formulas.

Sales and use tax collections reported by the mining industry for the five years immediately preceding the recent economic recession exceeded $145 million, representing approximately 25 to 30 percent of the total annual revenues generated by the state sales and use tax levies in the two counties during that period (**Table 3.15-7)**. These revenues are derived largely from oil and gas development, and of that total, approximately 51 percent accrued to the state coffers or was distributed to other communities.

Table 3.15-7. Annual sales and use tax collections by the mining industry in Carbon and Sweetwater Counties, 2006–2010

	FISCAL YEAR				
	2006	2007	2008	2009	2010
CARBON COUNTY					
Total state sales and use (from Table 3.15-5 above)	$19,562,434	$27,342,690	$26,813,689	$28,046,446	$18,210,158
State sales and use tax reported by mining	5,006,293	8,172,047	7,570,549	8,017,405	3,540,632
Percent by mining	25.6%	29.9%	28.2%	28.6%	19.4%
SWEETWATER COUNTY					
Total state sales and use (from Table 3.15-6 above)	$73,377,462	$88,814,219	$88,602,127	$89,796,413	$68,156,887
State sales and use tax reported by mining	19,534,344	26,514,528	25,192,508	25,948,033	15,644,884
Percent by mining	26.6%	29.9%	28.4%	28.9%	23.0%

Sources: Wyoming Department of Revenue, Annual Reports, and WEAD, Sales and Use Tax Distribution Reports, Annual Series 2002–2010.

3.15.5.2 County Revenues and Expenditures

Property, sales, and use taxes combine to account for the major share of county revenues. However, counties have many other revenue sources, ranging from fees for services to federal payment-in-lieu-of-taxes, and distributions of severance tax and mineral royalties from the state. Historically, Carbon County also has received various grants to address capital needs, but the amount and timing of such grants is highly variable.

Table 3.15-8 shows total fund revenues and expenditures in several broad categories for Carbon County's general fund over the past three fiscal years. As shown, property tax receipts increased by $2.7 million from 2009 to 2010 in response to increases in assessed valuation, driven primarily by mineral valuation. Budgeted expenditures for selected departments that tend to be sensitive to growth increased from 2008 to 2009 and were budgeted to increase again in 2010. However, as described elsewhere, the economic downturn and reduction in the pace of development had noticeable adverse effects on revenues; actual revenues from sources other than property taxes were 40 percent below the budgeted sums. Consequently, the County's total general fund revenue was 22 percent below budget, requiring substantial reductions in operating outlays, deferral of planned capital outlays, and use of reserve funds. While the recession may have resulted in some reductions in service demand, the severity of the cutbacks resulted in diminished levels of service for county residents.

Table 3.15-8. General fund revenues and expenditures, Carbon County

	FY2008 Actual	2009	2010 Original	2010 Adjusted Actual	Change 2010 Original vs. Adjusted
GENERAL FUND REVENUE					
Property tax revenue	$ 9,603,868	$ 9,700,506	$12,472,882	$12,472,882	0%
Other revenue	11,999,836	12,156,935	15,976,118	9,593,391	-40%
Total revenue	**$21,603,704**	**$21,857,441**	**$28,449,000**	**$22,066,273**	**-22%**
GENERAL FUND EXPENDITURES					
Select departments					
• Criminal justice	$ 1,507,178	$ 1,674,792	$ 1,743,346	$ 1,691,878	-3%
• Sheriff	1,467,007	1,704,024	2,139,065	1,654,892	-23%
• Jail	1,749,921	1,913,701	3,032,959	2,583,053	-15%
• Road and bridge	2,310,140	3,393,772	3,253,057	2,015,528	-38%
Select departments subtotal	**$ 7,034,246**	**$ 8,686,289**	**$10,168,427**	**$ 7,945,351**	**-22%**
All other departments	13,414,088	13,277,770	31,176,149	12,826,271	-59%
Total General Fund Expenditures	**$20,448,334**	**$21,964,059**	**$41,344,576**	**$20,771,622**	**-50%**

[1] *Other includes all other departments, budgeted capital outlays and closing balances/reserves. The 2010 original budgeted expenditures included anticipated receipts of a $10 million grant.*

Source: Carbon County, County Budget, FY 2008-10.

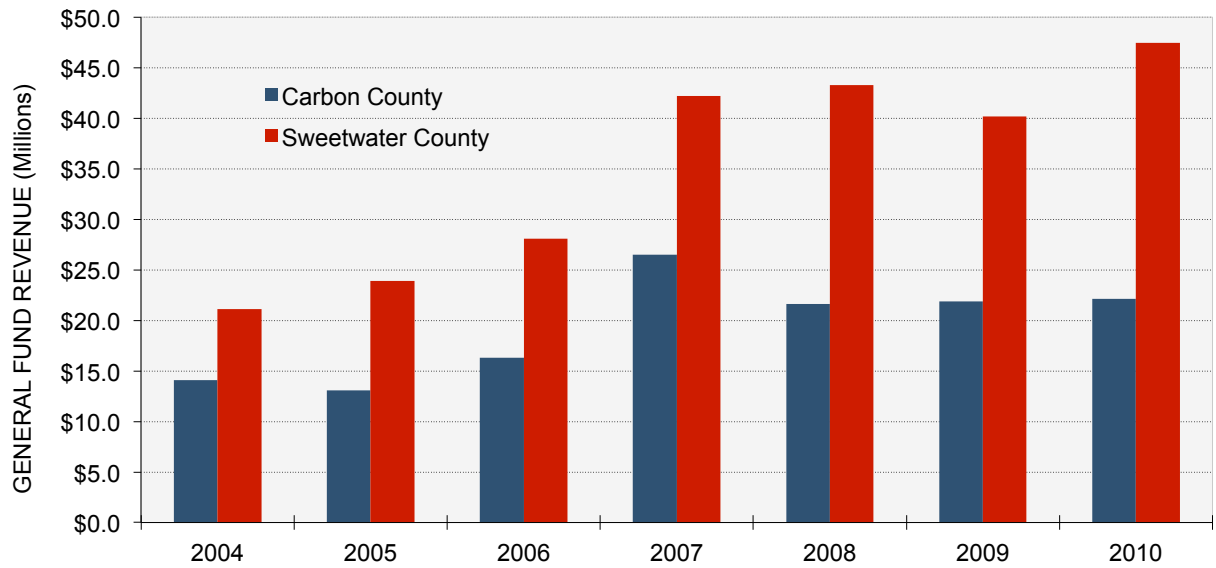
Table 3.15-9 shows similar general-fund budget data for Sweetwater County. There too, the effects of the recession are apparent in declines in revenues and general fund expenditures from fiscal year 2008 to 2009. Sweetwater County realized a net increase in tax revenues between 2009 and 2010, primarily derived from property taxes on mineral production which more than offset declines in sales and use tax receipts. Due to the lags between production and taxation on mineral valuation, a substantial reduction in property tax revenues and further reductions in sales and use taxes are anticipated for the 2011 budget year.

Table 3.15-9. General fund revenues and expenditures, Sweetwater County (in millions)

	FY2008	FY2009	FY2010
GENERAL FUND REVENUE			
Property tax revenue	$18.54	$19.25	$28.51
Other revenue, excluding transfers	24.73	20.94	18.97
Total revenue	**$43.27**	**$40.19**	**$47.48**
GENERAL FUND EXPENDITURES			
• General government	$27.79	$17.25	$18.52
• Public safety	11.16	10.21	14.38
• Road and bridge	5.50	4.43	4.41
• Other miscellaneous	0.21	0.22	1.30
• Capital outlay	0.00	7.32	5.57
Total General Fund expenditures	**$44.66**	**$39.43**	**$44.18**
• Changes in reserves	($1.39)	$0.76	$3.17

Source: Sweetwater County, Sweetwater County Budget Audit Reports, FY 2009 and 2010.

Figure 3.15-8 summarizes the total annual general fund revenues for Carbon and Sweetwater Counties for FY 2004 through 2010, illustrating the volatility in tax revenues associated with natural-resource development. Because the timing and magnitude of the changes are often not foreseeable and can come about relatively quickly, the year-to-year changes in revenues, coupled with the subsequent implications for budgeted expenditures, pose important challenges for local government The challenges can be particularly acute with respect to planning and funding large-scale capital improvement projects and to expanding current services during periods of rapid growth.



Note: The 2007 revenue shown for Carbon County excludes a one-time $10 million grant.

Figure 3.15-8. General fund revenues for Carbon and Sweetwater Counties, 2004–2010

3.15.5.3 Municipal Fiscal Conditions and Trends

Property Taxes

Property taxes are a less significant, but still important revenue source, for municipalities than for counties. Unlike county-wide valuations that rely heavily on mineral valuation, municipal valuations are more heavily based on the real estate. The dependency on real estate reduces the volatility in year-to-year valuations for municipalities, as compared to that for counties. Because of the latter factor, trends in assessed valuation are important indicators of local economic growth.

As shown in **Table 3.15-10**, Green River, Rawlins, and Rock Springs have relatively large ad valorem tax bases, while the three smaller communities have much smaller property tax bases. The most significant trends disclosed by these data include the strong growth in valuations among the three large communities, and the recent declines in Wamsutter's property tax base following its peak of $5.4 million in 2006. Rock Springs saw a 136-percent increase in assessed value between 2003 and 2010 due to its emergence as a regional service center for natural gas development, resulting in an assessed value nearly four times that of Rawlins and over twice that of Green River.

Table 3.15-10. Total assessed value, affected cities and towns

City/Town	FISCAL YEAR					Change 2006-10
	2006	2007	2008	2009	2010	
Green River	$ 55,080,205	$64,197,337	$75,527,179	$76,962,206	$76,067,639	38.1%
Rawlins	31,466,624	40,026,026	46,593,587	51,449,273	50,599,959	60.8%
Rock Springs	119,965,719	146,505,485	179,056,974	194,302,844	191,988,774	60.0%
Baggs	1,253,046	1,740,673	2,061,521	3,363,378	2,733,582	118.2%
Wamsutter	5,438,372	1,804,230	2,791,829	3,988,816	3,942,481	-27.5%
Saratoga	10,176,335	11,169,625	$13,836,362	$14,003,982	$14,327,425	40.8%

Source: Wyoming State Board of Equalization, 2009 and 2010, and Wyoming Taxpayers Association, 2007 to 2008.

Sales and Use Tax Distributions

Sales and use taxes are typically the single largest source of general-fund revenue for municipalities. That pattern applies to the affected municipalities in the project area. **Table 3.15-11** shows the annual sales and use tax distributions reported by the state to each of the six potentially affected communities from 2005 through 2010. The comparative distributions among the communities generally reflect their relative sizes, as well as differences in the level of economic activity and growth associated with the natural gas industry.

Table 3.15-11. Total annual sales and use tax distributions, cities and towns

City/Town	FISCAL YEAR						Change 2009-10
	2005	2006	2007	2008	2009	2010	
Green River	$10,177,818	$12,668,279	$15,299,399	$15,252,520	$15,458,494	$11,728,814	-24%
Rawlins	5,252,016	6,336,901	8,594,271	8,417,212	8,808,209	5,695,922	-35%
Rock Springs	16,429,886	20,471,622	24,239,596	24,165,324	24,491,659	18,582,542	-24%
Baggs	205,710	245,475	332,090	325,249	340,357	220,096	-35%
Wamsutter	228,118	282,659	338,173	337,136	126,988	259,250	104%
Saratoga	982,768	1,173,515	1,647,092	1,613,159	1,688,093	1,091,624	-35%

Source: Wyoming Department of Revenue, Sales and Use Tax Distribution Reports.

As shown above, the local municipalities experienced substantial declines in sales and use tax distributions as the economic recession continued. In Rock Springs the total distribution dropped by $5.9 million, or 24 percent. Rawlins experienced a larger decline, in relative terms, of 35 percent. The unforeseen magnitude of these declines necessitated mid-year revisions in budgets, which translated to responses such as staff layoffs, deferral of planned hiring, cutbacks in services and programs, and cancellation or deferral of capital-improvement spending.

Municipal Revenue and Expenditures

Summaries of municipal general-fund revenues and expenditures were developed from budget documents of the selected cities and towns. These summary budgets are presented in **Tables 3.15-12** through **3.15-15**. Although the organization of funds and level of detail provided in the municipal budgets varies among the communities, the summary budgets attempt to present comparable information for each municipality by assigning all revenues and expenditures to one of a broadly defined set of categories. Two conventions should be noted. First, the income category of "taxes" includes sales and use taxes returned to the municipalities by the state. Several of the source-document budgets listed such payments as "intergovernmental revenue." Conversely, some "taxes" such as severance tax and mineral royalties are included in the summaries as "intergovernmental" even though some local budgets classified them under the "tax" heading. Second, in preparing the expenditure summaries, multiple departments are grouped into six categories with descriptive titles that do not necessarily mean only the department with a similar name. For example "public works" in the table could include the Public Works department, but also Streets, Engineering, Shops, Building Maintenance, and other physical facility and plant construction and maintenance activities.

<u>City of Rawlins</u>

Table 3.15-12 summarizes general-fund budget data for three years of recent budgets for the City of Rawlins. General fund revenues and expenses will effectively equalize over the long term, but there may be variances in any one year due to inter-fund transfers, contributions to or from reserves, and varying year-end cash balances. In Rawlins, budgeted revenue was anticipated to increase modestly over the three-year period, with approximately half of the total revenue from taxes. On the expenditure side, public safety accounts for the largest share of outlays.

Table 3.15-12. General fund revenue and expenditures, City of Rawlins

	2007-08 Actual	2008-09 Budget	Preliminary 2009-10 Budget	Change 2007-08 to 2009-10
GENERAL FUND REVENUE				
Taxes	$ 7,454,450	$ 7,468,667	$ 8,348,500	12.0%
Franchises	359,000	394,000	430,000	19.8%
Intergovernmental	2,969,635	2,547,347	2,380,139	-19.9%
Charges for services	1,053,513	1,077,050	1,030,200	-2.2%
Police and court	354,700	387,400	390,900	10.2%
Other revenue	119,500	82,900	71,140	-40.5%
Transfers in	425,850	483,610	687,497	61.4%
Beginning balance	2,638,736	3,820,237	3,593,656	36.2%
Total Revenue	**$15,375,384**	**$16,261,211**	**$16,932,032**	**10.1%**
GENERAL FUND EXPENDITURES				
Administration	$ 2,511,368	$ 2,652,215	$ 3,097,286	23.3%
Courts	287,597	289,915	284,631	-1.0%
Public safety	4,666,059	5,059,741	5,234,031	12.2%
Public works	2,482,836	2,426,548	2,937,439	18.3%
Parks & recreation	1,623,278	1,291,187	1,314,228	-19.0%
Miscellaneous	617,235	842,476	1,037,273	68.1%
Capital improvements	1,060,242	1,473,192	274,349	-74.1%
Ending balance	2,026,769	2,225,937	2,752,795	35.8%
Total Expenditures	**$15,275,384**	**$16,261,211**	**$16,932,032**	**10.8%**

Source: City of Rawlins, Budget Worksheet, FY2009-10.
Note: Taxes include state-rebated sales and use tax.

Revenue shortfalls beginning in 2009 and continuing through 2010 necessitated amending the use of reserves, and cutbacks of more than $1.1 million in city spending to address the resulting deficit. The cutbacks included a reduction of 16 positions through attrition or layoffs.

The proposed budget for 2010-2011 calls for another $1.1 million reduction in expenditures, with periodic reviews to monitor revenues, particularly sales and use tax proceeds. If necessary, the city may draw on its reserve account to preserve essential services.

City of Rock Springs

The City of Rock Springs has an annual general-fund budget more than twice that of Rawlins, with taxes again the largest single contributor to revenue (see **Table 3.15-13**). The City's anticipated general revenues exhibit substantial year-to-year revenue variability due to transfers and unexpected changes in local economic activity.

The City's total budgeted general-fund expenditures decreased by 28 percent over the past 3 years. Sharp cutbacks in the budgets for public works and parks and recreation accounted for most of the reduction, while the budget for administration increased by about $2.1 million.

Table 3.15-13. General fund revenue and expenditures, City of Rock Springs

	2008-2009 Actual	2009-2010 Actual	2010-2011 Budget	Change 2010-2011
GENERAL FUND REVENUE				
Taxes	$ 3,647,055	$ 3,762,761	$ 2,932,782	-22%
Intergovernmental	34,175,579	35,645,049	31,573,137	-11%
Charges for services	1,388,822	1,350,393	1,377,425	2%
Fines and forfeitures	518,009	572,146	518,250	-9%
All other, including transfers	3,234,759	5,638,559	1,833,039	-67%
Total revenue	**$42,964,224**	**$46,968,908**	**$38,234,633**	-19%
GENERAL FUND EXPENDITURES				
Administration	$ 8,163,156	$ 8,571,182	$10,309,818	26%
Municipal Court	398,800	430,351	439,101	10%
Parks & Recreation	20,605,894	10,613,992	8,578,928	-58%
Public Safety	13,297,227	12,802,508	12,376,084	-7%
Public Works	11,484,602	11,956,730	7,343,680	-36%
Total expenditures	**$53,949,679**	**$44,374,763**	**$39,047,611**	**-28%**

Note: Taxes include state-rebated sales and use tax.
Sources: City of Rock Springs, Final Budget 2008–2009, 2009-2010, and 2010-2011.

City of Green River

As indicated in **Table 3.15-14**, Green River's general-fund revenues have declined by 27 percent over the last three years, with reductions in taxes comprising the majority of the decline. During the same period, total general fund expenditures increased by about 9 percent; the increase funded through the use of reserves.

Table 3.15-14. Revenue and expenditures, City of Green River

	2008–2009 Actual	2009–2010 Budget	2010–2011 Budget	Change 2008-10
General Fund Revenue				
Taxes	$ 17,290,036	$ 12,612,606	$ 11,858,377	-31%
Intergovernmental	2,788,802	3,325,009	2,927,386	5%
Charges for services	492,437	426,700	449,150	-9%
Other & Miscellaneous	1,387,866	829,200	711,200	-49%
Total revenue	**$ 21,959,141**	**$ 17,193,515**	**$ 15,946,113**	**-27%**
General Fund Expenditures				
Administration	$ 3,010,274	$ 3,464,791	$ 3,284,419	9%
Courts	5,119,193	5,555,267	5,526,219	8%
Public safety	2,450,853	2,746,938	2,830,292	15%
Public works	727,121	844,111	974,537	34%
Parks & recreation	4,364,043	4,878,946	4,918,062	13%
Total expenditures	**$ 15,671,484**	**$ 17,490,053**	**$ 17,533,529**	**9%**

Notes: Taxes include state-rebated sales and use tax.
Source: City of Green River, Annual Budgets Fiscal Year 2008, 2009 and 2010.

3.15.6 Schools

Four school districts could be affected by the CD-C project:

- CCSD #1
- CCSD #2
- SCSD #1
- SCSD #2

Figure 3.15-9 displays 1991–2010 fall enrollment statistics for the four affected school districts. All four districts had substantial enrollment declines through the 1990s and the first several years of the following decade. Thereafter CCSD #1 and both Sweetwater districts experienced enrollment gains in concert with population growth associated with the increased pace of natural resource development. Enrollment gains continued in CCSD #1 and SCSD #2 through 2007 and 2008, respectively, but stabilized somewhat in subsequent years. Enrollment in SCSD #1 has grown steadily over the past seven years, gaining more than 960 students since 2003. Fall 2010 enrollment counts, covering kindergarten through grade 12, were 1,810 for CCSD #1, 640 for CCSD #2, 2,635 for SCSD #2, and 5,159 for SCSD #1.

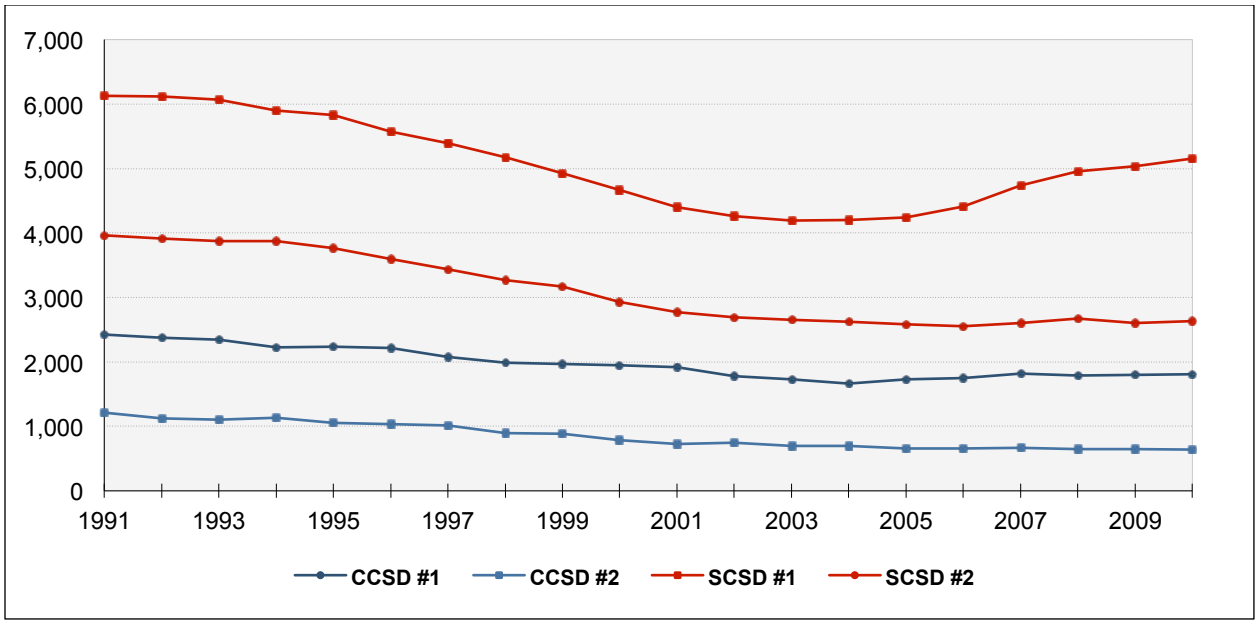


Figure 3.15-9. Fall enrollment, Carbon County School District #1 and #2 and Sweetwater County School Districts #1 and #2, 1991–2010

Source: Wyoming Department of Education 2010, 2011.

The differences in enrollment levels are reflected in their respective annual operating budgets and level of staffing (see **Table 3.15-15**). The pupil/teacher ratios for all three districts are slightly above the statewide median.

Table 3.15-15. School district revenue, staffing, and enrollment, 2009

	FISCAL YEAR 2009			
	CCSD #1	CCSD #2	SCSD #1	SCSD #2
Total Revenue	$19,717,769	$14,133,675	$84,586,170	$52,736,915
Staff (FTE)				
• Teachers	137.9	82.4	356.5	200.4
• Others	139.6	95.6	483	264.9
Total	277.5	177.8	839.5	465.3
Enrollment	1,727	648	4,955	2,669
Pupil/Teacher Ratio	12.5	7.9	13.9	13.3

Source: Wyoming Department of Education 2009.

All districts have historically had difficulty finding affordable housing for teachers. The districts have also occasionally had difficulty in recruiting and retaining maintenance and custodial workers and bus drivers during periods of economic expansion when labor shortage and the high wages paid in the energy industry put the districts at a competitive disadvantage for labor (Grube 2007, Sanders 2007, Sorenson 2007).

3.15.6.1 Carbon County School District #1

CCSD #1 serves Rawlins, Sinclair, and the Little Snake River Valley (LSRV), including the communities of Baggs and Dixon and the Sweetwater County community of Bairoil. Currently CCSD #1 operates two elementary schools, a middle school, a high school, and a cooperative high school in Rawlins; elementary schools in Sinclair and Bairoil; and a K–12 comprehensive school in Baggs that serves the entire LSRV. Additionally the district operates a fine-arts center, a swimming pool, and a sports complex in Rawlins.

The Rawlins Elementary School opened in early 2011. It currently has two learning communities, (grades 2–3 and grades 4–5). The school is designed to allow the addition of a K–1 community. Currently, kindergarten and first-grade students are housed in the adjacent Highland Hills Elementary School, which is at capacity. Rawlins Elementary could accommodate an additional 100 students over the 2010–2011 school year enrollment. The Rawlins Middle School can accommodate an additional 50 to 75 students. The Rawlins High School was designed to accommodate 1,100 to 1,200 students and fall enrollment was 455 students. The high school is an aging and outsized facility that is inefficient to operate. The Wyoming School Facilities Commission has authorized construction of a new 500-student high school, but the district believes it will need capacity for 600 students given pending energy projects in the area. Sinclair elementary is approaching capacity and the Little Snake River K–12 school could accommodate an additional 40 or more students (Terhune 2011).

3.15.6.2 Carbon County School District #2

CCSD #2 serves the communities of Elk Mountain, Encampment, Hanna, Saratoga, and Medicine Bow. The District Administration Central Office is located in Saratoga. Declining enrollments across CCSD #2 necessitated the closure/consolidation of four schools in recent years. The district presently operates seven schools: four elementary, two middle/high schools, and a K-12 school, including the Saratoga Elementary School and Saratoga middle/high school. Both can accommodate additional students (BLM 2012h, CCSD #2 2014).

3.15.6.3 Sweetwater County School District #1

SCSD #1 serves eastern and central Sweetwater County, including the communities of Rock Springs, Farson, Eden, Superior, and Wamsutter. SCSD #1 has seven elementary schools, one junior high school,

and two high schools (one traditional and one alternative) in Rock Springs. The district opened the new Pilot Butte Elementary, a 5–6 grade school, in the fall of 2011. SCSD #1 also operates a K–12 school in Farson; and a K–8 school in Wamsutter. The district closed eight schools between 1991 and 2003 due to declining enrollments.

SCSD #1 has proposed to build an additional 5–6 grade school and a new junior high school. Longer-term plans include replacing the high school. School construction plans are subject to approval by the Wyoming School Facilities Department.

With new and planned facilities, SCSD #1 should be able to accommodate an additional 60 students per grade in the elementary schools. The new junior high school will have additional capacity, but the high school is currently near capacity with anticipated increases in enrollment in the coming years. The district has a plan to relocate a portion of the school to a satellite facility. The Wamsutter K–8 school currently has enrollment of about 8 to 12 students per classroom and could accommodate up to 23 students per classroom (Lopiccolo 2011).

3.15.6.4 Sweetwater County School District #2

SCSD #2 serves the western half of Sweetwater County including the communities of Green River, Granger, and McKinnon. SCSD #2 operates a high school (grades 9–12), an alternative high school (grades 10–12), a middle school (grades 7–8), and an intermediate school (grades 5–6). The District also maintains four K–4 elementary schools within the city limits and three rural elementary schools. The district has closed two elementary schools since 1990 due to declining enrollment.

It is estimated that the four Green River K–4 elementary schools could accommodate a combined total of an additional 110 students and the 5–6 elementary school could accommodate an additional 20 students. There is some capacity to absorb new students in the middle school. The high school has a design capacity of 1,200 to 1,500 students and currently serves about 700 students (Little-Kaumo 2011).

3.15.7 Social Conditions and Trends

This section describes relevant social conditions and trends within in and near the CD-C project area. Specific social conditions associated with other users of the project area (grazing operators and recreationists) are also examined. Information for this section was obtained from over 60 interviews with community officials, local government staff, business persons, and ranchers; from review of scoping comments and newspaper articles; and from other secondary sources as cited.

Section 2 of the Baseline STR describes the human geography of the study area, discusses human settlement of the area, characterizes the communities, and describes the economic influences that have helped shaped the region and the individual communities. Although these communities share elements of a common heritage and regional geography, each has its own distinct economic, demographic and social setting.

3.15.7.1 Common Social Elements and Trends

Over the past decade, the communities in the study area experienced an economic expansion fueled by energy development in the project area and elsewhere in the bi-county region and in much of southwest Wyoming, and then a rapid contraction resulting from the sub-prime mortgage crisis, the ensuing global recession, and falling energy prices. The social effects of the recent expansion and contraction provide valuable insights into potential effects of the Proposed Action and Alternatives on social conditions in the area.

The recent expansion was the latest in a series of regional economic expansion and contraction cycles dating back to the construction of the transcontinental railroad but more recently associated with mineral and energy development. The larger communities in the study area have a somewhat economically diverse population resulting from the influences of the ranching, energy, mining, and transportation

industries and federal and state government offices and facilities. Wamsutter, Baggs, Saratoga and the other smaller communities are much less diverse economically. Wamsutter, although formerly a railroad and wool-shipping center, has recently become dependent on the energy industry and I-80 commerce. Of the communities in the study area, Baggs and Saratoga remain most closely tied to the ranching and outdoor recreation industries, although a number of residents of Baggs and the LSRV are employed by or provide services to the energy industry and Devon Energy operates a field office in Baggs. Saratoga's economy benefitted from the reopening of the Saratoga Lumber mill in 2013 after being closed for a decade (Forest Business Network 2013).

Even during the current (mid-2011) economic contraction there are reduced levels of energy development activity and in- and out-migration associated with the energy and mining sectors. Communities in the study area are familiar with energy industries and with the relatively constant stream of newcomers to these communities. However, during the recent expansion, which began in 2002/2003 in Sweetwater County and 2004/2005 in Carbon County, economic and population growth occurred at levels not seen for more than two decades in these two counties. Local communities are in agreement that federal and state population statistics did not reflect the magnitude of growth and there were no reliable estimates of the number of energy workers who stayed in communities on a temporary basis.

As a result of the economic and population growth and the presence of relatively large numbers of temporary and transient, predominantly male workers in these communities, social conditions in affected communities were changing at a relatively rapid pace. Many of the "boom-town" phenomena (e.g. housing shortages and escalating housing costs, workforce shortages, elevated rates of certain types of crime) reported by researchers in the late 1970s and early 1980s once again emerged. Social settings within the study area such as stores, restaurants, bars, and post offices were increasingly crowded and from a local resident's perspective, filled with strangers. Traffic on major streets and thoroughfares in Rock Springs and Rawlins was often congested (relative to past years), housing prices increased substantially, and local retail and service establishments had difficulty obtaining and keeping employees.

There were enthusiastic supporters of the boom and just-as-ardent detractors in all communities. But even some of the supporters lamented the change in social conditions, e.g., "feeling the need to lock their houses and take the keys out of their cars, entering a supermarket or restaurant and not seeing a familiar face, having to wait for two stoplight cycles to cross an intersection." For many, these inconveniences were offset by the robust economy and the increase in employment and shopping options. Others, including those who did not benefit from energy development and those on fixed incomes, were less likely to be enthusiastic about the boom.

Many residents of Carbon and Sweetwater counties value clean air and water, wildlife, wildlife habitat, and access to and the health of public lands (Blevins *et al.* 2004, CCCLUP 2010, Markert 2008). A key concern for many residents is the effect of energy development on public lands, particularly lands with high resource values.

Two groups have been directly affected by natural gas development in the project area: ranchers/grazing permittees and recreation users of the area.

3.15.7.2 Ranchers/Grazing Permittees

Information for this section was obtained in the spring of 2008 from individual and group interviews with grazing permittees, the Rawlins-based University of Wyoming Cooperative Extension Area Educator for Range Management, and the RFO Range Resources Specialist assigned to the CD-C EIS. As discussed in **Section 3.18 Range Resources**, 47 allotments are permitted for grazing within the project area. Many of these allotments extend beyond the boundaries of the project area. The active allotments are permitted for about 199,000 animal unit months (AUMs) of grazing per year used mostly by cattle, although sheep are grazed on 11 allotments.

Many of the affected livestock operations that use the project area are locally owned, multi-generational family ranches. A combination of long-term drought, high fuel and feed prices, unfavorable market conditions, and the high level of existing natural gas development within the allotments has resulted in challenging times for grazing permittees, causing some to substantially alter their methods of operation and even consider relinquishing their allotments.

In the most active natural gas fields within the project area, the predominant land use has changed from grazing/dispersed recreation to industrial. The project area contains roads with some of the highest traffic volumes in Carbon and Sweetwater counties, including high volumes of heavy-truck traffic. The high traffic volumes within the project area produce substantial amounts of dust on all but the portions of major roads that have been treated with magnesium chloride.

Natural gas development can affect grazing operations in several ways. Effects include livestock injury/mortality, reduced rates of weight gain in livestock, increased maintenance of range improvements, and required changes in livestock management practices.

Heavy traffic during the drilling and field-development phase often results in conflict with livestock operations. Vehicle/livestock collisions are not uncommon and, although some natural gas companies compensate permittees for livestock mortality, accidents are not reported in many cases. Responsibility is difficult to assign in areas used by multiple gas companies, and some service companies are less willing to compensate livestock owners. Companies are, in general, unwilling to compensate grazing permittees unless a driver accepts or is assigned responsibility for the accident. Gas-field traffic is of particular concern during lambing and calving periods, when animals sometimes use the roads to give birth and newborn animals are less able to move out of the way of oncoming traffic. In addition to animal losses from accidents, livestock lose weight if they are frequently startled by traffic. Some permittees have stopped trailing their herds along WY 789, the Wamsutter–Dad Road, and other major county and BLM roads within the project area because of the high volumes of industrial traffic, resulting in higher costs to move livestock by truck from pastures on one side of the road to the other.

High levels of gas-field traffic can increase damages to range improvements such as fences and cattle guards, resulting in scattering of livestock from pastures and introduction of other livestock and wild horses into pastures. During severe winters, when natural gas company contractors clear snow for some distance on either side of road surfaces to remove heavy snow accumulations, damage to cattle guards and sections of fence often occurs. As a result, some permittees are unable to use some pastures in the spring, which has disrupted grazing patterns and resulted in unbudgeted costs to relocate livestock. Although in most cases gas companies compensate grazing permittees for repairing fences and cattle guards, there are sometimes disputes over the amount of compensation, the quality of the replacement fences and structures, and the timeliness of compensation. It is again difficult to assign responsibility for damage in areas where multiple gas and service companies are active; grazing permittees lose the use of the pastures while awaiting repairs, which at times requires an extended period to locate and schedule contractors.

Another concern for livestock grazing permittees is that some gas companies do not notify them in advance of starting new development within a federal grazing allotment. Consequently, affected grazing permittees do not have advance opportunity to relocate herds to avoid conflict with development. Although required by regulation, some drilling contractors do not adequately fence drilling facilities such as reserve pits, resulting in livestock injury or mortality.

New and improved roads are at times beneficial for grazing permittees in that they allow better access to pastures and livestock. However, new and improved roads also facilitate higher travel speeds for gas-field traffic, increasing the risk of vehicle/livestock accidents. New and improved roads also allow more public access into grazing allotments, increasing the potential for vandalism and disruption of grazing in formerly remote areas. Some grazing permittees report reductions in vandalism in areas that are actively being developed, however, which they attribute to the greater human presence.

An oft-cited effect of high levels of natural gas development is the reduction in forage associated with surface disturbance and infestation of noxious and invasive species when reclamation is delayed or unsuccessful. In areas where development is concentrated, reductions in forage can be substantial. Although a portion of disturbance for well pads, pipelines, roads, and other ancillary facilities is required to be reclaimed within a short period of time, a combination of the prolonged drought and ineffective reclamation methods has resulted in drill pads, pipeline and road corridors, lay-down areas, and pads for ancillary facilities remaining unreclaimed or in a weed-infested state for years. In addition to the direct reductions in forage associated with unreclaimed or weed-infested areas, a substantially larger area is often removed from productive use as a result of wind-blown dust from unreclaimed areas and roads which accumulates on plants, reducing palatability and accelerating wear on livestock teeth. The location of well pads, gathering lines, and roads may also alter surface-water flow patterns, resulting in erosion and loss of vegetative cover and forage.

The combination of high levels of gas-development activity, reduced forage, and drought conditions requires substantially higher levels of livestock management for grazing permittees, as they are required to more frequently monitor livestock condition and movements, relocate livestock more frequently, and round up livestock that have wandered from pastures when fences and cattle guards are down. Sheepherders have been required to avoid grazing and trailing their flocks through certain areas and to find new trails to avoid halogeton infestations, which can be toxic to sheep. Some grazing permittees who formerly wintered cattle on allotments within the project area have had to truck their herds to other areas or other states, in part because of periodic drought years but also in part to avoid natural gas activity during winter months when herd management is more difficult.

Higher levels of livestock management result in higher fuel outlays and labor costs. Fuel costs for grazing permittees in the project area can be substantial given the distance to the allotments from communities and home ranches. Securing ranch hands in Carbon and Sweetwater counties during the boom years was complicated by the regional labor shortage and competition for workers. Some grazing permittees had difficulty competing for workers with the traditionally higher wages paid by the energy industry. More active livestock management, including frequent movement of livestock from pasture to pasture or between allotments to avoid disruptive activity can reduce weight gain in cattle.

All of the above factors result in higher cost, lower production, and reduced profitability for grazing permittees. In addition, although their allotments are less productive because of activity, disturbance, weed infestations and drought, their allotment lease fees are not reduced. The reduced profitability is likely to change the nature of some CD-C area ranching operations and may result in others leaving the ranching business. Grazing permittees interviewed for this assessment reported reductions in herd size, potential selling off of herds, and potential relinquishment of BLM leases.

The ranching economy in Carbon and Sweetwater counties is substantially smaller than the energy economy, but reductions in ranching operations would result in adverse changes in economic diversity in these two counties. Reductions in ranching operations would also have social and cultural implications for the study area. Ranching is an important element of the heritage and culture of Carbon and Sweetwater counties and the State of Wyoming as a whole.

3.15.7.3 Recreation Users of the Area

Substantial changes in the recreation setting within the project area have already occurred. As noted elsewhere in this assessment, an average of about 239 wells/year were drilled within the project area during the 2000-2010 period and there were over 3738 producing wells in the area at the end of 2010.

As discussed in **Section 3.12 Recreation**, hunting—primarily by locals—is the dominant recreation use of lands within the project area. Some pleasure driving to view wild horses or the Red Desert landscape occurs near the specific resources and settings of interest. As noted in Section 3.12, the BLM makes estimates of recreation usage at the field-office level only, so there are no available data on recreation participation and recreation visitor days that are specific to the CD-C project area. Similarly, the WGFD's

Hunt Areas extend beyond the boundaries of the project area and the WGFD does not collect statistics for sub areas; it is therefore not possible to assign hunter activities specifically to the CD-C project area. Consequently, data are not available to support the estimation of economic effects of hunting or other recreation activities within the project area. Recreation use in the project area is low overall and seasonal, with most occurring in the fall during the big game hunting seasons. The BLM generally considers the project area to be a recreation resource that attracts some non-residents who have special interests (e.g., wild horses, historic trails, and the Red Desert) but is visited mainly by Wyoming residents, especially those living nearby.

A combination of local residents, residents from elsewhere in Wyoming, and non-residents has historically hunted within the project area, although as noted above, locals are the dominant users and the level of hunting use is relatively low. Adverse effects of existing natural gas development on hunting have resulted from development activity, traffic, and changes in wildlife distribution and abundance. Although the current presence of relatively widely spaced wells is not a deterrent for all hunters, safety issues associated with hunting around natural gas facilities and the change in the recreational setting are believed to be deterrents for many non-local and out-of-state hunters for whom a natural setting is a part of the overall hunting experience. Displacement of hunters from the project area could result in increasing hunting pressure in other areas. There is increasing concern among hunting and wildlife advocacy groups that development in wide expanses of wildlife habitat and migration corridors will have an adverse effect on wildlife populations within an area, which could result in a shift in hunting activity away from the project area.

Some local and non-local groups and individuals value specific areas within and adjacent to the project area including a Sage-Grouse lek complex southeast of Creston, the Red Lakes Dunes Citizens' Proposed Wilderness and the Chain Lakes WHMA. At the time of this assessment, one well has been drilled in the Chain Lakes WHMA and several wells have been drilled near the part of the Red Lakes Dunes Citizens' Proposed Wilderness and the Sage-Grouse lek east of Creston.

A growing concern is the increasing amount of big-game poaching occurring in remote areas now accessible on roads improved for natural gas development and an increasing amount of both personal and industrial litter along highways and county, BLM, and private roads. These effects represent a loss in environmental amenity values for local residents, recreational users, and non-users alike.

Cumulative effects of energy development on recreation use of the area is discussed in **Chapter 5** of this EIS, but there is increasing concern among local public officials and residents regarding the direct and indirect effects of the intensive level of current and ongoing energy-related development, including oil and gas development, pipeline construction, and wind energy and transmission line development across southwest Wyoming on the availability and quality of outdoor recreation opportunities and experiences. The potential for adverse effects arise in conjunction with changes in recreational setting, visual character, noise, dust, increased presence of other humans, changes in vegetation, water quality, and presence of wildlife.

3.15.8 Environmental Justice

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA 2009). EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* published in the Federal Register in 1994, tasks "each Federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Implementation of EO 12898 for NEPA by agency directive involves the following steps (BLM 2005d):

- Identification of the presence of minority and low-income populations and Indian Tribes in areas that may be affected by the action under consideration.
- Determination of whether the action under consideration would have adverse human health, environmental, or other effects on any population.
- Determination of whether such environmental, human health, or other effects would be disproportionately high and adverse on minority or low-income populations or Indian Tribes.
- Providing opportunities for effective community participation in the NEPA process, including identifying potential effects and mitigation measures in consultation with affected communities and improving the accessibility of public meetings, crucial documents, and notices (CEQ 1998).

The BLM standard for identifying a low-income population is the poverty level used by the U.S. Census Bureau. The standard for identifying minority populations is either: 1) the minority population of the affected area exceeds 50 percent, or 2) the minority population percentage of the affected area is "meaningfully greater" than the minority population percentage in the general population or other appropriate unit of geographic analysis. For environmental justice compliance, the relevant minority population is the total minority population comprising all persons of a minority racial identity plus persons of Hispanic-origin and Latinos (BLM 2005d).

The minority and low-income status of populations within the socioeconomic study area are described in the following section.

3.15.8.1 Racial and Ethnic Minority Populations

The overwhelming majority of the project area is extremely rural and sparsely settled due to the "checkerboard" pattern of alternating sections of public and private land ownership. There are few permanently occupied residences within the project area outside of the town of Wamsutter, although some ranch facilities and a few rural cabins and privately-owned lots are occupied on a seasonal basis. There are no American Indian Reservations, Colonies, or Tribal trust lands in or near the project area.

Table 3.15-16 compares the percentage of minority residents in the project area, based on data from the 2010 Census, with that for two counties in which it is located, the state of Wyoming and the nation as a whole. The percentages of minorities in Carbon County and Sweetwater County are higher, but not meaningfully higher, than the statewide average. Minorities were an estimated 18.7 percent of the population in an area that encompasses the project area, essentially the same as the local county averages (Carbon County at 20.2 percent and Sweetwater County as 19.1 percent), slightly higher than the statewide average, but considerably lower than the national average. The Hispanic or Latino population is the single largest minority group, locally as well as across the state.

Table 3.15-16. Percentage of minorities in the State of Wyoming, Carbon County, Sweetwater County, the CD-C project area, and selected communities

Geographic Area	Percentage of Total Population				
	(A)	(B)	(C)	(D)	(E)
	White and not Hispanic or Latino	Total Racial Minorities and not Hispanic or Latino [1]	Hispanic or Latino Ethnicity	Total Racial and Ethnic Minorities (B) + (C)	Difference, Percent Minority Population Above/Below State Average
United States	62.3%	19.5%	18.2%	37.7%	23.6%
Wyoming	85.9%	5.2%	8.9%	14.1%	0.0%
Carbon County	79.8%	3.4%	16.8%	20.2%	6.0%
Sweetwater County	80.9%	3.8	15.3%	19.1%	5.0%
Rawlins	71.5%	4.2%	24.3%	28.5%	14.3%
Rock Springs	79.1%	4.5%	16.4%	20.9%	6.8%
Wamsutter	74.7%	5.6%	19.7%	25.3%	11.1%
CD-C project area estimate [2]	81.3%	3.3%	15.4%	18.7%	4.6%

[1] *Racial minorities includes all persons identifying themselves as a non-white race, including "Black or African American," "American Indian and Alaska Native," "Asian," "Native Hawaiian and Other Pacific Islander," "Some other race alone," and "Two or more races." Ethnic minorities include persons who identify themselves as Hispanic or Latino.*

[2] *The project area estimate is based on data for several rural census tracts in western Carbon County and eastern Sweetwater Counties, including the town of Wamsutter, but excluding Baggs.*

Source: U.S. Census Bureau, 2010.

When expressed as a share of the total population, the Hispanic population has grown across these two counties over the past decade, climbing from 13.8 percent to 16.8 percent of the Carbon County population and from 9.4 percent to 15.3 percent of the Sweetwater County population. The analysis area does not exactly match the project area boundaries, but has similar demographic characteristics to the project area.

Wamsutter had a 2010 census population of 451, 25.3 percent of whom were identified as racial or ethnic minorities. The town exists in large part due to the substantial presence of the energy industry and ongoing oil and gas development activity has been largely responsible for the recent population growth. Thus, the relatively high share of minorities and the increase in minority population in recent years is indicative of growth attracted by economic opportunity, rather than the presence of a minority population rising to the BLM standards for consideration from an environmental justice perspective.

3.15.8.2 Persons in Poverty

Table 3.15-17 summarizes the prevalence of poverty in the project area and two host counties that encompass the project area. For the analysis of low-income population for the year 2000, the local area that includes the project area is slightly larger than that for the analysis of minority populations because the level of aggregation of income data available from the U.S. Census Bureau is larger than that for racial and ethnic characteristics.

Based upon 2000 Census data, persons with incomes below the poverty level represent 10.6 percent of the population in the analysis area that includes the project area, 1.8 percent lower than the 11.4 percent of the population with incomes below the poverty level for the State of Wyoming. In comparison county-wide poverty in Carbon County was slightly above the national average, while that in Sweetwater County was approximately 25 percent lower. In part the latter reflects the strong industrial base of Sweetwater County, while the former is influenced by the location of a relatively large inmate population at the Wyoming State Penitentiary in Rawlins.

Detailed poverty data are not yet available from the 2010 Census. However, poverty estimates prepared by the Census Bureau for 2009 indicate a reduction in poverty rates in Wyoming and Carbon and Sweetwater counties, as compared to those for 2000. Meanwhile, poverty rates rose at the national level for the same two points in time. The median household income for Carbon and Sweetwater counties also exceeded the national average, with that for Sweetwater ranking among the top 5 percent within the nation. Estimates for 2009 are not available for Wamsutter, but the relatively high rates of employment—much of it in energy-related jobs—that characterize the community are thought to be unlikely to result in poverty rates substantially higher than the statewide or national averages.

Table 3.15-17. Poverty levels in the United States, State of Wyoming, Carbon County, and Sweetwater County, 2000 and 2009

Geographic Area	Share of Population Below Poverty Level 2000	Share of Population Below Poverty Level 2009	Median Household Income 2009
United States	12.4%	14.3%	$50,221
Wyoming	11.4%	10.2%	$54,400
Carbon County	12.9%	11.7%	$50,353
Sweetwater County	7.8%	7.3%	$69,297
CD-C project area estimate	10.6%	Not Available	Not Available

Source: U.S. Census Bureau, 2002 and U.S. Census Bureau, 2010.

The communities of Rawlins, Rock Springs, Green River, Baggs, Sinclair, and other small settlements are outside the project area, spatially separated from the project by topography. Consequently, these communities are not considered likely to be affected from an environmental justice perspective.

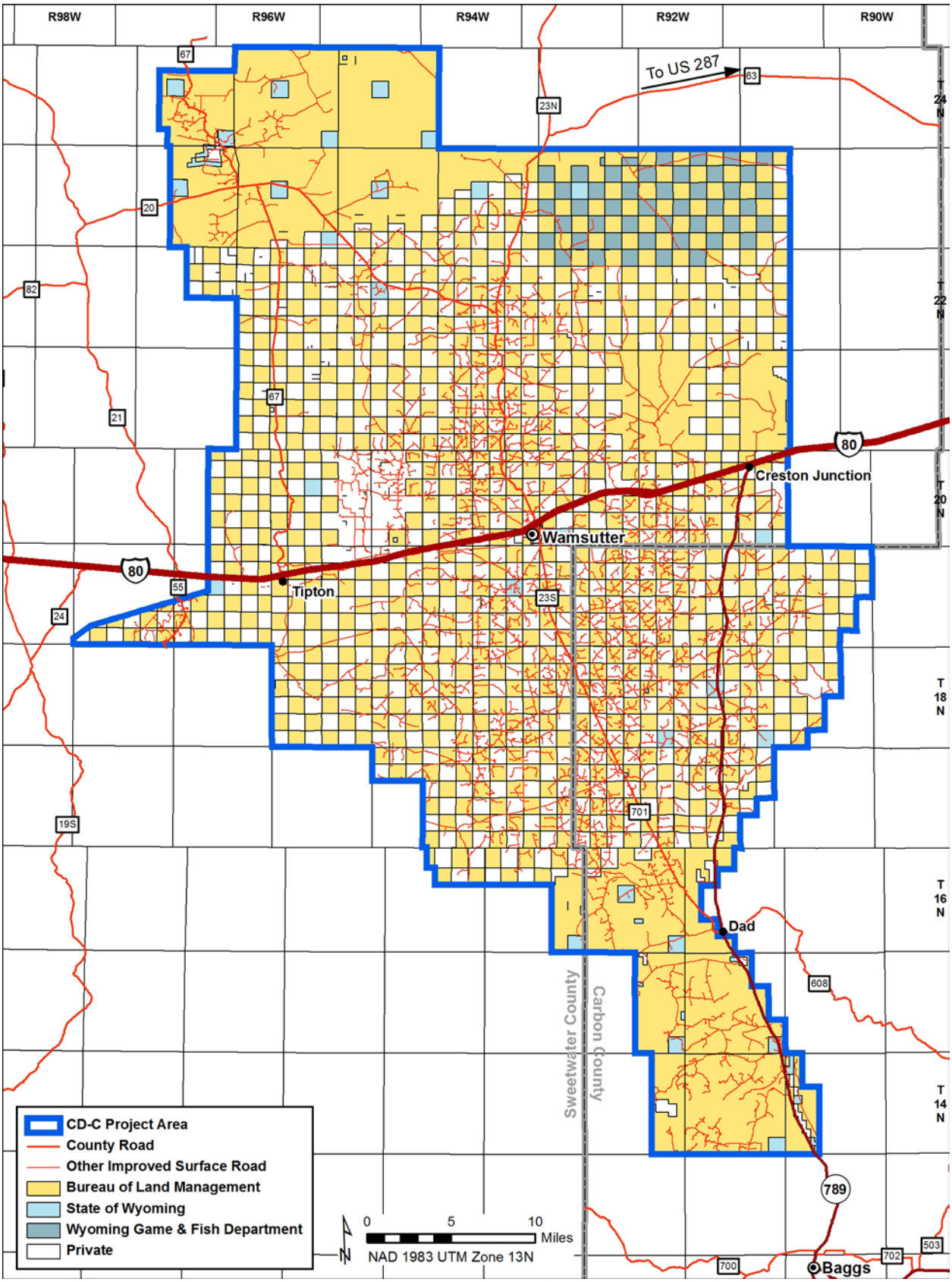
The foregoing analysis supports the finding that the low-income population in the project area does not rise to the BLM standards for consideration from an environmental justice perspective.

3.16 TRANSPORTATION AND ACCESS

The primary transportation access to and within the CD-C project area is via highway, although the Union Pacific mainline railroad across southern Wyoming passes through the project area on a generally east-west route. General aviation and commercial service-capable airports are located in Rock Springs and Rawlins, with several other general aviation and private airfields in the surrounding region.

Interstate Highway 80 (I-80) and WY 789 provide primary highway access to the project area. Most traffic destined for the project area originates in Rock Springs, Rawlins, Wamsutter, or Baggs, making I-80 and WY 789 the most direct and commonly used highway access routes. Highway access routes are shown in **Map 3.16-1**. I-80 bisects the project area and provides access to a number of county and BLM roads that in turn access both the north and south parts of the project area. WY 789 provides access to the existing gas fields to the east and west of the highway and has seen substantial increases in traffic during the last several years attributable to natural gas development and interstate pipeline construction. Although it is possible to reach the project area from US 287 to the east, this route is seldom used because of the distance and the connecting roads; these roads are not as direct and are not maintained for gas-field traffic. US 287 provides access to I-80 for gas-field traffic coming from Casper and other points of origin north of the project area.

Access within the project area is provided by an established network of Sweetwater and Carbon County numbered and maintained roads, improved and unimproved BLM roads, and private roads. The BLM categorizes roads based on existing use or anticipated traffic volumes, seasonal or year-round use, design vehicle (types of vehicles most frequently using the road), soil types, weather conditions, topography,



Map 3.16-1. Access to and within the CD-C project area

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

construction costs, compatibility with other resource values, and safety (USDI and USDA 2006). BLM road types include the following:

- *Collector roads* serve large land areas and are the major access routes into development areas with high average daily traffic rates. They are usually double-lane, graded, drained and surfaced, with a 20- to- 24-foot travelway. They usually connect with public highways or other arterials to form an integrated network of primary travel routes and are operated for long-term land and resource management purposes and constant service. The locations and standards are often determined by a demand for maximum mobility and travel efficiency rather than a specific resource management service.
- *Local roads* provide access to large areas and for various uses. They collect traffic from resource or local roads or terminal facilities and are connected to arterial roads or public highways. The location and standards for these roads are based on both long-term resource needs and travel efficiency. Local collector roads may be single-lane or double-lane with travelways 12 to 24 feet in width and 'intervisible turnouts,' where approaching drivers have a clear view of the section of road between the two turnouts and can pull off to the side to let the approaching driver pass. They are normally graded, drained, and surfaced and are capable of carrying highway loads. They may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area being served.
- *Resource roads* are low-volume, single-lane roads. They normally have a 12- to14-foot travelway with intervisible turnouts, as appropriate. They are usually used for dry weather, but may be surfaced, drained, and maintained for all-weather use. These roads connect terminal facilities, such as a well site, to collector, local, arterial, or other higher-class roads. They serve low average annual daily traffic (AADT) and are located on the basis of the specific resource activity need rather than travel efficiency.

Within the project area, an existing network of collector and local roads has been developed or improved to accommodate the already high level of natural gas development and operations-related travel, which is the dominant use of these roads. In several cases Carbon and Sweetwater county roads serve the function of collector roads and have been improved by the respective county to accommodate that use. Within the project area, SCR 23S/ CCR 701—known as the Wamsutter/Dad Road—serves as a collector road for the portion of the field south of I-80; SCR 23N, SCR 67, and BLM Road 3207 serve as collector roads for the part of the field located north of I-80.

The Operators have in some cases improved local roads on BLM and private lands to accommodate their level of use and they provide ongoing maintenance for those roads and for resource roads that they have constructed on BLM and private lands.

3.16.1 Current Government-Industry Transportation Planning Efforts for the Project Area

Currently, a Transportation Plan (TP) and transportation planning committee (TPC) are in place for the Continental Divide portion of the project area. A TP has been included in this document as **Appendix N** and includes the Creston portion of the project area.

The BLM, the WYDOT, Carbon and Sweetwater Counties, and a number of companies operating within the CDWII Oil and Gas project area developed a Memorandum of Understanding (BLM MOU NO. WY 951-99-06-102) to establish a process for dealing with road issues. The MOU was intended to:

> "…establish a process through which governmental agencies, oil and gas companies, private landowners and other interested parties can meet together to discuss road-related concerns resulting from project development, to identify potential solutions to problems, and to develop implementation strategies for transportation. The primary focus of this MOU centers on issues related to transportation planning including road use, development, maintenance and reclamation."

The MOU and the recommendations of the Transportation Planning Technical Support Document for the CDWII Natural Gas Project (BLM 1999a) resulted in the formation of a TPC for the CDWII project area. After the signing of the MOU in late 1998 and early 1999, the TPC held semi-annual meetings to address transportation issues for a number of years. Recently the meetings have been more intermittent, and the scope of the meetings has been expanded to include operators in other areas of the RFO and cover other issues such as reclamation.

3.16.2 Highway Access to the Project Area

As noted above, two highways provide access to the project area: I-80 and WY 789 (see **Map 3.16-1**). I-80 bisects the project area horizontally and provides access to a number of county and BLM roads that in turn access both the north and south parts of the project area. WY 789 provides access to the existing gas fields to the east and west of the highway and has seen substantial increases in traffic during the last several years attributable to natural gas development and interstate pipeline construction. US 287 travels north from Rawlins at some distance from the project area and at present is used for access to I-80 rather than direct access to the project area.

WYDOT limits access to state highways to every one-half mile and encourages industrial developers to use main access points where possible. WYDOT also requires roads accessing state highways to be paved to the limits of the highway right-of-way and encourages developers to gravel roads for one-half mile before their intersection with state highways to allow trucks to shed mud from tires before entering the highway. WYDOT is currently monitoring traffic volumes on WY 789 to determine whether turn-lanes are needed at major gas-field road intersections.

The underpasses associated with off-ramps at the I-80 interchanges through the project area were not designed to accommodate over-height or over-width loads. Over-height/over-width loads traveling on I-80 that need to access areas on the opposite side of the highway must travel beyond the desired off-ramp, cross the median, and return in the opposite direction to the desired off-ramp. This maneuver requires three WHP troopers to provide traffic safety services. As many as 13 over-height vehicles required use of this maneuver on one day during 2007, the peak year for drilling activity, effectively requiring a detail of three WHP troopers for a full day (Griesbach 2007).

WYDOT measures AADT (annual average daily traffic) and collects accident statistics on federal and state highways. **Table 3.16-1** displays AADT data for segments of I-80 that provide access to the project area for 1999 and 2009 and WYDOT's AADT forecasts for 2020 and 2030 based on extrapolations of long-term trends. Included in the 2009 AADT is an estimated project area-related AADT of 1,060 (including an AADT of 299 trucks) associated with the drilling of 244 wells in 2009 and operations activities associated with 3,738 producing wells in that year.

During the 10-year period between 1999 and 2009, increases in total AADT on the I-80 segment between Rawlins and Rock Springs (both directions) ranged from 8 percent on the east side of Rock Springs to 16 percent at the west side of Rawlins. Increases in total truck AADT during the 10-year period were more modest, ranging from 2 percent on the west side of Rawlins to 5 percent at Wamsutter.

AADT increased substantially on WY 789 from I-80 at Creston Junction south to Baggs. South of the WY 789/I-80 junction, the combined AADT traveling in both directions increased by 49 percent and truck AADT increased by 98 percent during the during the 1999 to 2009 period. Just north of Baggs at the junction of WY 789 with CCR 700, which provides access to the Creston part of the project area, overall AADT increased by 86 percent and truck AADT increased by 167 percent over the 10-year period.

As noted, US 287 connects Rawlins and I-80 with Casper and I-25. Total AADT on US 287 north from Rawlins to Lamont increased during the 1999–2009 period; total traffic at the US 287 bypass on the north side of Rawlins increased by 106 percent but truck AADT increased by a more modest 6 percent. AADT south of Lamont increased by 9 percent and truck AADT decreased by 6 percent during the 10-year period.

Although 2009 was chosen to show most-recently available traffic statistics on the affected highways, traffic increases on a particular highway segment can be more dramatic as a result of industrial activities. For example, increases on WY 789 were more substantial between 1997 and 2007, the peak development year; ranging from an increase in total AADT of 76 percent and an increase in truck AADT of 156 percent south of Creston Junction and an increase in total AADT of 199 percent and an increase in truck AADT of 225 percent north of Baggs at the junction with CCR 700. The high level of traffic in this area during 2007 was attributed in part to interstate pipeline construction traffic

WYDOT assigns level of service (LOS) ratings to highways in the state system. LOS A through LOS F are assigned based on qualitative measures (speed, travel time, freedom to maneuver, traffic interruptions, comfort and convenience) that characterize the operational conditions within traffic streams and the perceptions of those conditions by motorists. LOS A represents the best, or free-flowing, travel conditions and LOS F represents the worst, or total stoppage of traffic flows. During 2008, the most recent year for which LOS ratings were calculated, I-80 through the project area operated at a LOS rating of A and WY 789 operated at a LOS rating of B, except for the intersection with CCR 700 West, which operated at a LOS rating of C. US 287/WY 220 north from Rawlins to Casper operated at LOS B or LOS C, depending on the highway segment.

WYDOT forecasts for 2030 indicate that traffic conditions on I-80 from Rawlins west to Rock Springs will remain at LOS A, except for the segment around the intersection with WY 789 at Creston Junction, which will fall to a LOS B. Conditions on WY 789 from Creston Junction south to Baggs will remain at LOS B except for the intersection with CCR 700 West, which will remain at LOS C. US 287/WY 220 north to Casper is forecast to operate at LOS C for its entire length in 2030 (Brown 2011).

As shown in **Table 3.16-1**, traffic is forecast to increase substantially on all highways providing access to the project area by 2020 and 2030, with the exception of US 287 at the Rawlins bypass, where total AADT is forecast to decline in both 2020 and 2030 and on WY 789 at the junction with CR 700, where truck traffic is also forecast to decline.

Table 3.16-1. AADT on highways providing access to the CD-C project area: 1999, 2009, 2020, and 2030

Highway Segment (Both Directions)	1999		2009				Projected 2020				Projected 2030			
	All Vehicles	Trucks	All Vehicles	Trucks	1999–2009 Increase All Vehicles	1999–2009 Increase Trucks	All Vehicles	Trucks	2009–2020 Increase All Vehicles	2009–2020 Increase Trucks	All Vehicles	Trucks	2009–2030 Increase All vehicles	2009–2030 Increase Trucks
I-80														
Rawlins W. Urban Limits	11,320	6,370	13,078	6,495	16%	2%	15,342	8,992	17%	38%	17,539	10,627	34%	64%
Creston Jct.	10,670	6,170	12,225	6,368	15%	3%	14,915	8,740	22%	37%	17,142	10,320	40%	62%
Continental Divide Int.	10,650	6,170	11,973	6,443	12%	4%	14,880	8,750	24%	36%	17,130	10,354	43%	61%
Wamsutter	10,650	6,170	12,014	6,458	13%	5%	14,938	8,747	24%	35%	17,211	10,354	43%	61%
Red Desert	10,630	6,170	11,563	6,332	9%	3%	14,806	8,722	28%	38%	17,063	10,325	48%	63%
Tipton	10,590	6,170	11,493	6,287	9%	2%	14,858	8,640	29%	37%	17,132	10,224	49%	63%
Table Rock	10,650	6,170	11,693	6,314	10%	2%	15,054	8,782	29%	39%	17,365	10,43	49%	65%
Rock Springs E. Urban Limits	12,710	6,770	11,678	6,498	8%	-4%	16,715	9,374	22%	44%	18,949	11,059	39%	70%
WY 789														
Creston Jct.	850	160	1,265	316	49%	98%	1,501	377	19%	19%	1,731	426	37%	35%
Jct CCR 700 West	970	160	1801	427	86%	167%	1,874	411	4%	-4%	2,174	472	21%	11%
US 287														
Rawlins N. at US 287 Bypass	2,550	740	5,241	786	106%	6%	4,419	962	-16%	22%	5,046	1,098	-4%	40%
Jct Rte 46 Lamont	2,110	660	2,303	620	9%	-6%	2,722	862	18%	39%	3,000	978	30%	58%

Source: WYDOT 2009 VMB

3.16.3 Motor Vehicle Crash Statistics on Highways Providing Access to the Project Area

Figures 3.16-1 and **3.16-2** display data for crashes on highway segments providing access to the project area. As shown in Figure 3.16-1, crashes on I-80 between Rawlins and Rock Springs averaged between 300 and 400 per year between 1998 and 2004, decreasing to 263 in 2005 and then more than doubling to 529 in 2006 and 536 in 2008 before decreasing to 343 in 2010. An average number of 370 crashes per year were reported in the 13-year period from 1998–2010. Until recently, WYDOT calculated crash rates for highways based on a formula that considered the type of highway, number of crashes and vehicle miles on the highway.[1] The 13-year average crash rate for the segment of I-80 between Rawlins and Rock Springs was 0.83, which was lower than the 1998–2007 statewide average for crashes on all Functional Class 1–Rural Interstate highways (1.10).

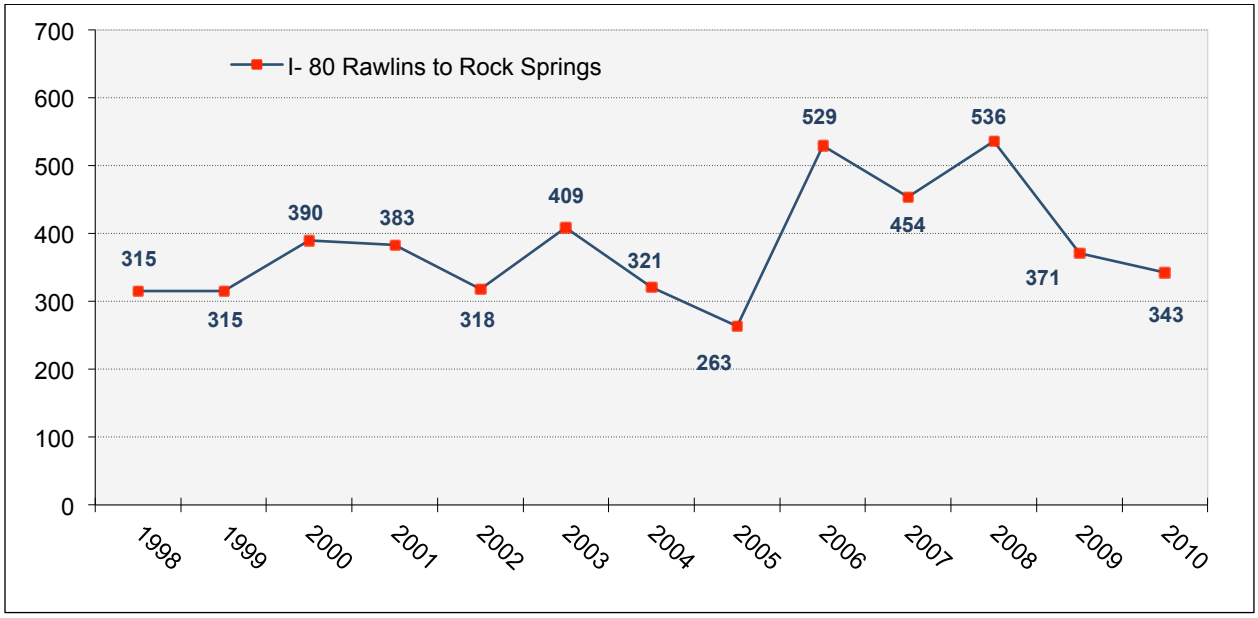


Figure 3.16-1. Annual number of crashes on I-80 between Rawlins and Rock Springs: 1998–2010

Source: WYDOT/Carpenter 2007and 2008.

Figure 3.16-2 displays annual crashes for the 1998–2010 period on WY 789 and on US 287 north of Rawlins. The number of annual crashes on WY 789 was generally 20 to 30 for the 13-year period except during 2006–2008 when the level increased to about 40 crashes. The 13-year average crash rate for WY 789 was 1.43, slightly below the 1998–2007 statewide crash rate for all Functional Class 6–Minor Arterial Highways (1.64).

The annual number of crashes on US 287 between Rawlins and Lamont ranged from 17 to 33 between 1998 and 2006, climbing to 42 in 2007 and 2008. The number of crashes then dropped to 8 in 2010. The 13-year average crash rate for the segment of US 287 between Rawlins and Lamont was 1.21, lower than the 1998–2007 statewide average for all Functional Class 02–Principal Arterial Highways (1.31).

[1] During the course of this assessment, WYDOT changed to a safety index that uses injury severity and fatal crashes as part of the weighting. Consequently the statewide crash rates for 2008 – 2010 highway functional classes were not calculated.

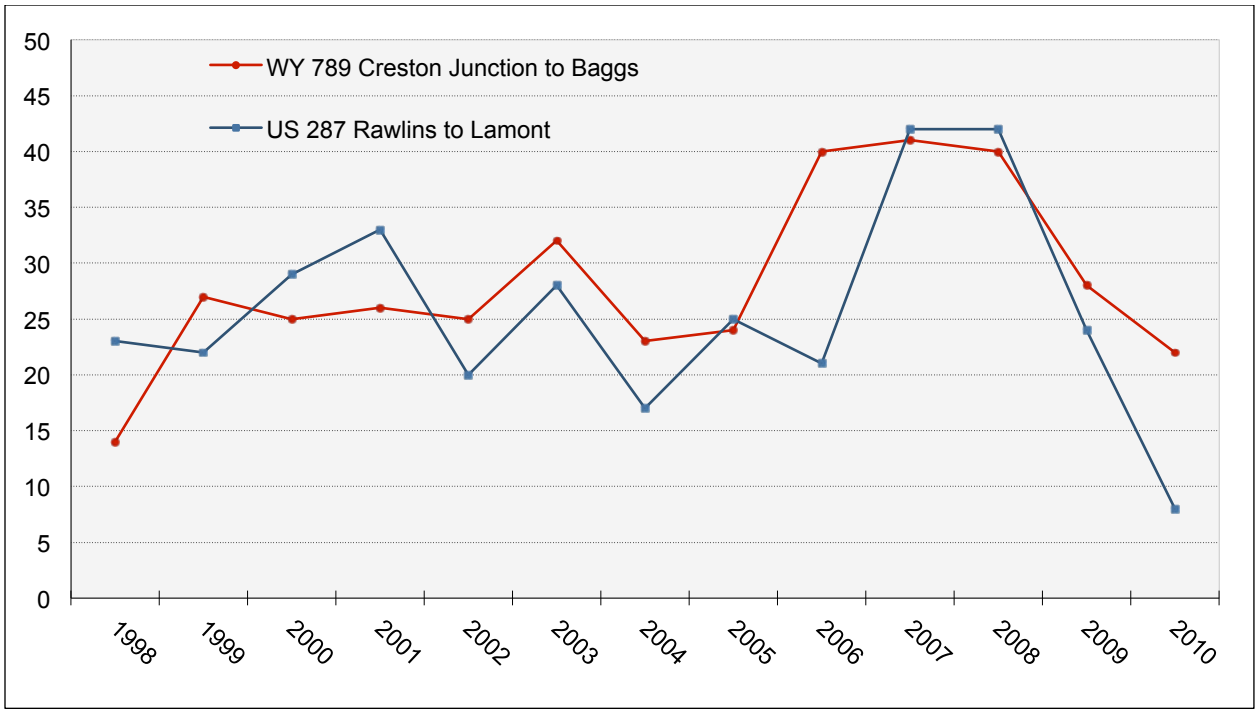


Figure 3.16-2. Annual number of crashes on WY 789 between Creston Junction and Baggs and on US 287 between Rawlins and Lamont: 1998–2010

Source: WYDOT/Carpenter 2007, 2008 and 2010

3.16.4 County Roads

Numbered and maintained Carbon and Sweetwater County roads that provide access to and within the project area are shown in **Map 3.16-1**. Other roads that are not numbered or maintained but which may fall under the definition of Public Roads as defined by U.S Revised Statute R.S. 2477—commonly known as R.S. 2477—are not specifically identified on the map. Most of the numbered and maintained county roads displayed on the map were originally developed for grazing and recreational uses but have evolved to become primarily natural gas industry access roads. This change in use, both in terms of volume and load, has resulted in substantial investments of time, equipment, materials, and funds by the counties to substantially reconstruct and maintain the affected roads.

3.16.4.1 Carbon County

Carbon County maintains about 1,000 miles of county roads. Only one Carbon County road is located within the project area: CCR 701, the Wamsutter–Dad Road.

CCR 701 (Wamsutter–Dad Road) provides access to the project area from WY 789 at Dad. Traveling north, the road becomes SCR 23S at the Sweetwater County line and provides access to the Town of Wamsutter and I-80 to the north. CCR 701 is by far the busiest road in Carbon County. The road is a 19.5-mile-long crowned-and-ditched, two-lane gravel road with a 24-foot-wide driving surface. Initially developed to serve ranching and grazing operations in the area, the road has been improved to accommodate the 24-hour/day, 365-day/year industrial level of use that it now receives. CCR 701 is in a constant state of maintenance, repair, and improvement. During 2006, the Carbon County Road and Bridge Department (CCRBD) completed a $1.2 million reconstruction of the road including 6–8 inches of gravel and one-half gallon of magnesium chloride dust-suppressant per square yard of gravel. Given the constant, high level of heavy and overweight vehicle use on CCR 701, portions of the road must be reconstructed every year. In 2008, the CCRBD applied additional gravel to the road along with one-

quarter gallon of magnesium chloride per square yard of gravel. This process was repeated in 2009 along with reclamation of gravel pushed to the roadside during the preceding two years. According to the CCRBD Superintendent, the benefits of the annual gravel/magnesium chloride applications are becoming evident as the program proceeds (Nation 2007).

The lack of a nearby source of suitable gravel with the proper mixture of rock and binder, high fuel costs, and the need for water for construction, road stabilization, and dust suppression are among the challenges that the CCRBD faces in constructing and maintaining county roads. In some cases, the Operators and landowners have cooperated with the county to provide gravel and water for road reconstruction and maintenance.

Vehicle travel speed, particularly that associated with heavy trucks, is a key issue for road maintenance and safety on county roads. During 2007, the CCRBD and Sheriff's Department conducted a speed index survey on CCR 701. As a result of the survey, the Sheriff's Department established a speed limit of 45 miles per hour (mph) on the road and 30 mph for some curves. The Sheriff's department monitors speed on CCR 701 and issues summons for speed-limit violations (Morris 2010).

3.16.4.2 Sweetwater County Roads

Sweetwater County maintains about 1,200 miles of roads and 23 bridges. Sweetwater County roads providing access to and within the project area include SCR 23, 20, 67, 80, and 55. These and all Sweetwater County roads that serve oil and gas industry activities are under a continuous maintenance program that includes grading and spot gravel replacement and accounts for about 77 percent of the Sweetwater County Road and Bridge Department's (SCRBD) annual budget (Gibbons 2007, Radosevich 2007).

- **SCR 23S (Wamsutter–Crooks Gap Road South**) is an 8.2-mile, 24-foot-wide gravel and native-material road that provides access from I-80 and Wamsutter to the north and connects with CCR 701 to the south to form a continuous road to WY 789 at Dad. SCR 23S is a heavily traveled industrial road. During 2007, SCRBD conducted a traffic study at a point 0.5 miles south of the Wamsutter overpass on SCR 23S and counted a total of 11,729 vehicles during a 72-hour period, which averages about 3,910 trips/day for those three days. The SCRBD overlaid six miles of the road with gravel and magnesium chloride during 2007 and the remainder of the road in 2008.
- **SCR 23 N (Wamsutter–Crooks Gap Road North)** is a 44.5-mile, 24-foot-wide gravel and native-material road that travels north from I-80 and Wamsutter to the Sweetwater County line. The road is paved for the first half-mile north of Wamsutter. The 2007 SCRBD traffic study counted 2,792 vehicles in a 72-hour period on the road or a daily average of 931 trips for the three-day period.
- **SCR 67 (Tipton North Road)** is a 24-foot-wide gravel and native-material road that travels north from I-80 at Tipton to a point north of Luman Butte, just outside the northwest corner of the project area. This route is divided into two segments. The first segment travels 25 miles north from I-80 to SCR 20, merges with SCR 20 (Luman Road) and travels west for about one mile, and then travels about 10 miles north of SCR 20.
- **SCR 20 (Luman Road)** is a 28.3-mile, 20-foot-wide native-material road that travels west from SCR 23 at about mile 13 near Denison Gap, crosses SCR 67 at mile 25.5 and proceeds westward to connect with SCR 21 about 3.5 miles west of the project area boundary.
- **SCR 46** travels west from WY 789 about one mile south of I-80 for approximately 2 miles, paralleling the Union Pacific railroad right-of-way to the former Creston Siding.
- **SCR 80 (Tipton Station Road)** is a 0.8-mile, 15-foot-wide native-material road that travels south from I-80 at Tipton and connects with an unnamed BLM road that provides access to lands along the southwestern boundary of the project area.
- **SCR 55 (Table Rock Road)** is a 4.6-mile, 20-foot-wide native-material road that provides access from I-80 to a small portion of land at the extreme western border of the project area.

3.16.5 BLM Roads

A number of BLM-designated roads provide access within the project area. BLM has right-of-way agreements for all private lands crossed by three of the roads; other BLM numbered roads within the project area do not have right-of-way agreements in place for all the private lands crossed. Operators who need to use these roads to access leases must obtain their own right-of-way agreements with private landowners. Agency maintenance of BLM roads is relatively minimal; the RFO has one road-grader for 1,700 miles of roads in the RFO area. In some cases the operators maintain heavily used segments of BLM roads.

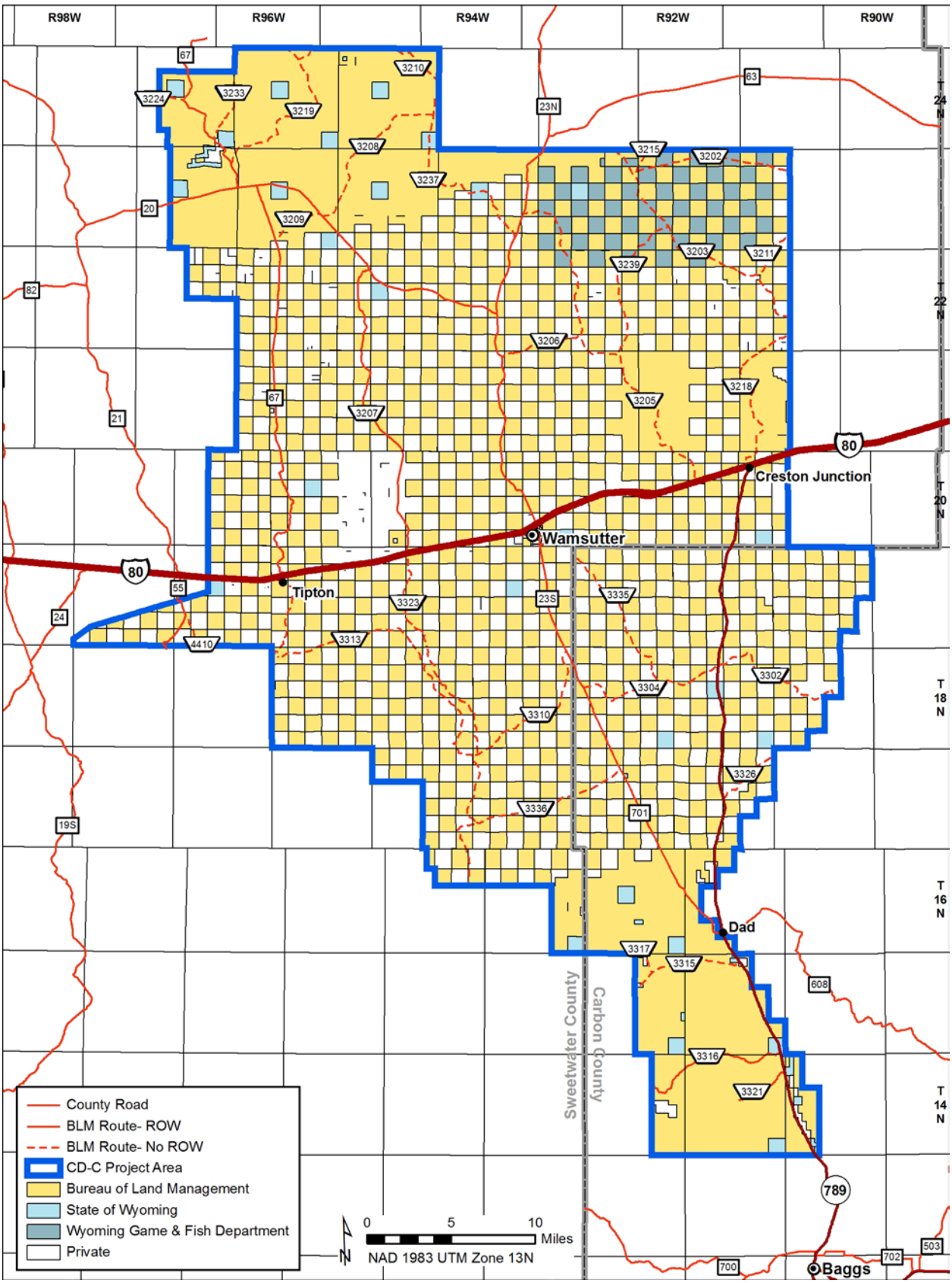
Most of the BLM-designated roads used to access natural gas development and production areas within the project area were not designed or constructed to accommodate heavy truck traffic and continuous all-weather use. As noted above, operators often improve and maintain roads that access development and production areas and some have developed agreements with private landowners for road improvement and maintenance. Dust, excessive speed, conflicts with livestock, and damage to grazing improvements such as fences, gates, and cattle guards are frequent problems within the project area (Miller 2007).

3.16.5.1 BLM Roads with Right-of-Way Agreements

- **BLM Road 3207 (Red Desert Road)** provides access to the north-central portion of the project area from I-80 at Red Desert. The road extends about 18 miles north towards the Lost Creek Basin.
- **BLM Road 3316 (Robbers Gulch Road)** travels west from WY 789, providing access into and across the southern portion of the project area about 15 miles north of Baggs.
- **BLM Road 3321 (Little Robber Road)** travels west from WY 789 for about five miles and provides access into the southern portion of the project area about 11 miles north of Baggs.

3.16.5.2 BLM Roads Without Full Right-of-Way Agreements

- **BLM Road 3202 (Stratton Road)** traverses the northeast corner of the project area for about 9 miles, connecting with BLM Road 3203 to the west and exiting the project area to the east.
- **BLM Road 3203 (Riner Road)** provides access to the northeast side of the project area from I-80 at Riner, about 14 miles east of Rawlins. The road extends about 10 miles to the northwest from I-80 before it enters the project area and then travels another 15 miles to the northwest before exiting the project area. Currently the road is not heavily used by gas industry traffic; rather it primarily provides access for ranchers, grazing operators, and recreation users of the area.
- **BLM Road 3205 (Continental Divide Road)** travels northwest from I-80 at Continental Divide, intersecting with SCR 23N near the northern boundary of the project area. BLM 3205 also intersects with BLM 3239 about 10 miles from its beginning.
- **BLM Road 3206 (Mineral X Road)** provides access east from SCR 23N to the Monument Lake area of the north-central project area, connecting with BLM 3205.
- **BLM Road 3208 (Lost Lake Road)** travels northeast from its origin on SCR 20 in the northwestern portion of the project area for about five miles to its intersection with BLM 3237, which then exits the project area.
- **BLM Road 3209 (Tipton Road)** connects SCR 20 to SCR 67 just below Horseshoe Bend in the northwestern part of the project area, a distance of about 3 miles.
- **BLM Road 3210 (Eagle's Nest Road)** connects SCR 23N with BLM Road 3219 in the northwestern portion of the project area. For most of its length, BLM 3210 is outside the northern boundary of the project area.



Map 3.16-2. Highways, County Roads, and BLM roads within the CD-C project area

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

- **BLM Road 3211 (Larsen Knoll Road)** travels northeast for about 3 miles from its origin on BLM Road 3203 in the northeastern portion of the project area and then exits the project area.
- **BLM Road 3215 (Sooner Road)** travels north from its origin at BLM Road 3203 in the northeast corner of the project area and exits the project area within several miles.
- **BLM Road 3218 (Creston Junction Road)** travels north from I-80 at Creston Junction and travels about 8 miles north, exiting the project area on the eastern boundary.
- **BLM Road 3219 (Red Creek Road)** extends northeast from SCR 67 in the northwest corner of the project area and travels about 10 miles to an intersection with BLM 3210 and then exits the northern boundary of the project area.
- **BLM Road 3224 (Cronin Draw Road)** travels west from its origin at SCR 67 in the extreme northwest corner of the project area, exiting the project area within several miles.
- **BLM Road 3233 (Bush Lake Road)** travels north from its intersection with SCR 67, just north of Luman Ranch and exits the project area several miles to the north.
- **BLM Road 3237 (Government Reservoir Road)** travels northwest from its origin on SCR 23, providing access to the Lost Creek Butte area in the far north central portion of the project area
- **BLM Road 3239 (Chain Lakes Rim Road)** originates at BLM 3205 about 10 miles north of I-80 and travels to the east for about 8 miles, intersecting with BLM 3203 and providing access to the Chain Lakes area.
- **BLM Road 3302 (Divide Road)** extends east from WY 789 about 7 miles south of Creston Junction and provides access to the eastern border of the project area.
- **BLM Road 3304 (Eight Mile Lake Road)** provides access to the Creston/Blue Gap area on the west side of WY 789, terminating to the west at CCR 701 just south of its starting point at the Sweetwater County line.
- **BLM Road 3310 (Barrel Springs Road)** intersects SCR 23 about 7 miles south of Wamsutter and provides access to the southwest area of the project area.
- **BLM Road 3313 (Delaney Rim Road)** provides access from I-80 at Tipton to the southwestern part of the project area. The road travels about 5 miles south and then travels east along the south and east sides of the Delaney Rim for about 16 miles.
- **BLM Road 3315 (Standard Road**) travels west about 6 miles from its intersection with WY 789 about 2 miles south of Dad, providing access to the Blue Gap area.
- **BLM Road 3317 (Windmill Draw Road)** travels north from BLM Road 3315 to connect with several unnamed roads on the western edge of the project area.
- **BLM Road 3323 (Red Desert Road South)** extends south into the project area from I-80 at Red Desert. The road travels about 11 miles and provides access to the east side of the Delaney Rim and Barrel Springs Draw areas.
- **BLM Road 3326 (China Butte Road)** travels northeast for about 3 miles from its origination at WY 789 about 9 miles north of Dad, skirting Baldy Butte on the west and exiting the eastern boundary of the project area.
- **BLM Road 3335 (Echo Springs Road)** travels southeast for about 11 miles from its origin on SCR 23S just south of Wamsutter to its intersection with BLM Road 3304.
- **BLM Road 3336 (Eureka Headquarters Road**) travels for about 10 miles southwest from its intersection with CCR 701 about 3 miles southeast of the Sweetwater County line, providing access to the Barrel Springs area.
- **BLM Road 4410** [not shown on map] originates at SCR 55 about 2.5 miles south of I-80 in the western portion of the project area and travels south, exiting the project area in about 1.5 miles.

3.16.6 2007 Drilling and Production Traffic

Based on the per-well drilling/field-development and production operations factors used for the transportation assessment (**Section 4.16**), it is estimated that during 2009, a total AADT of 1,525 (including an AADT of 629 trucks) was generated by natural gas drilling and production activities within the project area. As noted in **Section 3.16.3**, an estimated total AADT of 1,060 traveled on highways providing access to the project area and the remainder occurred on county, BLM, and private roads within the project area.

3.17 NOISE

The common measure of noise in the United States is the A-weighted sound pressure level that measures noise in decibels (dBA). Although the EPA does not regulate noise, the EPA-identified guidance for acceptable environmental noise is 55 dBA. Noise levels greater than 55 dBA may disturb local residents and recreationists and could displace area wildlife. The degree of disturbance depends on the receptor's distance from the source, noise intensity and duration, as well as the sensitivity of the receptor.

The human ear is more sensitive to sound in the frequency range 1 to 4 kilohertz (kHz) than to sound at very low or high frequencies (EngineeringToolBox.com 2011). An A-weighting filter de-emphasizes low frequencies or pitches and therefore is less sensitive to very high and very low frequencies. Very high sound levels are more appropriately measured using the C scale. Measurements made on this scale are expressed as dBC (University of New South Wales 2011); C filters are seldom used (EngineeringTool-Box.com 2011). Animals tend to hear sound at frequencies that humans cannot; the C-weighted decibel scale may be appropriate for evaluating effects of some sounds on other species. For example, dogs hear noises up to 45 kHz, while humans only hear sounds up to about 23 kHz. This means that they could be hearing and responding to sounds that humans cannot hear at all. Cats can hear sounds as high as 64 kHz, bats up to 110 kHz, and porpoises up to 150 kHz (U.S. Department of Energy 2011).

Median noise levels for the project area likely range from 20 to 40 dBA in the morning and evening and from 50 to 60 dBA in the afternoon when wind speeds are typically greatest. These levels correspond to noise levels of a soft whisper (30 dBA), a library (40 dBA), a quiet office (50 dBA), a small town (40–50 dBA), and a normal conversation (60 dBA). Additional noise comes from aircraft, traffic on county roads and state highways, operation of the existing gas compression stations, natural gas drilling and production areas, and transportation (railroad and interstate highway) corridors. Existing noise levels within the project area are for the most part representative of rural conditions and are expected to be between 35 and 45 dBA (Harris 1991), except near county roads and compressor stations where noise levels may be as high as 65 dBA. Noise may exceed 70 dBA in close proximity to specific pieces of equipment or operations (**Table 3.17-1**).

The BLM measured various aspects of development operations in the Jonah Field in western Wyoming and found flaring activities to be the loudest source of noise followed by drilling operations and compression. At 0.25 miles from the activity, noise was reduced to below the 55 dBA level (BLM 2006b). Mitigation measures such as hospital-grade mufflers on compressors and flowback separators on high-intensity flaring operations aid in reducing noise to acceptable levels. Noise levels from traffic along the interstate typically average greater than 70 dBA (BLM 2005d). Blickley and Patricelli (2010) provide the following insight relative to noise generated by human activities: "Most anthropogenic noise sources have energy concentrated in low frequencies (<250 Hz), which can travel long distances with relatively little energy loss. Such noise is also more difficult to control using traditional noise-abatement structures, such as noise reflecting or absorbing walls along highways or surrounding other fixed noise sources, such as industrial sites."

The majority of the compressor stations in the CD-C project area may already meet the recommended 55 dBA (with an average day/night noise level of 49 dBA) for noise impacts to sensitive receptors at 0.25

mile (1,320 feet) from the source (Schomer 2005). This standard is commonly applied by the BLM to compressor stations within oil and gas development projects (BLM 2003).

Table 3.17-1. Noise measurements from common natural gas drilling and production equipment

Description	HP[1]	dBA[2]	dBC[2]
Compression Equipment			
Two (2) Caterpillar 3516 compressor engine with noise wall	1,000	45	---
Two (2) Caterpillar 3516 compressor engine without noise wall	1,000	50	---
Two (2) Waukesha H24 and F18 compressor engines	---	75	---
Two (2) Electric driven compressors	---	65	---
One (1) Ajax Cooper 2802 compressor engine	250	51	---
One (1) Ajax Cooper 2803 compressor engine	400	52	---
One (1) Caterpillar or Waukesha compressor engine	1,200	75	---
One (1) Caterpillar or Waukesha compressor engine with high-performance intake and exhaust silencers	1,200	70	---
One (1) Waukesha 5794LG compressor engine; fan end	1,000	91	95
One (1) Ajax/Cooper compressor engine with weather cover	4,000	---	76
One (1) Cummins electric generator skid unit	1,000	69	---
One (1) Caterpillar 3608 compressor engine w/ 2 heat exchangers	---	79	---
One (1) Caterpillar 3608 compressor engine	1,000	58	---
One (1) Champlin 242J-12 Ajax wellhead compressor	---	71	86
One (1) Caterpillar 3516 compressor engine; fan end, quiet fan	1,000	63	---
Well Site Equipment			
One (1) Dehydrator boiler	15	52	---
One (1) Disposal-well pump building with electric motors inside	---	53	---
Drill Rig			
One (1) Drill rig	---	69	---

[1] *HP = horsepower*
[2] *Decibels, measuring sound using either an A-weighted or C-weighted filter for sensitivity to different frequencies.*
Source: Noise Emission Data Levels at 100 ft. collected by Engineering Dynamics Incorporated.

The project area is sparsely populated and rural in nature. Noise-sensitive areas would include private residences, Greater Sage-Grouse habitats used during breeding and nesting seasons, mountain plover nesting areas, and occupied raptor nests. The ARMPA (BLM 2015b) provides this management decision for the benefit of Sage-Grouse "SSS 12: New project noise levels, either individual or cumulative, should not exceed 10 dBA (as measured by L50) above baseline noise at the perimeter of the lek from 6:00 pm to 8:00 am during the breading season (April 1–May 15). Specific noise protocols for measurement and implementation will be developed as additional research and information emerges." Similarly, there is an RDF that "limits noise to less than 10 decibels above ambient (20-24 dBA) at sunrise at the perimeter of a lek during active lek season." The SGEO (SWEO 2015) provides similar protection.

Occupational Health and Safety (OSHA) has established noise standards that are referred to as "action levels." The basic OSHA noise limit exposures are an 8-hour time-weighted average of 85 dBA or a dose of 50 percent (29 CFR 1910.95(c)(2)). Occupational exposure to noise levels in excess of 85 dBA requires monitoring and mitigation, preferably by engineering means, to protect workers.

■ MANAGEMENT ENVIRONMENT

3.18 RANGE RESOURCES

3.18.1 Introduction

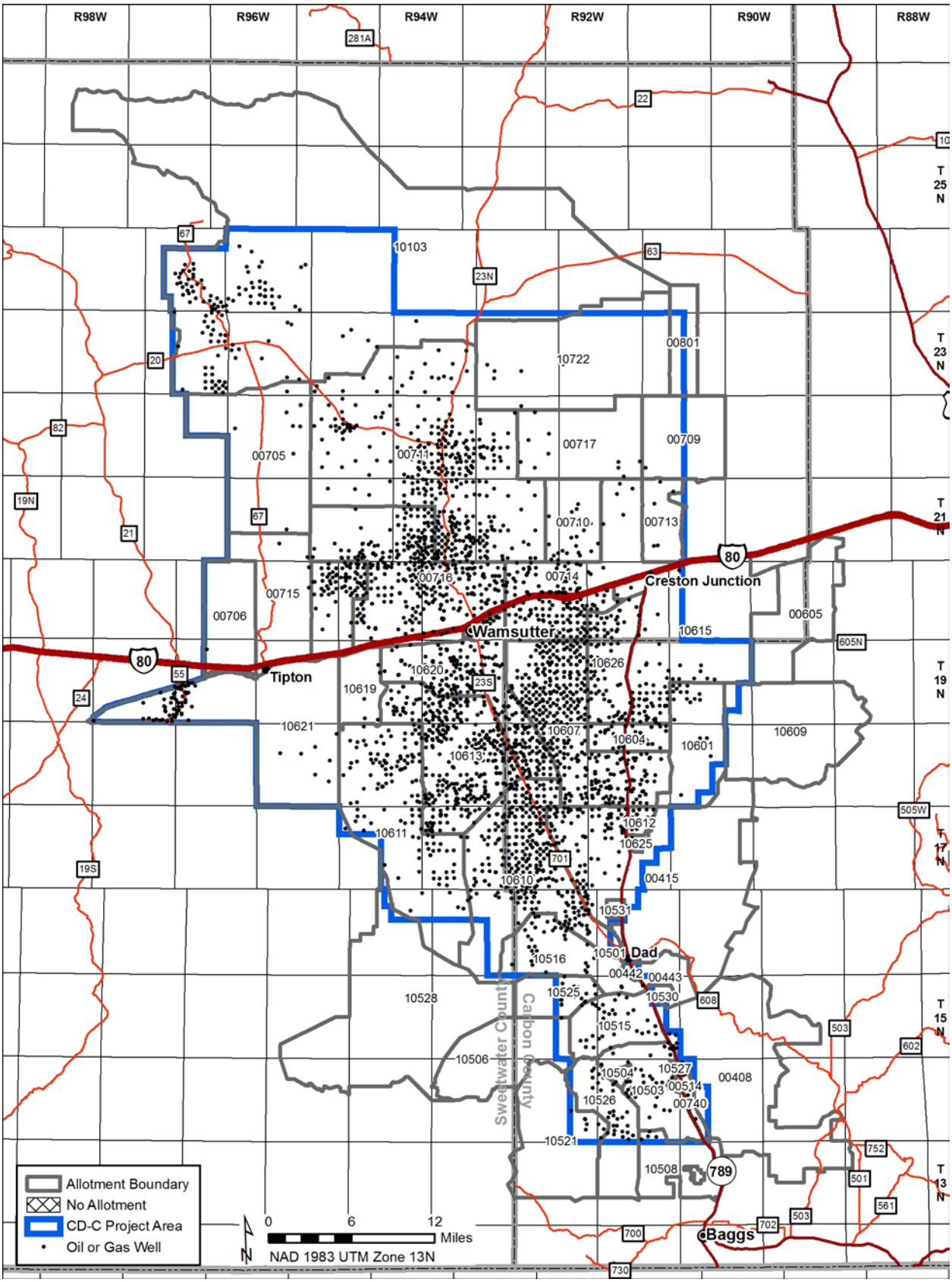
There are 47 allotments permitted for grazing use on public lands in the project area; their locations and boundaries are shown in **Map 3.18-1**. An allotment is defined as an area of land designated and managed for the grazing of livestock by one or more livestock operators. An allotment usually consists of public lands, but may include parcels of private and other federal or state-owned lands. Allotment size within the CD-C project area ranges from 120,536 acres (Cyclone Rim Allotment, 10103) to 118 acres for the Adam's Ranch Allotment, 10501. Two of the larger allotments (Cyclone Rim and Monument Lake 00711) make up approximately 23 percent of the total surface of the project area (**Table 3.18-1**).

Historical cattle use in this area began in 1871 when Noah Reader brought 2,000 head that were turned out at the mouth of Savery Creek south of the project area. Later in 1873, George Baggs brought 2,000 head into the valley near the vicinity of the town bearing his name (Baggs, WY). Livestock numbers increased rapidly until the disastrous winter of 1886–87 which ended the open-range industry in Wyoming when an estimated 65 percent of the state's cattle died in a series of extreme blizzards accompanied by unprecedented frigid temperatures (Bennett 1999, Larson 1942). In the absence of cattle, sheep soon became the dominant livestock in the area and were dominant from the 1890s through the 1950s. The peak in sheep numbers in Wyoming occurred in 1909 when a total of 6,023,000 animals was recorded (NASS 2004). The total inventory of sheep in Carbon County has steadily decreased over the years to about 8,200 head recorded in 2013 (NASS 2013); in Sweetwater County, the total for sheep in 2013 was 12,400. Cattle numbers have slowly risen through the years, with many sheep allotments converting back to cattle use in the 1960s through the 1980s. The peak number of cattle in Wyoming occurred in 1975 at 1,690,000 head, compared to 1,290,000 head in 2013. The most recent cattle inventory in Carbon County was 86,000 head; in Sweetwater County, it was 19,000 (NASS 2013).

The affected grazing allotments in relation to the major land cover types within their boundaries are shown in **Map 3.18-1**. These allotments, which overlap portions of the CD-C project area, total 1,616,637 acres; approximately 1,050,200 acres (65.0 percent) are located within the CD-C project area. In the extreme western portion of the project area, the Rock Springs Field Office manages three small grazing allotment inclusions, totaling about 1,289 acres. A total of five locations within the project area are not part of an allotment. The composite total of these five locations is about 19,942 acres. The largest such area is north of the Red Desert/I-80 exit and consists mainly of numerous private ranchettes.

The 47 grazing allotments (**Table 3.18-1**) are permitted for a total of approximately 191,746 Animal Unit Months (AUMs), of which an estimated 123,910 would be available from within the CD-C project area. An AUM is defined in the Rawlins RMP FEIS as "a standardized unit of measurement of the amount of forage necessary for the sustenance of one animal unit for 1 month." (BLM 2008a). For fee calculation, an AUM is defined in the Rawlins RMP FEIS as "a unit of measurement that represents the privilege of grazing one animal unit for 1 month" (BLM 2008a).

Cattle operations in the project area are primarily cow/calf pairs. Cattle use occurs during all seasons, including winter use both south and north of I-80. Winter use depends mainly on the location of the allotment and the requirements of each individual livestock operation. Each allotment is usually used for one season, or longer if use is rotated between pastures. Most cattle operators using the project area calve on the range versus their homeplace.



Map 3.18-1. Grazing allotments in the CD-C project area

No warranty is made by the BLM for use of the data for purposes not intended by the BLM.

Sheep use is limited within the project area and is confined predominantly to the Willow Creek (10528), Mexican Graves (10516), South Barrel (10525), South LaClede (10610), North LaClede (10613), Red Creek (10521), Cherokee (00408), Chain Lakes (10722), Badwater (10601), South Wamsutter (10620), and Cyclone Rim (10103) allotments. The Chain Lakes and Cyclone Rim allotments located in the northern portion of the project area are primarily for winter use.

Table 3.18-1. Estimated allotment acreage and AUMs within the CD-C project area

Allotment number	Allotment name	Acres[1]		Percent		AUMs[1]		
		Entire allotment	Within CD-C[2]	Of entire allotment	Of all allotted acreage	Entire allotment	Acres per AUM (stocking ratio)	Within CD-C[2]
00408	Cherokee	66,491	3,803	5.7	0.36	9,963	7.2	531
00415	Doty Mountain	85,936	28,903	33.6	2.75	10,111	7.9	3,660
00442	Dad	675	620	91.7	0.06	114	6.4	97
00443	East Muddy	6,174	620	10.0	0.06	796	7.7	80
00514	Little Robber	507	507	100.0	0.05	250	1.9	264
00705	Red Desert	46,560	46,557	100.0	4.43	4,075	11.5	4,060
00706	G.L.	19,039	19,039	100.0	1.81	2,551	7.5	2,540
00709	Jawbone	23,029	11,449	49.7	1.09	2,570	9.0	1,272
00710	Monument Draw	15,344	15,344	100.0	1.46	1,834	8.4	1,825
00711	Monument Lake	119,666	119,666	100.0	11.39	15,324	7.8	15,270
00713	North Creston-West	10,662	10,646	99.9	1.01	1,938	5.6	1,898
00714	Latham	40,161	40,159	100.0	3.82	5,116	7.8	5,148
00715	North Tipton	26,199	26,199	100.0	2.49	2,972	8.8	2,981
00716	North Wamsutter	59,808	59,808	100.0	5.69	6,296	9.1	6,587
00717	Ruby Knolls	30,094	30,094	100.0	2.87	3,159	9.5	3,151
00740	Grieve Pasture	2,176	2,136	98.2	0.20	220	9.9	216
00801	Larson Knolls	10,215	3,843	37.6	0.37	1,287	8.0	480
10103	Cyclone Rim	307,361	120,536	39.2	11.48	42,975	7.2	16,785
10501	Adam's Ranch	305	118	38.8	0.01	773	0.4	323
10503	Big Robber	17,605	17,605	100.0	1.68	1,580	11.1	1,591
10504	Big Robber Spreaders	1,129	1,129	100.0	0.11	114	9.1	124
10506	Continental	25,774	2,091	8.1	0.20	2,817	9.3	224
10508	Cottonwood Hill	14,560	1,208	8.3	0.12	790	18.3	66
10515	Mexican Flats	15,497	15,493	100.0	1.48	1,738	9.0	1,712
10516	Mexican Graves	20,264	19,782	97.6	1.88	1,976	10.2	1,932
10521	Red Creek	32,288	3,984	12.3	0.38	3,036	10.6	376
10525	South Barrel	10,298	4,716	45.8	0.45	1,037	9.9	478
10526	South Flat Top	19,010	11,342	59.7	1.08	1,771	10.6	1,066
10527	V Spreaders	337	337	100.0	0.03	150	2.1	158
10528	Willow Creek	76,422	1,180	1.5	0.11	5,468	14.3	83
10530	South Muddy	1,569	182	11.6	0.02	123	12.7	14
10531	George Dew	1,011	1,010	99.9	0.10	215	4.1	249
10601	Badwater	22,303	20,760	93.1	1.98	2,662	8.2	2,538
10604	Coal Bank Wash	7,640	7,640	100.0	0.73	1,053	7.3	1,049
10607	Echo Springs	45,500	45,500	100.0	4.33	5,093	9.1	5,022
10609	Fillmore	41,969	1,380	3.3	0.13	6,422	6.2	222
10610	South Laclede	52,944	48,032	90.7	4.57	5,948	9.0	5,322
10611	North Barrel	59,296	52,816	89.1	5.03	6,875	8.1	6,493
10612	North Pine Butte	2,322	2,322	100.0	0.22	224	10.5	221

Table 3.18-1. Estimated allotment acreage and AUMs within the CD-C project area, *continued*

Allotment number	Allotment name	Acres[1]		Percent		AUMs[1]		
		Entire allotment	Within CD-C[2]	Of entire allotment	Of all allotted acreage	Entire allotment	Acres per AUM (stocking ratio)	Within CD-C[2]
10613	North Laclede	41,501	41,501	100.0	3.95	4,323	9.7	4,300
10615	Riner	55,978	33,507	59.9	3.19	7,036	8.1	4,139
10619	South Red Desert	10,404	10,404	100.0	0.99	1,680	6.2	1,686
10620	South Wamsutter	31,408	31,408	100.0	2.99	2,648	11.7	2,681
10621	Tipton	58,202	58,112	99.8	5.53	9,540	6.4	9,136
10625	South Pine Butte	968	968	100.0	0.09	217	4.9	199
10626	Lazy Y S Ranch	17,865	17,865	100.0	1.70	1,898	6.2	2,880
10722	Chain Lakes	62,170	57,874	93.1	5.51	2,988	20.8	2,778
n/a	No allotment[3]	0	19,942					
	Total	1,616,637	1,050,200	65.0	100.0	191,746	8.6	123,910

[1] *Totals include all lands: private, public, and state.*
[2] *Estimated.*
[3] *Not included in totals.*

The establishment and rapid spread of halogeton—a plant toxic to sheep and cattle —in the project area has adversely affected livestock operations, especially sheep. Sheep losses due to halogeton are estimated to range between 150 to 200 head per year (Calton 2008). Cattle and domestic horses can also be poisoned by ingesting halogeton. Most livestock losses occur when hungry animals are allowed to graze in heavy infestations of halogeton. The toxic effect of ingesting halogeton is due to the high level of toxic sodium oxalates that occur in the plant, especially in the leaves. Halogeton is toxic at all growth stages but toxicity increases as the plants mature. Herbivorous wildlife have been observed to consume halogeton but it is believed their highly varied grass/forb/shrub diet prevents the animals from ingesting a lethal dose (Pfister 2012). Although undocumented, this probably applies to wild horses as well.

According to grazing regulations that became effective on August 12, 1995, the State Director of the Wyoming BLM is required to develop and implement standards for healthy rangelands and guidelines for grazing management (Standards for Healthy Rangelands & Guidelines for Livestock Grazing Management for the Public Lands Administered by the BLM in the State of Wyoming at: < http://www.blm.gov/wy/st/en/programs/grazing/standards_and_guidelines/-standards.html>). Standards apply to all uses of BLM-administered public lands in Wyoming and represent the minimum acceptable conditions for public rangelands. The guidelines apply only to livestock grazing. The Wyoming standards and guidelines were submitted to the Secretary of the Interior in July 1997 and were approved August 12, 1997.

The RFO continues to implement or refine BMPs for livestock grazing, which promote perennial vegetation to stabilize stream banks and improve cover and litter on uplands. Season, duration, and distribution of livestock are the principal factors in considering management changes to meet desired resource objectives for both riparian and upland habitats. Specific dates or times must be decided on a case-by-case basis. Methods to achieve this include, but are not limited to: herding, pasture fencing, water developments, and vegetation treatments. Vegetation treatments are designed to restore plant communities with diverse species, age classes, and cover types. The ultimate goal of these rangeland management tools is to improve watershed cover, riparian habitat, and upland plant communities to ensure that long-term range quality and national and Wyoming BLM Standards for Healthy Rangelands are being met.

The Wyoming BLM Standards for Healthy Rangelands are the basis for assessing and monitoring rangeland conditions and trends. The assessments evaluate the standards and are conducted by an interdisciplinary team (IDT) with participation from permittees and other interested parties. Assessments are only conducted on BLM-administered public land; however, interpretation of watershed health and water quality may reflect on all land ownerships within the area of analysis. The six standards are as follows:

- Standard 1 – Watershed Health
- Standard 2 – Riparian/Wetland Health
- Standard 3 – Upland Vegetation Health
- Standard 4 – Wildlife/Threatened and Endangered Species Habitat Health, Fisheries, Weeds
- Standard 5 – Water Quality
- Standard 6 – Air Quality

From 1998 through 2000, the RFO conducted Standards and Guidelines Assessments on an allotment basis; in 2001, larger-scale watershed-based reports were undertaken. The Upper Colorado River and the Great Divide Basin were the first two watershed reports completed (2002 and 2003, respectively). The Upper Colorado River Basin was reassessed in 2011 (BLM 2012i) and the Great Divide Basin was reassessed in 2012 (BLM 2013b). Management progress as well as range improvements resulted in substantially meeting standards and guidelines in these watersheds within the CD-C project area. An exception is noted in the Upper Colorado River Basin assessment. Management progress as well as range improvements resulted in substantially meeting standards and guidelines in these watersheds within the CD-C project area, in all but the Cherokee allotment—3,803 acres of which are located in the CD-C project area, which did not meet Standard 2, Riparian/Wetland. According to the assessment, "The current grazing management of spring cattle use in the Muddy Creek pasture has improved condition and function but needs additional time to allow channel width-to-depth ratios to decrease in order to meet proper functioning condition."

The recent extensive drought in this area of Wyoming has affected livestock operations in several ways, including (1) the low soil-moisture levels associated with drought which limit plant growth and reduce forage yields; (2) the low soil moisture which limits root growth and makes it more difficult for range plants to reach scarce soil moisture; (3) low germination rates which hamper successful revegetation efforts; and (4) over a series of drought or dry years, a shift in plant species to weedy, less-productive species (e.g., desert alyssum, halogeton, etc.).

3.18.2 Existing Allotment Disturbance

GIS analysis of the project surface area was performed to estimate the total area of existing disturbance by allotment. The disturbance terminology was standardized to conform to that of Bargsten (2005) with the exception that all existing roads, pipeline disturbances, gas-compression facilities, storage-tank complexes, man-camps, construction/pipe yards, etc., were included in the HWA GIS analysis, regardless of whether or not they serviced an individual well or several. Bargsten (2005) defines short- and long-term disturbance as follows.

Short-term disturbance area: the maximum areal extent of ground disturbance associated with construction, drilling, and completion of an individual natural gas well, including the well pad, reserve pit, spoils pile(s), topsoil stockpile(s), and access road authorized to serve that individual well. The concept is referred to elsewhere in this document as *initial* disturbance.

Long-term disturbance area: the areal extent of un-reclaimed disturbance after interim reclamation occurs at an individual natural gas well. This is equal to the "life-of-project" disturbance area and represents the area, when interim reclamation is complete, that will remain in a disturbed state until the

well is plugged and abandoned. This includes the production facilities, dehydrator, separator, wellhead, production tanks, and access road area that is surfaced and/or maintained free of vegetation.

The existing initial and long-term disturbance acres of the 47 CD-C allotments are shown in **Table 3.18-2**. The disturbance acreage in the five "non-allotments" and the three partial Rock Springs Field Office allotments was calculated but not used for AUM calculation results. The disturbance percentages represent the part of the allotment that is within the CD-C project area.

Table 3.18-2. Historic surface disturbance by allotment, initial and long-term

Allotment number	Allotment name	Total Acres in CD-C project area[2]	Initial[1]		Long-term[1]	
			Disturbance acres	% of allotment	Disturbance acres	% of allotment
00408	Cherokee	3,803	121.1	3.2	21.8	0.6
00415	Doty Mountain	28,903	1,317.4	4.6	211.1	0.7
00442	Dad	620	29.5	4.8	0.8	0.1
00443	East Muddy	620	9.0	1.5	3.6	0.6
00514	Little Robber	507	15.4	3.0	2.6	0.5
00705	Red Desert	46,557	543.5	1.2	100.1	0.2
00706	G.L.	19,039	723.3	3.8	18.4	0.1
00709	Jawbone	11,449	41.3	0.4	17.4	0.2
00710	Monument Draw	15,344	391.9	2.6	88.1	0.6
00711	Monument Lake	119,666	5,332.9	4.5	992.6	0.8
00713	North Creston-West	10,646	82.9	0.8	28.0	0.3
00714	Latham	40,159	2,690.7	6.7	337.5	0.8
00715	North Tipton	26,199	840.5	3.2	109.4	0.4
00716	North Wamsutter	59,808	5,694.9	9.5	820.8	1.4
00717	Ruby Knolls	30,094	341.5	1.1	65.3	0.2
00740	Grieve Pasture	2,136	120.1	5.6	18.4	0.9
00801	Larson Knolls	3,843	15.7	0.4	6.0	0.2
10103	Cyclone Rim	120,536	2,309.7	1.9	533.5	0.4
10501	Adam's Ranch	118	7.0	5.9	0.5	0.4
10503	Big Robber	17,605	639.7	3.6	130.4	0.7
10504	Big Robber Spreaders	1,129	48.4	4.3	5.9	0.5
10506	Continental	2,091	1.6	0.1	0.0	0.0
10508	Cottonwood Hill	1,208	65.2	5.4	16.3	1.4
10515	Mexican Flats	15,493	649.5	4.2	152.8	1.0
10516	Mexican Graves	19,782	613.0	3.1	126.4	0.6
10521	Red Creek	3,984	81.0	2.0	18.9	0.5
10525	South Barrel	4,716	128.2	2.7	32.5	0.7
10526	South Flat Top	11,342	306.1	2.7	77.2	0.7
10527	V Spreaders	337	27.5	8.1	4.3	1.3
10528	Willow Creek	1,180	0.0	0.0	0.0	0.0
10530	South Muddy	182	0.0	0.0	0.0	0.0
10531	George Dew	1,010	6.6	0.7	0.5	0.1
10601	Badwater	20,760	521.6	2.5	87.1	0.4
10604	Coal Bank Wash	7,640	483.4	6.3	79.0	1.0
10607	Echo Springs	45,500	5,012.9	11.0	835.1	1.8
10609	Fillmore	1,380	0.1	0.0	0.0	0.0
10610	South Laclede	48,032	4,185.4	8.7	646.5	1.3
10611	North Barrel	52,816	2,303.5	4.4	384.8	0.7
10612	North Pine Butte	2,322	152.8	6.6	31.7	1.4

Table 3.18-2. Historic surface disturbance by allotment, initial and long-term, *continued*

Allotment number	Allotment name	Total Acres in CD-C project area[2]	Initial[1]		Long-term[1]	
10613	North Laclede	41,501	4,422.8	10.7	556.9	1.3
10615	Riner	33,507	1,271.0	3.8	205.8	0.6
10619	South Red Desert	10,404	204.1	2.0	47.2	0.5
10620	South Wamsutter	31,408	2,674.1	8.5	461.3	1.5
10621	Tipton	58,112	1,577.5	2.7	241.3	0.4
10625	South Pine Butte	968	43.2	4.5	9.9	1.0
10626	Lazy Y S Ranch	17,865	1,130.1	6.3	175.8	1.0
10722	Chain Lakes	57,874	292.6	0.5	85.1	0.1
n/a	No allotment[3]	19,942	1,747.7	n/a	683.5	n/a
Totals		**1,070,142**	**49,218.0**	**n/a**	**8,472.0**	**n/a**

[1] *Totals include all lands, private, public, and state.*
[2] *Estimated.*
[3] *Not included in totals.*

3.19 OIL AND GAS AND OTHER MINERALS

Mineral resources within the CD-C project area include deposits of base and precious metals, bentonite, gypsum, limestone, uranium, zeolite, gravel, and klinker, as well as oil, gas, coal, and CBM (BLM 2003b). Federal mineral management organizes minerals into three categories: locatable, leasable, and mineral materials. Originally, all minerals except coal were obtained under the Mining Law of 1872; however, Congress has removed certain minerals from the operation of the Mining Law. Since 1920, the federal government has leased energy fuels and certain other minerals. Since 1947, the federal government has sold common varieties of sand, gravel, stone, pumice, pumicite, cinders, and ordinary clay. Locatable, leasable, and salable minerals are described below.

Locatable minerals are all minerals subject to exploration, development, and production under the provisions of the Mining Law of 1872. Locatable minerals include both metallic minerals (gold, silver, lead, etc.) and nonmetallic minerals (such as fluorspar, asbestos, mica, and gemstones). Mining claims can be located for such minerals pursuant to 43 CFR Part 3830.

Leasable minerals are subdivided into two classes, fluid and solid.

- Fluid minerals include oil and gas; geothermal resources and associated by-products; and oil shale, native asphalt, oil impregnated sands, and any other material in which oil is recoverable only by special treatment after the deposit is mined or quarried.
- Solid leasable minerals are those leased under the mineral leasing acts and those hardrock minerals leased under Reorganization Plan No. 3 of 1946 (acquired lands), such as coal and phosphates.

Leasable minerals are managed under the Mineral Leasing Act of 1920, as amended and supplemented.

Mineral materials, also termed "salable" minerals, include common varieties of sand, stone, gravel, pumice, pumicite, cinders and clay, which are generally put to use in building and construction. BLM disposes of mineral materials via contract sales where the material is sold by the ton or cubic yard at fair market value, or provides them to governmental entities or nonprofit organizations under free use permit pursuant to the regulations at 43 CFR Part 3600.

3.19.1 Locatable Minerals

The most abundant locatable mineral found in the CD-C project area is uranium. The Wyoming State Geological Survey's *Uranium Map of Wyoming* (WSGS 2010) shows four uranium mining districts in or near the CD-C project area. *Mining district* refers to recognized areas of discovery and exploration for identified locatable minerals. The Great Divide Basin Mining District is the largest and the only one within the CD-C project area, overlapping the upper third of the project area. Uranium-bearing prospects there occur in arkoses of the Battle Spring Formation (Pipiringos 1961) that is exposed just west of the project boundary; in coals of the main body of the Wasatch Formation, north of Wamsutter (Masursky 1962); and around the towns of Creston and Latham (Harris *et al.* 1985, Harris and King 1993). The only notable site of mining claims for locatable minerals in the CD-C project area is located within the Great Divide Basin sedimentary uranium deposits. Over 80 mining claims have been filed in sections 3, 10, 12-15, 24, and 35, T23 N:R94W in the north central portion of the project area, along the Crooks Gap Road (available at: http://www.blm.gov/landandresourcesreports/rptapp/criteria_select.cfm?rptId=19&APPCD=2&).

The Poison Basin (Baggs) Mining District lies just west of the town of Baggs and about five miles outside the CD-C project's southern boundary. The Ketchum Buttes District lies about 15 miles east of the project area in T15N:R89W. A fourth district, the Crooks Gap-Green Mountain Minding District, is located about 20 miles north of the project area boundary.

No uranium development activity has taken place within the CD-C project area, but historic activity has occurred in all four of the described districts and the Great Divide Basin and Crooks Gap-Green Mountain districts contain several proposed and active new developments. One, the Lost Creek Uranium In-Situ Recovery Project, is located several miles north of the CD-C project's northern boundary in sections 16–20, T25 N:R92W and sections 13, 24, and 25, T25N:R93W. The mine is expected to be in operation for about 12 years.

3.19.2 Leasable Minerals

Coal and CBM occur in Tertiary and Cretaceous-age geologic formations, and oil and gas occur in geologic formations of Tertiary, Cretaceous, Jurassic, Triassic, and Pennsylvanian age underlying the project area. Oil shale resources occur within the Green River Formation in the Washakie Basin; however, the most geologically prospective oil shale resources of the Washakie Basin occur to the southwest of the CD-C project area (2012 Oil Shale and Tar Sands Draft Programmatic EIS, posted at http://ostseis.anl.gov/documents/peis2012/) and so this resource will not be discussed further in this document. Other leasable minerals that occur within the CD-C project area are phosphate and sodium. The 2003 *Mineral Occurrence and Development Potential Report*, prepared for the RFO RMP (BLM 2003b), indicates that the potential for development of phosphate is low. The report also concluded that the nature of the sodium deposits within the RFO (including the CD-C project area), in conjunction with the available domestic production capacity, suggests that there is little potential for commercial exploitation of the RFO's phosphate deposits. Because the potential for development is low, phosphate and sodium will not be discussed further in this document.

3.19.2.1 Coal and Coalbed Methane

Fort Union Formation

The Fort Union Formation of south and southwest Wyoming constitutes an enormous, largely untapped reserve of coal. Coals occur throughout the formation, but are thickest and most continuous in its lower part (the lower coal-bearing unit) (Smith *et al*. 1972, Sanders 1974 and 1975, Beaumont 1979, Edson 1979, Hettinger and Brown 1979, Honey and Roberts 1989, Honey and Hettinger 1989b, Honey 1990, Jones 1991, Hettinger *et al*. 1991).

Within and adjacent to the project area, coal seams of the Fort Union Formation comprise the Creston-Cherokee and Green River coals. These coals are best developed along the east side of WY 789 in T19N:R92W and include about 20,364 leasable acres.

Studies of the Fort Union Formation coals in the project area and adjacent areas have been conducted by Sanders (1974, 1975), Edson (1979), Honey and Hettinger (1989b), Honey and Roberts (1989), and Honey (1990). As many as ten coal seams have been mapped in the subsurface with individual seams averaging 10 to 20 feet thick, but thickening to as much as 40 feet. Net coal thickness increases in the subsurface southward toward the Baggs area where it may reach a maximum of about 75 feet. Thicker Fort Union coals have been interpreted to have accumulated in flood plains above and on the flanks of major Paleocene-age, south/north-oriented river systems. Thinner coal seams accumulated away from these main trunk streams.

The Fort Union Formation is a primary CBM target in the southeastern Greater Green River Basin, but the formation crops out at the surface only in the easternmost part of the project area, so few if any of the coalbeds that dip westward are buried deep enough to be candidates for development. Deeper buried coalbeds west and south of the area have ash-free gas contents generally less than 100 standard cubic feet per ton, but ranging from 9 to 561 scf/ton. Scott *et al*. (1994) estimated coal gas reserves in the western and southwestern parts of Carbon County underlying the project area to be less than 2 billion cubic feet (Bcf) per square mile (mi^2) near the eastern margins of its subcrop, to 6–8 Bcf/mi^2 in deeper buried areas north and west of Baggs. These values may be enhanced by migration of gases into the area from deeper parts of the basin. Based on vitrinite reflectance percentages from wells in the Sand Wash Basin, Fort Union coals rank as sub-bituminous high volatile C bituminous and high volatile B bituminous.

Within the CD-C project area, CBM development in the Hay Reservoir area has targeted production from coals in the Fort Union Formation. Approximately 25 wells were completed; they were unable to establish production and have been plugged and abandoned (BLM 2007f).

Lance Formation

Coals occur discontinuously in outcrops in the Lance Formation from I-80 south for about 25 miles. Averaging about five feet in thickness, but ranging from a few inches to 22 feet thick, these coals are thicker, more abundant, and laterally extensive in the lower part of the formation. The coals have limited lateral extent and usually cannot be traced more than a few hundred to several thousand feet. Lance Formation coalbeds are minor CBM targets (Scott *et al*. 1994).

Mesaverde Group

Coal occurs in outcrops in the Mesaverde Group in several places along the western edge of the Sierra Madre, and exists in the subsurface within the project area. These coals are best developed high in the Mesaverde Group near its contact with the overlying Lewis Shale in exposures east of the project area, along the eastern edge of the project area (Atlantic Rim and Green River Coal Fields) and in T15-16N:R90-91W (an unnamed coal field). These fields include about 230,400 leasable acres. Coals are also developed sporadically lower in the Mesaverde Group (Allen Ridge Sandstone) but these coals are thin and discontinuous. Based on vitrinite reflectance percentages from wells in the Sand Wash Basin, the Mesaverde coals underlying the project area rank as high volatile C bituminous, high volatile B bituminous and high volatile A bituminous.

Coals in the Ericson Sandstone (a/k/a Pine Ridge Sandstone or Williams Fork Formation) include the thickest and most extensive coals of the Upper Cretaceous in the Greater Green River Basin and are the basin's prime CBM targets. The maximum net coal thickness of about 220 feet, contained in 40 individual coalbeds, occurs near Craig, Colorado. The coalbeds thin in a westerly and northerly direction, so that in the southeastern part of Carbon County, underlying the project area, net coal thicknesses range from 40 to 90 feet. These coals are interpreted to have accumulated in coastal plain environments and

fluvial-dominated, wave-modified deltas, along a southwest/northeast-oriented strand (beach) line that faced southeastward into the Cretaceous epicontinental seaway.

Gas content values for coals developed in the Ericson Sandstone (a/k/a Pine Ridge Sandstone or Williams Fork Formation) range from less than 1 to more than 540 scf/ton, but are generally less than 200 scf/ton. Based on gas content values, Scott *et al*. (1994) estimated coal gas reserves in the western and southwestern parts of Carbon County underlying the project area to be less than or equal to 10 Bcf/mi^2 near the eastern margins of its subcrop and 8 to 40 Bcf/mi^2 in the extreme southwestern corner of the county. CBM development in the Atlantic Rim project area, just east of the CD-C project area, targets production from coals in the Mesaverde Group (BLM 2006a).

Coals in the Rock Springs Formation (a/k/a Allen Ridge Sandstone or Iles Formation) are thinner and not as well-developed as those in the Pine Ridge and the formation is considered a minor coal-bearing unit and CBM target. A maximum net coal thickness of 32 feet occurs in the easternmost part of the Great Divide Basin, but in most other places it is typically less than 15 feet. These coals are interpreted to have accumulated in a variety of swampy environments above shoreline sandstones and in floodplains adjacent to delta river channels.

Based on samples from wells primarily in the Rock Springs Uplift, gas content values in the Rock Springs Formation (a/k/a Allen Ridge Sandstone or Iles Formation) range from zero to more than 650 scf/ton. No estimates of total coal gas reserves are available for this unit.

CBM development in the Atlantic Rim project area, just east of the CD-C project area, targets production from coals in the Mesaverde Group.

3.19.2.2 Oil and Gas

The region within which the CD-C project is located has produced substantial quantities of oil and natural gas, principally from Cretaceous rocks, but with additional notable resources derived from the Tertiary Wasatch and Fort Union Formations, and from the Pennsylvanian Tensleep Sandstone.

Developed oil and gas fields within the area are listed in **Table 3.19-1**. Most of these fields produce principally from stratigraphic traps in sandstones of the Tertiary and upper Cretaceous formations (DeBruin 1996); a few produce from structural traps.

The Oil and Gas Fields Symposium Committee (1957, 1979, 1992), Gregory and DeBruin (1991), DeBruin and Boyd (1991), and DeBruin (1996) report oil and gas from wells penetrating the Cretaceous Niobrara, Lance, Shannon Sandstone, and Mesaverde formations in the region surrounding the towns of Dixon and Savery (east of the southern part of this study area), as well as some shows there from the Tensleep Formation. The Baggs South Oil and Gas Field and the West Side Canal Oil and Gas Field (Cronoble 1969; Kaiser *et al.* 1994) produce oil and gas (largely gas) from combined stratigraphic and faulted structural traps in the lower Eocene Wasatch, the Paleocene Fort Union, and the Upper Cretaceous Lance, Fox Hills, Almond, and Lewis Shale (sandstone facies) in T12–13 N:R90–93 W, in the southern part of the adjacent Atlantic Rim CBM area.

Regionally, Colson (1969) reported Tertiary oil and gas production from all Tertiary stratigraphic units from the Tipton Tongue of the Green River Formation (within the report's study area), down to the level of the Cretaceous/Tertiary (Lance/Fort Union) unconformity. In the South Baggs Field in T12 N:R92 W (south of this study area), oil and gas are concentrated at the crest of a structural high (probably a faulted anticline) in the Fort Union Formation. Farther east, production in the West Side Canal Field (T12N:R 91–92W) is from the lower sandy interval of the Paleocene Fort Union Formation, also in a structural trap on a faulted anticline.

Table 3.19-1. Oil and gas fields in the CD-C project area and cumulative production as of 2007

Field	General Location	Discovered	Producing Horizons (alphabetical)	Production/ Oil (BBLS)	Production Gas (MCF)
Baldy Butte	17N–92W	1982	Almond, Lewis, Mesaverde	280,142	25,717,419
Barrel Springs	16N–93W	1965	Almond, Lance, Lewis, Mesaverde	1,135,636	115,954,827
Bastard Butte	25N–97W	1978	Lewis	7,200	9,806
Battle Springs	23N–94W	1979	Almond, Ericson, Lewis, Mesaverde	17,732	1,754,063
Blue Gap	15N–92W	1974	Almond, Lance, Lewis, Mesaverde	393,537	44,171,587
Bush Lake	24N–96W	1978	Almond, Lance, Lewis	9,042	5,081,050
Coal Gulch	17N–93W	1977	Almond, Lewis, Mesaverde	1,461,251	110,000,237
Continental Divide	22N-93W	1964	Dakota, Ericson, Lewis, Mesaverde	54,117	875,731
Cow Creek	16N–92W	1960	Cow Creek, Dakota, Deep Creek, Frontier, Lewis, Mesaverde, Maropos, Muddy, Lakota, Nugget, Trout Creek	1,850	22,352,883
Creston	19N–92W	1960	Almond, Blair, Ericson, Frontier, Lewis, Mesaverde	481,245	36,871,009
Creston Southeast	19N–90W	1977	Almond	151	105,857
Delaney Rim Unit	18N–97-98W	1976	Almond, Lewis, Mesaverde	1,339,974	10,513,455
Echo Springs	19N–93W	1976	Almond, Ericson, Lewis, Mesaverde	9,942,729	572,186,906
Emigrant Trail	17N–95W	1981	Almond, Lance, Lewis, Mesaverde	68,305	2,009,639
Fillmore	20N–92W	1977	Almond, Ericson, Lewis, Mesaverde	335,805	8,633,145
Five Mile Gulch	21N–93W	1977	Almond Ericson, Lewis, Mesaverde	213,256	12,758,321
Frewen	19N–95W	1990	Almond Frontier, Lakota, Lewis, Mesaverde	789,764	22,250,444
Gale	23N–96W	1980	Ericson, Lewis	3,295	325,885
Great Divide	22–23N 95–96W	1978	Lance Lewis	346,116	10,674,736
Hay Reservoir	24N–97W	1977	Almond, Big Coal, Lance, Lewis, Mesaverde	2,615,544	165,002,506
Lost Creek Basin	23N–95W	1981	Ericson, Lewis, Mesaverde	28,413	635,377
Lost Creek	23N–97W	1972	Lewis	375	29,301
Monument Lake	21N–92W	1977	Almond, Ericson, Mesaverde	20,057	1,634,814
Nickey	24N–96W	1980	Almond, Lewis	1,511	1,785,984
Red	16N–94W	1979	Mesaverde	2,240	106,418
Red Desert	18N–97-98W	1971	Almond, Lewis, Mesaverde	240,542	23,318,701

Table 3.19-1. Oil and gas fields in the CD-C project area and cumulative production as of 2007, *continued*

Field	General Location	Discovered	Producing Horizons (alphabetical)	Production/ Oil (BBLS)	Production Gas (MCF)
Robbers Gulch	14N–91W	1962	Almond, Lance, Lewis, Mesaverde	238,479	35,649,093
Salazar	16N–95W	1975	Lewis, Mesaverde	4,735	535,536
Sentinel Ridge	23N–94W	1977	Almond Ericson, Lewis, Mesaverde	4,761	1,045,093
Shell Creek	19N–96W	1977	Almond, Mesaverde	11,935	521,586
Siberia Ridge	21N–94W	1976	Almond, Ericson, Lewis, Mesaverde	2,427,328	147,569,111
Standard Draw	18N–93W	1978	Almond, Ericson, Lakota, Lewis, Mesaverde, Steele	8,467,259	505,804,384
Stock Pond	22N–95W	1978	Almond, Ericson, Mesaverde	10,502	1,318,232
Table Rock	18–19N 97–98W	1946	Almond, Blair, Carney Coal, Dakota, Ericson, Fort Union, Fox Hills, Frontier, Lewis. Madison, Mesaverde, Morgan, Nugget, Wasatch, Weber	6,378,299	716,430,993
Strike	22N–95W	1994	Almond, Ericson, Lewis, Mesaverde	138,919	2,000,549
Table Rock SW	18N–98W	1955	Almond, Lewis	37,589	1,628,192
Tierney	19N–94W	1973	Almond, Frontier, Lewis, Mesaverde	1,394,555	42,717,016
Wamsutter	20–21N 94–95W	1958	Almond, Ericson, Lance, Lewis, Mesaverde, Rock Springs	3,745,535	36,672,037
Wells Bluff	18N-96W	1977	Almond, Ericson, Mesaverde	24,480	555,970
Wild Rose	17-18N-94W	1975	Almond, Ericson, Fort Union, Lance, Lewis, Mesaverde	6,692,296	399,132,288
Windmill Draw	15N-94W	1979	Almond, Ericson, Mesaverde	1,987	870,431

Exploration for fluid mineral resources has been underway in the CD-C project area since the 1940s and production and development of oil and gas has been an important element of the local economy for over 30 years. Through 2013, over 4,700 wells had been drilled within the CD-C project area (shown on **Map 1-1**), over 3,900 of which are still producing. Over the 10-year period ended December 31 2013, drilling averaged 236 wells per year, peaking in 2008 at 304 wells. In 2013, 118 wells were drilled.

3.19.3 Mineral Materials

Mineral materials, also termed “salable” minerals, include common varieties of sand, stone, gravel, pumice, pumicite, cinders and clay, which are generally put to use in building and construction. Salable minerals disposition is addressed under the Materials Act of July 31, 1947, as amended by the Acts of July 23, 1955 and September 28, 1962 (BLM 2003b). The BLM disposes of mineral materials via contract sales where the material is sold by the ton or cubic yard at fair market value, or provides them to governmental entities or nonprofit organizations under free-use permit pursuant to 43 CFR Part 3600

regulations. Potential purchasers or permittees may conduct pre-application sampling and testing of a mineral material deposit per 43 CFR 3601.30 (BLM 2012d).

The most significant salable mineral within the RFO—and within the CD-C project area—is aggregates, or sand and gravel, occurring in the project area typically as terrace and alluvial sand and gravel deposits and as windblown (dune) deposits. Mapped occurrences of sand and gravel deposits are found at the following general locations in and near the project area (BLM 2003b):

- T25N:R95-96W North of Lost Creek Basin (terrace)
- T22N:R95-96W Northeast flank of the Red Desert Basin (terrace)
- T20-21N:R92W Creston Junction area (terrace)
- T24N:R96W East of Hay Reservoir (alluvial)
- T24N:R95W Mouth of Eagle's Nest Draw (alluvial)
- T19N:R93W Echo Springs, southeast of Wamsutter (alluvial)
- T12-17N:R91-92W Muddy Creek area (alluvial)
- T21-23N:R95-96W Red Desert Basin (windblown sand)
- T16-17N:R93-94W Barrel Springs Draw (windblown sand)

Also present within the project area are pumice and scoria, near Creston Junction, and baked and fused shale (known locally as "scoria" or "klinker" but not technically a true volcanic scoria), with several large deposits in the area stretching from Creston Junction to Baggs. Both are important local sources of aggregate. Some of these deposits have been developed as gravel pits. Sources on BLM-administered land are located near Wamsutter (T19N:R95W), Creston Junction (T20N:R91W), and along the Little Snake River (T12-13N:R90-91W) (BLM 2003b). Several sites on private lands also provide mineral materials. **Map 3.19-1** shows the locations of permitted sand and gravel and scoria mines by section within and adjacent to the CD-C project area (WDEQ – Land Quality Division 2012: accessed at http://deq.state.wy.us/lqd_permit_public/).