

## Chapter 5.0 Cumulative Effects

### 5.1 INTRODUCTION

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Cumulative effects are defined in the CEQ regulations (40 CFR 1508.7) as “...*the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.*” The cumulative effects analysis typically encompasses broader areas and timeframes than the analysis of direct and indirect effects. The actions and effects selected for analysis depend on access to reasonably available data.

### 5.2 CUMULATIVE IMPACT AREAS ANALYZED

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The areas to be analyzed for cumulative effects have been selected based on several criteria. Common analysis areas have been used for different resources, where such usage is logically defensible. The analysis areas selected for each analyzed resource and the rationales for those selections are provided in Table 5.2-1. Maps 5.2-1, 5.2-2, 5.2-3, and 5.2-4 show the Cumulative Impact Analysis Areas (CIAAs) as well as the specific past, present, and reasonably foreseeable projects described in Section 5.3.

### 5.3 ACTIONS ANALYZED

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This section provides the past, present, and reasonably foreseeable future actions (RFFAs) within the CIAAs associated with each analyzed resource. For this analysis, foreseeable actions are considered to be limited to those for which some formal notice or permit application has been made and does not include potential developments which are speculative. Levels of surface disturbance are used as best estimates for total impacts to the human environment. The rationale is that levels of surface disturbance are among the most comprehensive and readily determined impacts and because disturbance to the surface results in direct and indirect effects to many analyzed resources.

Generally, past and ongoing activities (natural and man-made) that have affected and are affecting the project area and surrounding areas include but are not limited to the following:

- mining;
- oil and gas exploration and development;
- rights-of-way or other land uses (powerlines, pipelines, roads);
- wildland fire;
- drought;
- wildlife utilization;
- climate change;
- livestock grazing;
- dispersed recreation (i.e., hunting, camping, etc.); and
- off-highway vehicle (OHV) use.

The sections that follow provide more detailed information about specific past and present actions and RFFAs.

**Table 5.2-1  
Sheep Mountain Uranium Project EIS  
Cumulative Impact Analysis Areas (CIAAs) and Rationale**

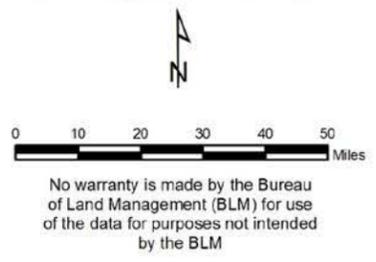
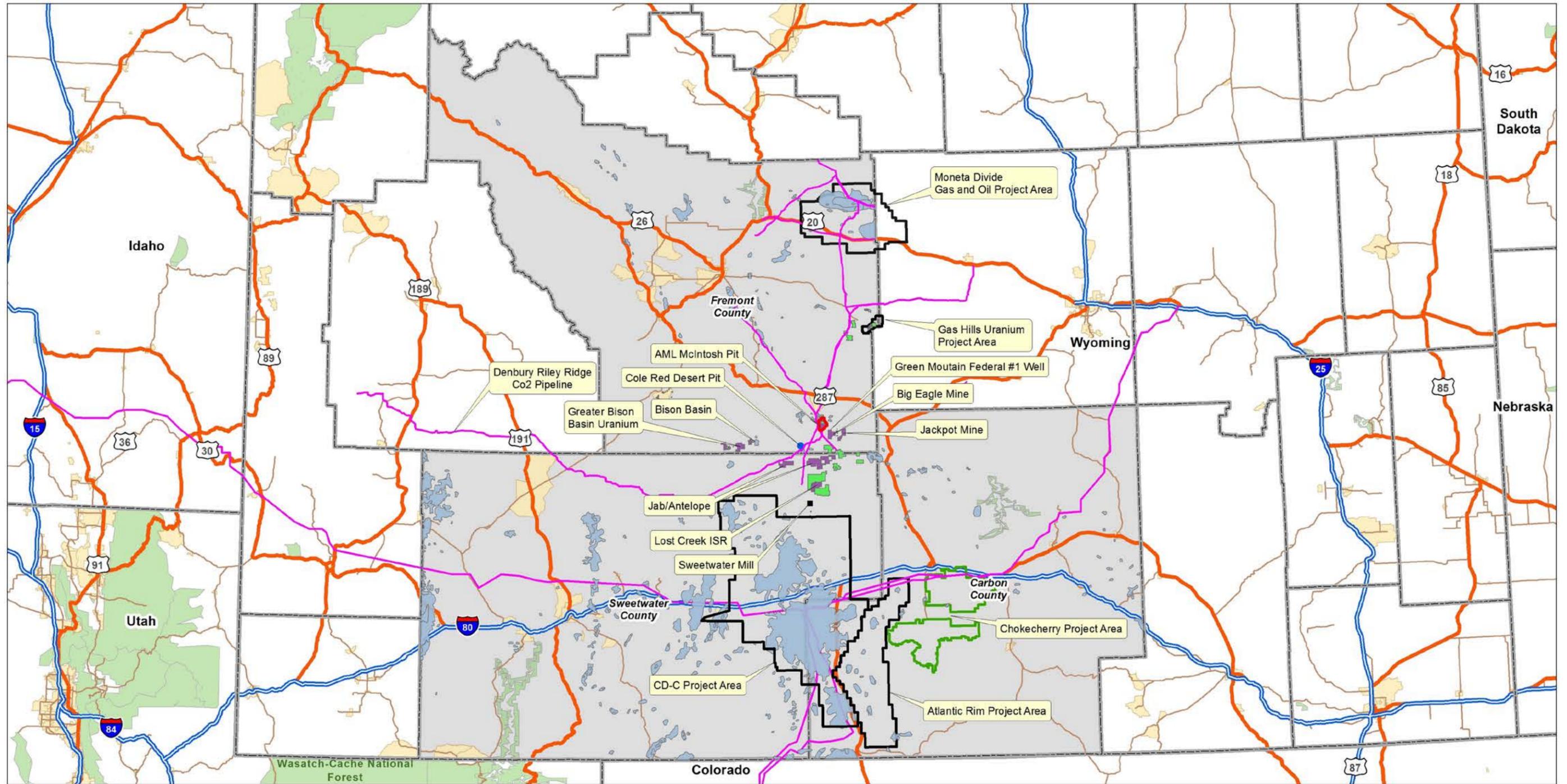
| Resource                                | Cumulative Impact Analysis Area  | Rationale  |
|---|--|--|
| <b>Physical Resources</b>               |  |  |
| Air Quality                             | Far-field impacts of project-specific emissions as well as cumulative emissions impacts will be assessed in a region centered on the Project Area within 12-km and 4-km resolution grids centered on and surrounding the Project Area (see Maps 5.4-1 and 5.4-2).                                      | Impacts are required to be assessed for criteria pollutants, visibility, and atmospheric deposition. Criteria pollutant impacts will be assessed in all areas of the regional modeling domain. Impacts on visibility will be assessed at designated Class I and II areas, and impacts of atmospheric deposition will be assessed at sensitive lakes.   |
| Geology and Mineral Resource            | The CIAA for geology and minerals is an approximate 10-mile buffer around the Project Area, which includes the north central portion of the Great Divide Basin (see Map 5.2-3).  | <p>The selection of a 10-mile buffer around the Project Area is based on a balance between assessing an area large enough to evaluate an aggregate of actions and yet not so large that the impacts of the Sheep Mountain Uranium Project would be lost among other larger projects.</p> <p>Potential indirect impacts to geology and mineral resources are not likely to extend across the entire planning area for the LFO, which covers 6.6 million acres in Fremont, Natrona, Carbon, Sweetwater, and Hot Springs counties, or the planning area for the Rawlins Field Office, which covers 3.5 million acres in Carbon, Albany, Laramie, and Sweetwater counties.</p> |
| Soils                                   | The CIAA for soil resources is the Project Area.   | Cumulative impacts on soil resources would be limited to soil disturbance and soil quality degradation within the Project Area because these effects do not act in combination with similar effects outside the Project Area.  |
| Water (Surface, Groundwater, Water Use) | <p>The CIAA for surface water includes the Upper Crooks Creek, Middle Crooks Creek, and Lower Crooks Creek sub-watersheds (see Map 5.2-2).</p> <p>The CIAA for groundwater resources is a 15-mile buffer from the project area (see Map 5.2-3).</p> <p>The CIAA for water use is the Project Area.</p> | <p>These are the sub-watersheds that have connectivity with the Project Area, which is located in the Middle Crooks Creek sub-watershed. Sheep Creek runs through Lower Crooks Creek sub-watershed, and Crooks Creek runs through all three of the sub-watersheds.</p> <p>A 15-mile buffer from the project area is a reasonable distance to consider potential effects from drawdown or water quality impacts considering the proximity to other similar projects that have the potential to impact the Project Area aquifers.</p> <p>Water use would be minimal; therefore the Project Area would encompass any effects.</p>   |

| Resource                                 | Cumulative Impact Analysis Area   | Rationale   |
|--|---|---|
| <b>Biological Resources</b>              |   |   |
| Invasive, Non-Native Species             | The CIAA for invasive, non-native species includes the Project Area plus a 10-mile buffer as well as the travel route to the Sweetwater Mill and a 5-mile buffer around the route and the mill (see Map 5.2-2). | Cumulative impacts associated with invasive, non-native species would be expected to be limited to the Project Area and the travel route to the mill if noxious weed management measures are implemented.   |
| Vegetation, Special Status Plant Species | The CIAA for vegetation and special status plant species is the Project Area.   | Cumulative impacts to vegetation and special status plant species would be limited to the Project Area if noxious weed management measures are implemented.   |
| Wetlands and Riparian Zones              | The CIAA for wetlands and riparian zones includes the Project Area plus a one-mile buffer around the Project Area border (see Map 5.2-3).   | This area includes the wetland areas that are within or adjacent to the Project Area.   |
| Special Status Wildlife Species          | The CIAA for special status wildlife species and bats is the Project Area plus a 10-mile buffer (see Map 5.2-3).  | Home ranges for special status wildlife species have the potential to expand outside the Project Area in contiguous habitats. Bats potentially roosting in the Project Area could forage 10 miles away.   |
|  | The CIAA for Greater Sage-Grouse includes the Project Area plus a 10-mile buffer as well as the travel route to the Sweetwater Mill and a 5-mile buffer around the route and the mill (see Map 5.2-2).          | The Project Area is not in a greater sage-grouse core area. Known leks are within a 10-mile radius of the Project Area and all leks are within core areas. A 10-mile buffer around the Project Area and a 5-mile buffer around the travel route to the mill and the mill will encompass home ranges for sage-grouse that could be affected by cumulative impacts. |
| Wildlife<br>(includes Fisheries)         | The CIAA for big game includes the Project Area plus a 22-mile buffer, which incorporates the Sweetwater Mill (see Map 5.2-4).  | The CIAA for big game includes portions of the pronghorn Beaver Rim and Red Desert herd units, portions of the mule deer Sweetwater Herd Unit, portions of the Elk Green Mountain Herd Unit, and portions of the moose Lander Herd Unit. The 22-mile buffer is a reasonable distance to account for cumulative effects to big game.                               |
|  | The CIAA for raptors is the Project Area plus a 10-mile buffer (see Map 5.2-3).   | Home ranges for raptors have the potential to expand outside the Project Area in contiguous habitats, particularly larger species such as golden eagles or ferruginous hawks. A 10-mile buffer around the Project Area will encompass home ranges for these species that could be affected by cumulative impacts.   |
|  | The CIAA for other general wildlife, including leopard frogs and sensitive migratory bird species, is the Project Area plus a one-mile buffer (see Map 5.2-3).  | Home ranges vary among species, and a one-mile buffer around the Project Area will encompass home ranges of species that occupy the project area and would be affected by cumulative impacts.   |

| Resource  | Cumulative Impact Analysis Area  | Rationale   |
|---|--|---|
|   | The CIAA for fisheries includes the Upper Crooks Creek, Middle Crooks Creek, and Lower Crooks Creek sub-watersheds (see Map 5.2-2).  | These are the sub-watersheds that have connectivity with the Project Area, which is located in the Middle Crooks Creek sub-watershed.   |
| Wild Horse and Burros                           | The CIAA for wild horses includes the Project Area and the Green Mountain and Crooks Mountain herd management areas (see Map 5.2-4).   | This area includes the rangelands that support wild horses in the region. The Project Area is located in the Green Mountain HMA. The Crooks Mountain HMA is approximately 6 miles west of the Project Area.   |
| <b>Heritage Resources and Human Environment</b> |  |   |
| Cultural Resources                              | The CIAA for cultural resources includes the Project Area plus up to 15 miles from the Project Area. The indirect visual CIAA extends up to 15 miles from the Project Area and includes any historic properties, where setting is important, from which the Project Area is visible. This includes the Crooks Gap Stage Station, the Rawlins to Fort Washakie Road, and the National Historic Trails corridor (see Map 5.2-3). | Given the scale of proposed development, the visual CIAA encompasses the foreground, middleground, and background areas (up to 15 miles) where viewsheds of significant cultural resources may be impacted by development within the Project Area. Due to terrain, many historic properties within 15 miles of the Project Area will not be visible and do not need to be included in the CIAA.                             |
| Paleontological Resources                       | The CIAA for paleontological resources is the Project Area.  | Cumulative impacts on paleontological resources would be limited to direct surface disturbance.   |
| Tribal and Native American Religious Concerns   | The CIAA for Tribal and Native American Religious Concerns includes the Project Area plus up to 15 miles from the Project Area where sites of religious or cultural significance may be visually impacted (see Map 5.2-3).   | This area includes the two sites identified by tribal representatives as of potential religious or cultural significance: the Crooks Gap Stage Station and an intact segment of the Rawlins to Fort Washakie Road (see Section 3.4.3). Due to terrain, many other potential sites of religious or cultural significance within 15 miles of the Project Area will not be visible and do not need to be included in the CIAA. |
| Socioeconomics                                  | The socioeconomic CIAA includes Fremont and Carbon counties with additional attention to Sweetwater County to the extent warranted to include potential effects of processing at the Sweetwater Mill (see Map 5.2-1).  | Carbon and Fremont counties could be directly impacted by the proposed Project. Sweetwater County may also be impacted based upon the location of the processing mill.  |
| Environmental Justice                           | The Environmental Justice CIAA includes Fremont and Carbon counties with additional attention to Sweetwater County to the extent warranted to include potential effects of processing at the Sweetwater Mill (see Map 5.2-1).  | Populations in other counties are not sufficiently integrated with mining activities in southeast Fremont County or milling activities in northeast Sweetwater County for impacts to be of relevance.   |

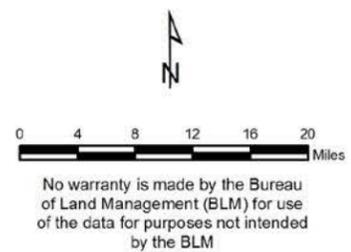
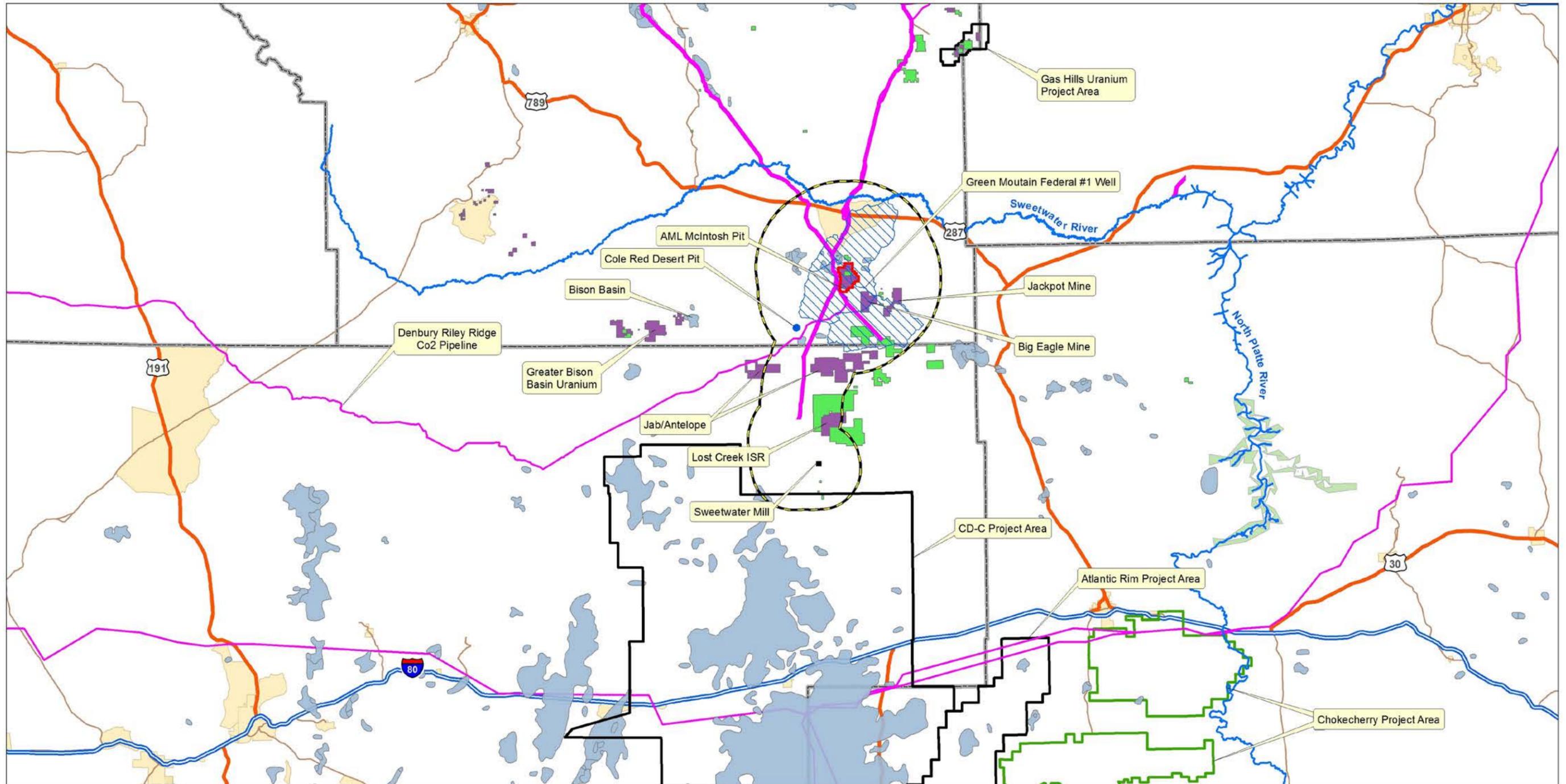
| Resource                                      | Cumulative Impact Analysis Area   | Rationale  |
|---|---|--|
| Transportation/Access                         | The transportation/access CIAA includes roadway systems in Fremont, Carbon, and Sweetwater counties (see Map 5.2-1).  | The major transportation routes that serve the Project Area pass through these counties.   |
| Public Health and Safety<br>(includes Wastes) | The CIAA for the storage of hazardous materials is the Project Area. The impact area for the transportation of hazardous materials includes the Project Area and designated access routes for the Project Area and Sweetwater Mill. | This area is sufficient for a cumulative effects analysis for public health and safety.  |
| <b>Land Resources</b>                         |   |  |
| Recreation                                    | The CIAA for recreation includes the Project Area and the surrounding area within approximately 5 miles of the Project Area boundary and primary access routes between the Project Area and the Sweetwater Mill (see Map 5.2-3).    | <p>The selection of a 5-mile buffer around the Project Area and primary access routes is based on a balance between assessing an area large enough to evaluate an aggregate of actions and yet not so large that the impacts of the Sheep Mountain Project would be lost among other larger projects.</p> <p>Potential indirect impacts to recreational resources are not likely to extend across the entire planning area for the LFO, which covers 6.6 million acres in Fremont, Natrona, Carbon, Sweetwater, and Hot Springs counties, or the planning area for the Rawlins Field Office, which covers 3.5 million acres in Carbon, Albany, Laramie, and Sweetwater counties.</p> |
| Livestock Grazing and Range Management        | The CIAA for livestock grazing and range management includes the full extent of the two grazing allotments that overlap the Project Area, the Mountain Allotment and Crooks Gap Allotment (see Map 5.2-3).                          | Grazing allotments are the geographic units within which the BLM manages livestock grazing and defines the type, level, and areas of livestock use by individual permittees. The CIAA encompasses the full extent of the grazing allotments that would be directly and indirectly affected by the Project and cumulative impacts.  |

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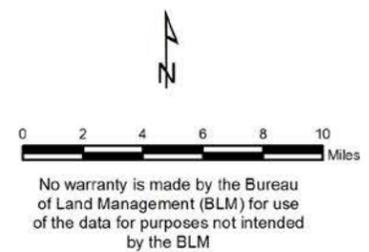
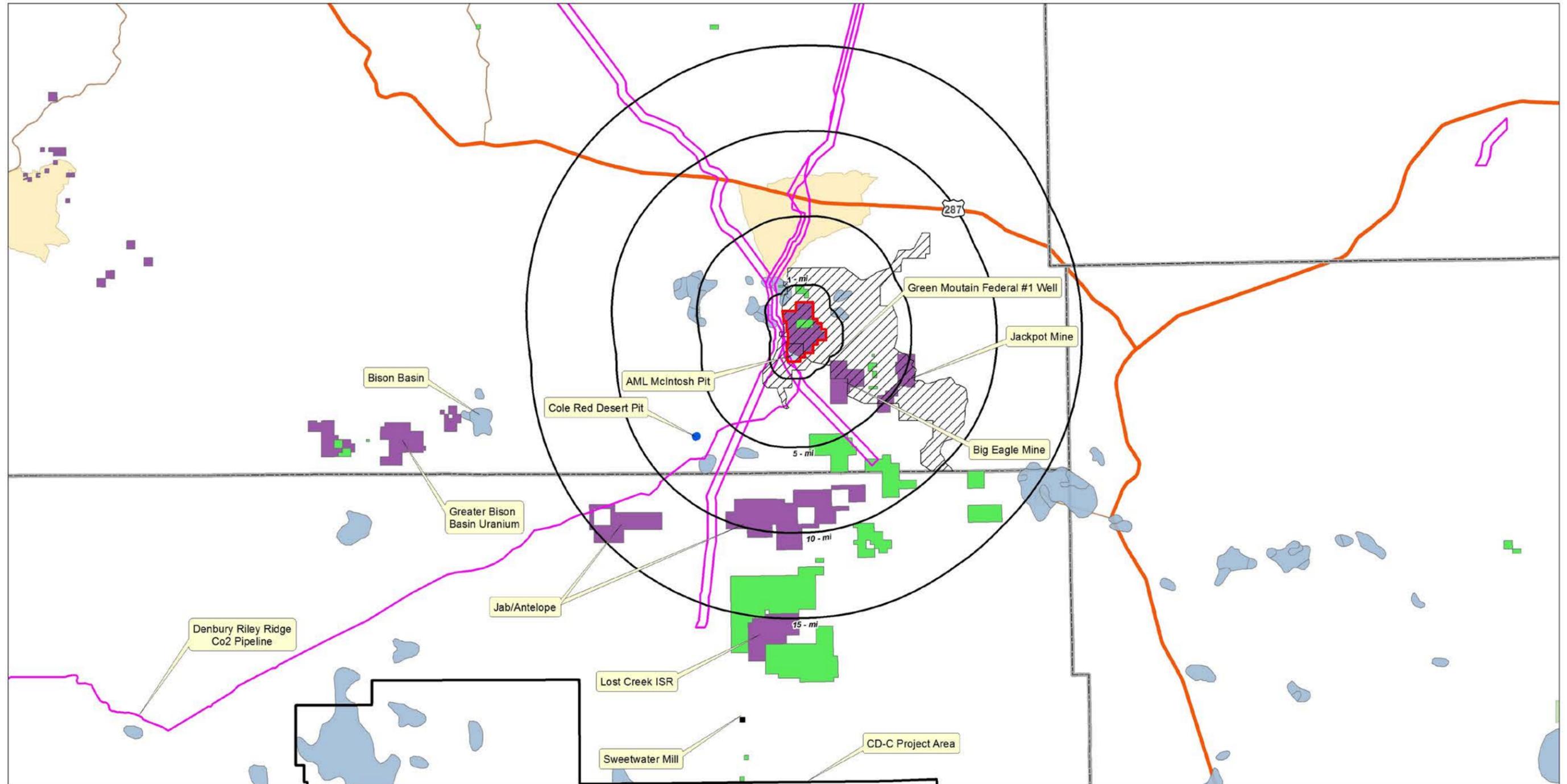
- Project Area
- CIAA Boundary
- Past, Present, and RFFAs Mining
- Mining Exploration
- Oil and Gas Exploration and Development
- CD-C, Gas Hills, Moneta Divide, and Atlantic Rim Projects
- Chokecherry and Sierra Madre Wind Energy Project
- Proposed Rights of Way
- WY County Line
- City Limits
- Parks and Forests
- Interstate
- State Highway
- Local Road
- Other Road

**Map 5.2-1**  
**Cumulative Impact Analysis Area**  
 (Socioeconomics, Environmental Justice,  
 Transportation and Access)



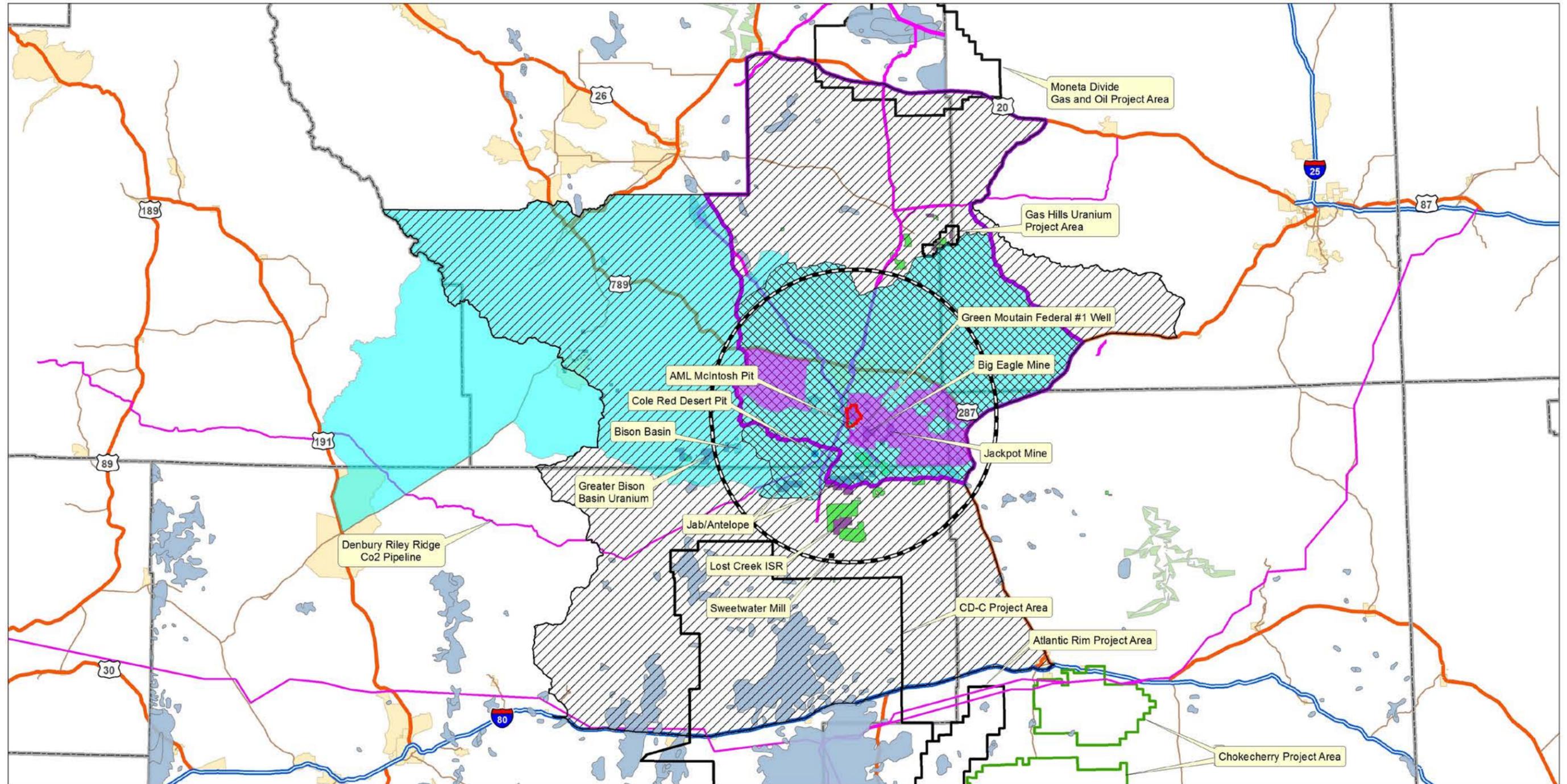
- Project Area
- Surface Water, Fisheries CIAA
- Sage Grouse, Invasive Species CIAA
- Mining
- Mining Exploration
- Oil and Gas Exploration and Development
- CD-C, Gas Hills, Moneta Divide, and Atlantic Rim Projects
- Chokecherry and Sierra Madre Wind Energy Project
- Proposed Rights of Way
- WY County Line
- City Limits
- Interstate
- State Highway
- Local Road
- Other Road

**Map 5.2-2**  
**Cumulative Impact Analysis Areas**  
 (Surface Water, Fisheries, Invasive Species and Sage Grouse)



- Project Area
  - 1 - mi buffer (Wetlands & Riparian, Wildlife, Other Sensitive Species)
  - 5 - mi buffer (Recreation)
  - 10 - mi buffer (Geology, Minerals, Special Status Wildlife Species)
  - 15 - mi buffer (Cultural, Native American Concerns, Groundwater)
  - Grazing Allotments CIAA
- Mining
  - Mining Exploration
  - Oil and Gas Exploration and Development
  - CD-C Proposed Natural Gas Project
  - Proposed Rights of Way
- WY County Line
  - City Limits
  - Interstate
  - State Highway
  - Local Road
  - Other Road

**Map 5.2-3**  
**Cumulative Impact Analysis Areas**  
 (Groundwater, Grazing, Recreation, Tribal, Cultural, Geology, Minerals, Wildlife, and Special Status Wildlife Species)



0 4 8 12 16 20 Miles

No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by the BLM



- Project Area
  - Big Game CIAA
  - Wild Horse Management Areas CIAA
- Past, Present, and RFFAs**
- Mining
  - Mining Exploration
  - Oil and Gas Exploration and Development
  - CD-C, Gas Hills, Moneta Divide, and Atlantic Rim Projects
  - Chokecherry and Sierra Madre Wind Energy Project
  - Proposed Rights of Way
- Pronghorn - Beaver Rim and Red Desert Herd Units
  - Elk - Green Mountain Herd Unit
  - Mule Deer - Sweetwater Herd Unit
  - Moose - Lander Herd Unit
  - WY County Line
  - City Limits
  - Interstate
  - State Highway
  - Local Road
  - Other Road

**Map 5.2-4**  
**Cumulative Impact Analysis Areas**  
**(Big Game and Wild Horses)**

### 5.3.1 Past and Present Actions

Past disturbance within and surrounding the Sheep Mountain Project Area is primarily associated with uranium mining. Many of the areas disturbed by past mining have been or are being reclaimed. For a description of past disturbances within the Sheep Mountain Project Area see Chapter 2 and Map 2.2-1. Present actions are mainly associated with uranium reclamation and mining, oil and gas activities, and a gravel pit. Summary descriptions of the various past and present projects within the CIAAs follow.

**Big Eagle Mine.** The Big Eagle Mine is an open pit uranium mine on private, patented ground on the south side of Green Mountain, last producing in 1999. The mine consists of two open pit lakes, a processing facility and reclaimed spoils piles. Total disturbance associated with the Big Eagle Mine is approximately 440 acres.

**Jackpot Mine (WYW127576).** The Jackpot Mine is a reclaimed underground uranium mine on the south side of Green Mountain that was never put into production. The features associated with the mine consist of several monitoring wells on top of Green Mountain, a plugged shaft, and fencing. The reclaimed area of the Jackpot mine totals approximately 31 acres.

**Abandoned Mine Land Program (AML) Project 16-0-McIntosh Pit.** The AML Project 16-0 is located in the Crooks Gap Uranium Mining District in Fremont County, approximately 10 miles south of Jeffrey City. The McIntosh Pit is the primary mining area included in the AML project and lies within the Sheep Mountain Project Area. Energy Fuels, as the current mine permit and bond obligation holder, has proposed to make a payment to AML in order to release their reclamation obligation and bond on a portion of the McIntosh Pit.

The McIntosh Pit is characterized as a large groundwater impoundment surrounded by 100-foot to 300-foot highwalls on all sides. An access ramp enters the pit from the northwest corner and the pit floor slopes toward the south. Additionally, spoils piles block nearby Quaking Asp Creek and have created a surface water impoundment known as Western Nuclear Pond. The pond collects surface water drainage from approximately 2,286 acres, allowing it to maintain a pool year round except in the worst prolonged drought conditions. The pond supports aquatic life and is stocked by the WGFD; therefore, its enhancement and maintenance is a key aspect of the reclamation design for this project.

A conceptual design for the reclamation project has been proposed. The design proposes to construct a geomorphic reclamation surface which will be hydrologically stable; to eliminate hazards posed by highwalls and dangerous piles and embankments; to enhance Western Nuclear Pond for the benefit of wildlife and stock; to provide over-flow, through-drainage in the McIntosh Pit; and to promote vegetative success and diversity. To achieve these goals, the proposal includes backfilling the McIntosh Pit above the predicted groundwater recovery elevation (approximately 11 million cubic yards), reducing the highwalls, and diverting overflow water from Western Nuclear Pond to a constructed impoundment in McIntosh Pit which would overflow to Crooks Creek.

The AML program plans to begin reclamation in 2015. Total disturbance associated with the McIntosh Pit reclamation is speculative but could disturb up to approximately 185 acres primarily on privately owned lands.

**Lost Creek Uranium In-Situ Recovery Project.** Lost Creek ISR, LLC (LCI) has been approved for construction, operation, and reclamation of facilities for ISR operations within the Lost Creek Permit Area. ISR involves the use of a recovery solution, known as a lixiviant, to extract the

mineral from the geologic formation, and the mineral is removed from the solution using ion exchange resins at the processing facility. ISR occurs without physically removing the ore-bearing strata. Approximately 6 million pounds of uranium could be produced from the Permit Area. The project began operations in Fall 2012 and will continue production for approximately 7 years, with reclamation continuing for another 5 years. With appropriate regulatory approval, the processing facilities could also be used to process ion exchange resins from other ISR mines in the region after completion of mineral recovery in the Permit Area.

The Lost Creek Uranium ISR Project area contains approximately 4,377 acres within the project boundary, with no more than 345 acres actual surface disturbance. Most of the surface disturbance is/would be related to construction of the well fields used to extract the uranium from the subsurface.

**Sweetwater Mill.** The Sweetwater Mill is the existing conventional uranium mill facility that may be used for off-site processing under the Proposed Action (see Chapter 2). This facility consists of tailings ponds, processing buildings, shop/warehouse buildings, administrative buildings, roads, pipelines, one large reclaimed spoils pile, one reclaimed open pit mine (pit lake), and one reclaimed soils remediation area, totaling approximately 950 acres of reclaimed and existing disturbance.

**Mining Exploration Notices.** There are approximately nine authorized or expired 43 CFR 3809.31 Notices for exploration of mining claims located within the region. The Notices consist of exploratory drilling or trenching activities for uranium and jade, which allow for up to five acres of disturbance per notice. Therefore, for purposes of analysis, it is assumed that 45 acres in total are disturbed as a result of these Notices within the CIAA's.

**Existing Oil and Gas Fields.** There are numerous existing oil and gas fields in the region that have been in production since as early as 1935. Development in these fields varies but generally consists of roads, pipelines, power distribution, well pads, and wells which disturb only a portion of the areal extent of the field. For the purposes of this analysis, 15 percent of the area within the extent of the field boundary is assumed to be disturbed, as summarized in Table 5.4-1.

**Cole-Red Desert Pit.** The Cole-Red Desert pit is a Mineral Material Sale for gravel and equals 5 acres of disturbance.

### 5.3.2 Reasonably Foreseeable Future Actions

RFFAs include uranium mining and reclamation and oil and gas activities. Oil and gas activities require development of roads, pipelines, power distribution, well pads and wells. The following is a brief description of the RFFA's that might fall within the CIAA's depending on resource.

**Jab/Antelope.** Jab/Antelope is a Plan of Operations for uranium exploration exceeding 5 acres owned by Uranium One. There are currently no future plans regarding additional activities besides reclamation at this project, but it is an active Plan of Operations with the potential to disturb approximately 50 acres.

**Greater Bison Basin Uranium Project.** The Greater Bison Basin uranium project is a Plan of Operations for uranium exploration exceeding 5 acres of disturbance as proposed by WildHorse Energy in 2011. There are currently no future plans regarding additional activities besides continued use of monitoring wells, but it is a pending Plan of Operations with the potential to disturb approximately 35 acres.

**International Petroleum and Exploration Operating Corporation Green Mountain Federal # 1.** International Petroleum and Exploration Operating Corporation (IPEOC) filed an Application for Permit to Drill (APD), which was approved on May 8, 2014. The well is a unit obligation well for the Found Soldier Unit on federal oil and gas lease WYW-131797 Federal oil and Gas. IPEOC proposes to vertically drill a gas production well to a depth of 14,500 feet, approximately 10 miles southeast of Jeffrey City, Wyoming. The project would require construction of a 4.4-acre well pad and removal of approximately 300 immature lodgepole pines. In addition, 2.6 miles of existing access road would be upgraded and 2,000 feet of new access road would be built. It is estimated that the well pad and associated access road would result in a potential maximum initial surface disturbance of approximately 14 acres. Short-term impacts to surface resources from the proposed project are expected to last three to five years. If the well goes into production, and after interim reclamation is achieved, long-term impacts to approximately 9.5 acres of surface resources would remain for the duration of the well's operating life (more than 20 years). There is the potential for additional wells to be drilled in the future but this would depend on the success of this unit obligation well. There are no additional wells proposed at this time.

**Atlantic Rim Natural Gas Field Development Project.** In 2007, the BLM authorized 2,000 in-fill wells (1,800 coal-bed methane and 200 traditional gas wells), in the currently producing Atlantic Rim Natural Gas Field south of Rawlins and north of Baggs in Carbon County. The project includes the construction of supporting infrastructure, including access roads, pipelines, and ancillary facilities. Drilling is expected to require approximately 20 years and the project's productive life is expected to extend an estimated 30 to 50 years beyond construction, for a combined total project life of 50 to 70 years.

**Continental-Divide-Creston Natural Gas Development Project.** The CD-C Project area encompasses approximately 1.1 million acres (1,672 square miles) in an existing gas-producing area located west of Rawlins, Wyoming in Carbon and Sweetwater Counties. Total new surface disturbance would be approximately 47,300 acres or 4.4 percent of the CD-C project area.

The CD-C Project is an in-fill project with more than 4,400 existing oil and gas wells. The proposed project includes the development of an additional 8,950 gas wells, including construction of supporting infrastructure - access roads, pipelines, electrical power lines, a central gas-processing plant, and water management and disposal facilities. Construction would require approximately 15 years and the productive life of the project would extend an estimated 30 to 40 years beyond construction, for a combined total project life of 45 to 55 years.

**West Bison Basin Unit Secondary Oil Recovery Projects.** The project proposal is to implement a nine-well steam injection program in the West Bison Basin Unit for secondary oil recovery (SOR) of an existing oil field. The West Bison Basin Unit enhanced oil recovery project, Richardson proposes to inject steam into the oil bearing zones to increase the amount of recoverable oil and gas compared to the current primary recovery of this aging oil field. The SOR is expected to expand the field's oil recovery.

It is estimated that the nine new well pads and associated access roads, pipelines, and all other new project disturbance would result in a potential maximum initial surface disturbance of approximately 20 acres. Short-term impacts to surface resources from the proposed project are expected to last three to five years. All areas of new disturbance not needed for the duration of project operations will be reclaimed per BLM specifications. Long-term surface disturbance resulting from the proposed project is estimated to be approximately ten acres. The anticipated duration of the proposed project is approximately 20 years.

**Proposed Rights of Ways within the RMP Designated Corridor.** The Lander RMP and Final EIS (2013a) includes a designated corridor for Rights-of-Way (ROWs) such as pipelines, powerlines, and fiber optic lines that travel through Crooks Gap and are within several of the CIAAs for individual resources. The corridor is identified as 0.5-mile wide corridor that could allow for numerous ROW's with varying widths. ROW's proposed within the LFO would be required to be within this corridor or provide reasonable justification as to why it is not possible to fall within this corridor. At this time two proposed projects fall within this corridor: the Denbury Riley Ridge CO<sub>2</sub> pipeline and the Moneta to Rawlins Gas pipeline. For analysis purposes each of these pipelines could disturb a 65-foot wide swath along the length of the corridor during construction. In order to accommodate a conservative analysis for projects within the ROW, it is assumed that ROWs will disturb a total width of 300 feet within this corridor. Disturbance for ROW's outside of the LFO but within individual resource CIAA's is estimated based on the most likely route for such ROWs that may or may not be within a designated corridor.

## 5.4 CUMULATIVE EFFECTS

Surface disturbance estimates for the mining and oil and gas projects within each CIAA are summarized in Table 5.4-1. Because the cumulative effects analyses associated with Socioeconomics, Environmental Justice, and Transportation/Access assess the use of and impacts on existing financial and physical infrastructure, rather than surface disturbance, the CIAA of Carbon, Fremont, and Sweetwater counties is not included in Table 5.4-1. A cumulative analysis by resource follows.

### 5.4.1 Air Quality

#### 5.4.1.1 Introduction

The CD-C Project FEIS (BLM, 2012b) is used for addressing cumulative impacts for the Sheep Mountain cumulative air quality and AQRV assessment, including regional ozone formation. For the CD-C impact analysis, the CAMx (Comprehensive Air quality Model with Extensions; ENVIRON, 2010) photochemical grid model (PGM) was used to predict maximum potential regional-wide ambient air quality and AQRV impacts at federal PSD Class I and other sensitive PSD Class II areas, as well as designated acid-sensitive lakes. The CD-C Project analysis included a regional air quality assessment (including ozone) and AQRV analysis for southwest Wyoming including the region surrounding the Sheep Mountain Project Area. The analyses were performed using the CAMx model and two years of meteorological data, years 2005 and 2006. The CD-C analysis analyzed regional impacts for a base case year 2008 and for future year 2022.

The CD-C analysis included impact assessments at 12 PSD Class I and sensitive Class II areas, and at 19 sensitive lakes throughout the CD-C Project modeling domain, which included all of Class I and Class II areas and lakes that have been included in the Sheep Mountain Project Calpuff impacts analyses, with the exception of the Washakie Class I Wilderness Area. For the Sheep Mountain Project cumulative assessment, the CD-C Project cumulative impacts are presented for each of the PSD Class I and sensitive Class II areas and for lakes that were analyzed for Project-specific impacts and are described earlier in Section 4.2.1.

**Table 5.4-1  
Summary of Cumulative Surface Disturbance**

| CIAA  | Total CIAA Area (acres) | Previously Disturbed Area within Project Area (acres) <sup>1</sup> | Past and Present Actions (acres) |                        | RFFAs (acres) | Proposed Action (acres) <sup>3</sup> | Total Disturbance Acres (percent of CIAA) |
|---|-------------------------|--|----------------------------------|------------------------|---------------|--------------------------------------|---|
|   |                         |  | Mining <sup>2,3</sup>            | Oil & Gas <sup>4</sup> |               |                                      |   |
| Project Area (Soils, Water Use, Vegetation, Special Status Plants, Paleontological Resources, Public Health and Safety) | 3,611                   | 740  | 0                                | 0                      | 0             | 929                                  | 1,669 (46%)                               |
| 1-mi buffer (Wetlands/Riparian, Wildlife, Other Sensitive Species)  | 12,497                  |  | 237                              | 117                    | 305           |                                      | 2,328 (19%)                               |
| 5-mi buffer (Recreation)  | 86,585                  |  | 1,576                            | 523                    | 1,105         |                                      | 4,873 (6%)                                |
| 10-mi buffer (Geology, Minerals, Special Status Wildlife Species)   | 269,423                 |  | 5,057                            | 978                    | 2,064         |                                      | 9,768 (4%)                                |
| 15-mi buffer (Cultural, Tribal, Groundwater)  | 552,697                 |  | 16,874                           | 1,173                  | 2,828         |                                      | 22,544 (4%)                               |
| Sage-Grouse, Invasive Species   | 398,621                 |  | 18,691                           | 1,101                  | 2,355         |                                      | 23,816 (6%)                               |
| Surface Water and Fisheries   | 94,505                  |  | 3,304                            | 463                    | 1,069         |                                      | 6,505 (7%)                                |
| Big Game  | 1,118,651               |  | 31,520                           | 2,289                  | 3,684         |                                      | 39,162 (4%)                               |
| Wild Horses   | 175,017                 |  | 66                               | 208                    | 232           |                                      | 2,175 (1%)                                |
| Grazing   | 39,696                  |  | 1,118                            | 108                    | 196           |                                      | 3,091 (8%)                                |

Source: 2012 and 2013 BLM GIS shapefiles.

<sup>1</sup> Includes 185 acres associated with the AML McIntosh Pit.

<sup>2</sup> Includes Cole Red Desert Pit and the Sweetwater Mill.

<sup>3</sup> To avoid double counting, historical mining acres within the Proposed Action disturbance footprint were not included. Disturbance acres within the Project Area are provided under 'Proposed Action.'

<sup>4</sup> The acres represent 15 percent of the entire field to be developed for oil and gas.

### 5.4.1.2 Regional Emissions

#### RFD Emissions

The CD-C cumulative assessment included maximum emissions from reasonably foreseeable development (RFD) sources within the study area. RFD is defined as (1) air emissions from the undeveloped portions of authorized NEPA projects and RMPs, and (2) air emissions from not-yet-authorized NEPA projects (if emissions were quantified when modeling commences). A listing of RFD projects and emissions which were included in the study is presented in Table 5.4-2. Map 5.4-1 indicates the locations of each of the RFD projects and Map 5.4-2 illustrates the extents of CD-C modeling domain.

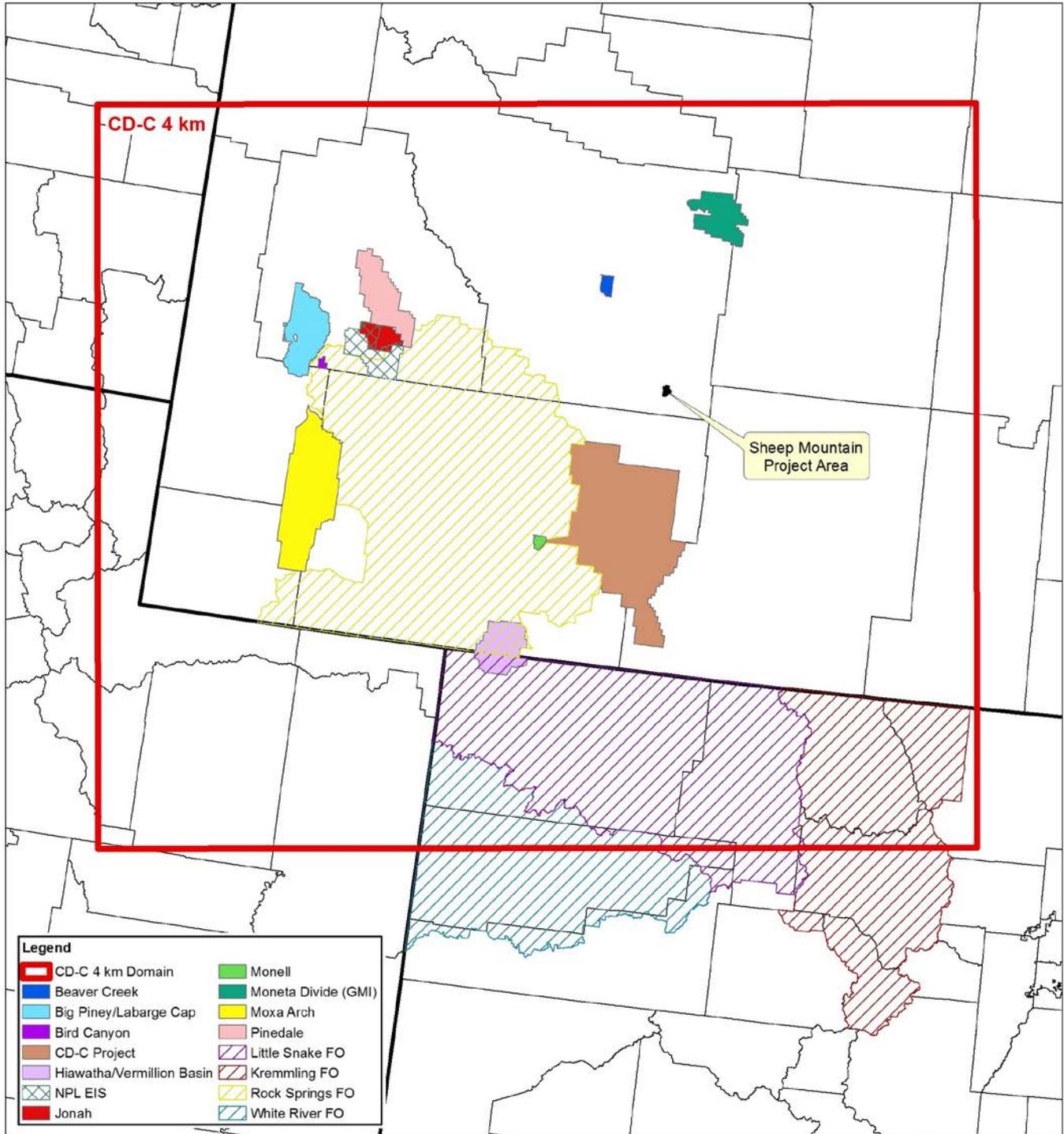
The Sheep Mountain Uranium Project emissions were not directly included as RFD emissions in the CD-C modeling analysis. However, as shown in Table 5.4-2, the CD-C Project cumulative analyses included emissions for the Beaver Creek Coalbed Natural Gas and Conventional Oil and Gas Development Project EIS. The Beaver Creek project area is located in Fremont County, Wyoming, approximate 35 miles to the northwest of the Sheep Mountain Project Area. The project has been terminated and the emissions included in the CD-C cumulative modeling results are comparable to the level of the emissions from the Sheep Mountain Uranium Project. The Sheep Mountain Uranium Project Year 3 emissions, for the production with off-site processing scenario, are 201.1 tpy of NO<sub>x</sub>, 57.4 tpy of VOC, 255.5 tpy of PM<sub>10</sub>, and 41.1 tpy of PM<sub>2.5</sub>.

**Table 5.4-2  
RFD Emissions within the CD-C Project Study Area**

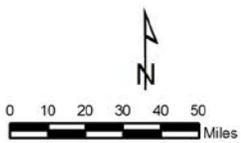
| RFD Project                                     | Inventory Year | Emissions (tpy) |               |               |                 |                  |                   |
|---|----------------|-----------------|---------------|---------------|-----------------|------------------|-------------------|
|   |                | NO <sub>x</sub> | VOC           | CO            | SO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
| Continental Divide-Creston - Proposed Action    | 2022           | 4,742           | 14,716        | 8,588         | 2               | 2,235            | 455               |
| Beaver Creek                                    | 2016           | 105             | 85            | 103           | 0               | 89               | 14                |
| LaBarge Platform                                | 2027           | 676             | 1,534         | 383           | 96              | 110              | 36                |
| NPL   | 2022           | 472             | 310           | 623           | 10              | 968              | 145               |
| Monell Arch                                     | 2021           | 253             | 276           | 220           | 8               | 33               | 17                |
| Moneta Divide                                   | 2018           | 1,035           | 3,662         | 364           | 0               | 1,108            | 140               |
| Rock Springs Field Office                       | 2031           | 998             | 3,318         | 2,369         | 1               | 516              | 93                |
| Little Snake Field Office - Alt B (Preferred)   | 2021           | 559             | 2,712         | 1,103         | 3               | 378              | 55                |
| Kremmling Field Office - Alt. C (Preferred)     | 2028           | 738             | 5,914         | 191           | 3               | 2,473            | 408               |
| White River Field Office                        | 2021           | 3,320           | 8,564         | 7,054         | 20              | 1,037            | 198               |
| Colorado River Valley Field Office              | 2021           | 2,287           | 9,240         | 4,525         | 8               | 916              | 155               |
| Grand Junction Field Office - Alt B (Preferred) | 2018           | 3,373           | 2,686         | 4,160         | 135             | 2,397            | 525               |
| Uncompahgre Field Office - Alt. D (Preferred)   | 2028           | 3,271           | 2,498         | 3,327         | 138             | 1,118            | 494               |
| Bird Canyon                                     | 2020           | 658             | 641           | 481           | 5               | 250              | 64                |
| Moxa Arch Existing Wells                        | 2018           | 1,550           | 19,596        | 1,178         | 1               | 232              | 79                |
| Moxa Arch Proposed Action New Wells             | 2018           | 1,186           | 1,647         | 1,776         | 0               | 583              | 124               |
| Moxa Arch Proposed Action ROD Wells             | 2018           | 64              | 166           | 128           | 0               | 30               | 6                 |
| Hiawatha Existing Wells (CO & WY)               | 2017           | 318             | 4,136         | 352           | 0               | 41               | 9                 |
| Hiawatha Proposed Action New Wells (CO & WY)    | 2017           | 1,555           | 919           | 1,861         | 1               | 318              | 100               |
| Pinedale  | *              | 1,381           | 2,286         | 1,250         | 53              | 53               | 79                |
| Jonah   | 2008           | 1,099           | 2,705         | 686           | 62              | 62               | 28                |
| <b>Total</b>                                    |                | <b>29,640</b>   | <b>87,611</b> | <b>40,722</b> | <b>546</b>      | <b>14,947</b>    | <b>3,224</b>      |

\*Based on the Pinedale SEIS Alternative C Phase II emissions levels.

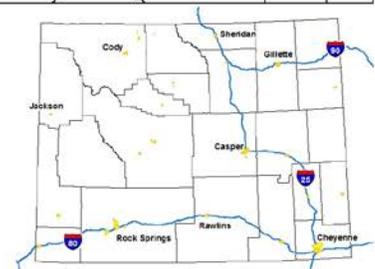
Table 5.4-2 also indicates the project year inventoried for each RFD project when maximum emissions are expected to occur. Full development of proposed projects inventoried as RFD may or may not coincide with full development of the Sheep Mountain Project. As a result, the assumption that all RFD are fully developed during the maximum year of the Sheep Mountain Project development results in conservatism in the cumulative impact analysis.

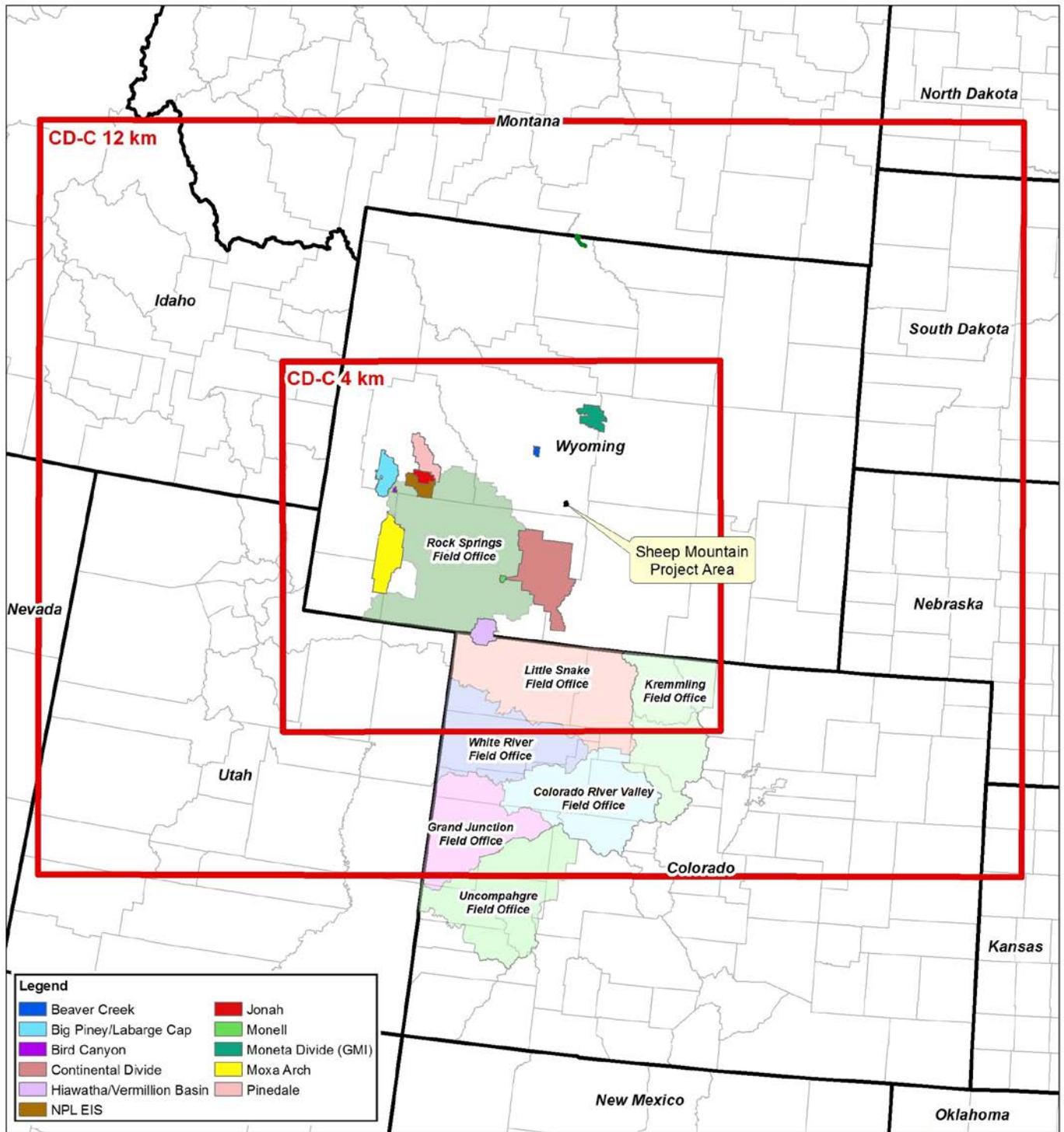


Map 5.4-1  
RFD Project Areas

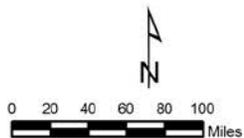


No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by the BLM





**Map 5.4-2**  
CD-C Project 4/12 km domain



No warranty is made by the Bureau of Land Management (BLM) for use of the data for purposes not intended by the BLM



## Other Regional Emissions

Regional emissions inventories for all other source type categories were quantified for the entire study area shown in Map 5.4-1. Emissions of CO, NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>, and VOC were inventoried for both the 2008 baseline year and for year 2022. A complete discussion of the emissions inventories included in the cumulative study is reported in Section 2 of the CD-C Project AQTSD (BLM, 2014b).

### **5.4.1.3 Cumulative Impacts**

#### **5.4.1.3.1 Criteria Pollutants Impacts**

The CD-C cumulative modeling analysis estimated potential impacts to ambient air concentrations from air pollutant emissions of NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, VOCs, and CO expected to result from RFD sources emissions and other cumulative (regional) emissions sources. The estimated impacts in the vicinity of the Sheep Mountain Project Area are discussed below.

#### Regional Ozone Impacts

The CD-C analysis included estimates of future year regional ozone impacts using two analysis methods. One method uses the change in the PGM modeled concentrations between base case or current year (DVC) (year 2008) and future year (DVF) (year 2022) simulations to scale observed ozone concentrations from monitoring sites to obtain projected future year ozone concentrations. This method utilized EPA's Modeled Attainment Test Software (MATS) (Abt, 2012) projection tool with the CAMx 2008 Base Case and 2022 scenario ozone concentrations to estimate ozone impacts. The second method uses the absolute modeling results from the CAMx model to estimate ozone impacts.

The CAMx predicted current year DVCs indicate areas of ozone concentrations near the NAAQS/WAAQS (75 ppb) in the vicinity of the Sheep Mountain Project Area in 2008 with the maximum values decreasing to less than 72.5 ppb in year 2022. The two-year approximation using absolute CAMx model concentrations indicates ozone concentrations no larger than 72.5 ppb in the vicinity of the Sheep Mountain Project Area for both the base year 2008 and future year 2022, with overall concentrations decreasing slightly in 2022. Given that the maximum future year emissions from the Sheep Mountain Project sources include 201.1 tpy of NO<sub>x</sub> and 57.4 tpy of VOC, the contribution to regional ozone impacts from Sheep Mountain project sources would likely be minimal. A detailed discussion of the ozone analysis is provided in Section 4.5.4 of the CD-C AQTSD (BLM, 2014b).

#### Regional NO<sub>2</sub>, SO<sub>2</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub> Impacts

The results of the cumulative modeling showed that NO<sub>2</sub>, SO<sub>2</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub> concentrations in the vicinity of the Sheep Mountain Project Area would be well below the applicable NAAQS and WAAQS. Additional detail on the modeling results are provided in Section 4.5.3 of the CD-C AQTSD (BLM 2014b).

#### **5.4.1.3.2 Visibility Impacts**

The cumulative visibility analysis follows the approach that was developed by the FWS and NPS and was documented in a letter sent on February 10, 2012 to the WDEQ-AQD. The approach uses the two EPA Regional Haze Rule (RHR) metrics goals:

- Improvement in visibility for the 20 percent worst visibility days
- No worsening in visibility for the 20 percent best visibility days

Although the cumulative visibility approach uses the RHR metrics, the cumulative visibility analysis for the regional emissions sources is not comparable to a states RHR State Implementation Plan (SIP) analysis because different basic assumptions are used in the analysis, such as different future emissions years, different emissions projections and different observed visibility baseline years.

The CAMx 2008 and 2022 model outputs were used to project the observed visibility conditions from all cumulative emissions, including RFD sources, at IMPROVE sites within the 4 km domain from the baseline period (2006-2010) to 2022 for the worst 20 percent and best 20 percent days, using the EPA's MATS tool. 2022 visibility projections for the worst 20 percent and best 20 percent days were also made without the RFD sources. This allows an assessment of the effects of emissions from the RFD emissions on the RHR visibility metrics.

Tables 5.4-3 through 5.4-6 indicate improved visibility in 2022 compared to the 2006 – 2010 baseline years at all the Class I and Class II areas for both the best and worst 20 percent days. Impacts from RFD sources on 2022 haze are estimated to vary between 0.03 dv and 0.16 dv among the Class I and Class II areas.

**Table 5.4-3  
Cumulative Visibility Results for Best 20 Percent Days - Using 2005 Meteorology**

| <b>Best 20 Percent Days - 2005 Meteorology</b> |   |   |   |  |
|--|---|---|---|--|
| <b>Class I or Class II Area</b>                | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Cumulative and RFD sources (Cumulative 2022 Visibility) (dv)</b> | <b>No RFD Sources (Cumulative 2022 Visibility) (dv)</b> | <b>Difference Between Cumulative and RFD Sources and No RFD Sources (dv)</b> |
| Bridger WA                                     | 1.39  | 1.17  | 1.14  | 0.03   |
| Fitzpatrick WA                                 | 1.39  | 1.19  | 1.16  | 0.03   |
| Mount Zirkel WA                                | 0.95  | 0.74  | 0.66  | 0.08   |
| Popo Agie WA                                   | 1.39  | 1.28  | 1.15  | 0.13   |
| Savage Run WA                                  | 0.95  | 0.62  | 0.49  | 0.13   |
| Wind River RA                                  | 1.39  | 1.17  | 1.13  | 0.04   |

**Table 5.4-4  
Cumulative Visibility Results for Worst 20 Percent Days - Using 2005 Meteorology**

| <b>Worst 20 Percent Days - 2005 Meteorology</b> |   |   |   |   |
|---|---|---|---|---|
| <b>Class I or Class II Area</b>                 | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Cumulative and RFD sources (Cumulative 2022 Visibility) (dv)</b> | <b>No RFD Sources (Cumulative 2022 Visibility) (dv)</b> |
| Bridger WA                                      | 10.58                                       | 10.28                                       | 10.23   | 0.05  |
| Fitzpatrick WA                                  | 10.58                                       | 10.27                                       | 10.24   | 0.03  |
| Mount Zirkel WA                                 | 9.36  | 9.09  | 9.01  | 0.08  |
| Popo Agie WA                                    | 10.58                                       | 10.45                                       | 10.29   | 0.16  |
| Savage Run WA                                   | 9.36  | 8.97  | 8.83  | 0.14  |
| Wind River RA                                   | 10.58                                       | 10.26                                       | 10.21   | 0.05  |

**Table 5.4-5**  
**Cumulative Visibility Results for Best 20 Percent Days - Using 2006 Meteorology**

| <b>Best 20% Days - 2006 Meteorology</b> |   |   |   |   |
|---|---|---|---|---|
| <b>Class I or Class II Area</b>         | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Cumulative and RFD sources (Cumulative 2022 Visibility) (dv)</b> | <b>No RFD Sources (Cumulative 2022 Visibility) (dv)</b> |
| Bridger WA                              | 1.39  | 1.22  | 1.19  | 0.03  |
| Fitzpatrick WA                          | 1.39  | 1.24  | 1.22  | 0.02  |
| Mount Zirkel WA                         | 0.95  | 0.75  | 0.67  | 0.08  |
| Popo Agie WA                            | 1.39  | 1.34  | 1.21  | 0.13  |
| Savage Run WA                           | 0.95  | 0.66  | 0.53  | 0.13  |
| Wind River RA                           | 1.39  | 1.21  | 1.17  | 0.04  |

**Table 5.4-6**  
**Cumulative Visibility Results for Worst 20 Percent Days - Using 2006 Meteorology**

| <b>Worst 20 Percent Days - 2006 Meteorology</b> |   |   |   |   |
|---|---|---|---|---|
| <b>Class I or Class II Area</b>                 | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Baseline Visibility (2006-2010) (dv)</b> | <b>Cumulative and RFD sources (Cumulative 2022 Visibility) (dv)</b> | <b>No RFD Sources (Cumulative 2022 Visibility) (dv)</b> |
| Bridger WA                                      | 10.58                                       | 10.30                                       | 10.28   | 0.02  |
| Fitzpatrick WA                                  | 10.58                                       | 10.32                                       | 10.31   | 0.01  |
| Mount Zirkel WA                                 | 9.36  | 9.16  | 9.05  | 0.11  |
| Popo Agie WA                                    | 10.58                                       | 10.56                                       | 10.40   | 0.16  |
| Savage Run WA                                   | 9.36  | 9.01  | 8.83  | 0.18  |
| Wind River RA                                   | 10.58                                       | 10.27                                       | 10.24   | 0.03  |

### 5.4.1.3.3 Atmospheric Deposition Impacts

Modeled wet and dry fluxes of sulfur (S) and nitrogen (N) due to emissions from the cumulative sources were processed to estimate total annual S and N deposition values at each PSD Class I and sensitive PSD Class II area.

Table 5.4-7 shows maximum predicted total N and S deposition impacts from all emission sources for the year 2022 from either of the 2005 and 2006 meteorology data sets. Estimated cumulative N deposition impacts at all Class I and sensitive Class II areas within the study area would be above the critical load threshold of 1.5 kg/ha-yr. Estimated S deposition impacts would be below the 3.0 kg/ha-yr threshold at all areas, with the exception of the Mount Zirkel Wilderness Area where S deposition is estimated at 3.25 kg/ha-yr.

**Table 5.4-7**  
**Cumulative Nitrogen and Sulfur Deposition Impacts**

| <b>Class I or Sensitive Class II Area</b> | <b>Nitrogen (kg/ha-yr)</b> | <b>Sulfur (kg/ha-yr)</b> |
|---|----------------------------|--------------------------|
| Bridger Wilderness Area                   | 2.85                       | 1.61                     |
| Fitzpatrick Wilderness Area               | 3.17                       | 1.66                     |
| Mount Zirkel Wilderness Area              | 5.40                       | 3.25                     |
| Popo Agie Wilderness Area                 | 3.62                       | 1.95                     |
| Savage Run Wilderness Area                | 2.67                       | 1.24                     |
| Wind River Roadless Area                  | 3.49                       | 2.04                     |

Table 5.4-8 shows the 2022–2008 change in maximum N and S deposition at all Class I/II areas from either of the 2005 and 2006 meteorology data sets. The modeling results indicate that cumulative N and S deposition impacts in 2022 would decrease in all Class I/II areas relative to

year 2008. The decrease in N deposition is due to various regulatory programs that will reduce NO<sub>x</sub> emissions in 2022 compared to 2008.

**Table 5.4-8**  
**2022-2008 Change in Cumulative Nitrogen and Sulfur Deposition**

| Class I or Sensitive Class II Area | Nitrogen Deposition   |                | Sulfur Deposition     |                |
|------------------------------------|-----------------------|----------------|-----------------------|----------------|
|                                    | Deposition (kg/ha-yr) | Percent Change | Deposition (kg/ha-yr) | Percent Change |
| Bridger Wilderness Area            | -0.3221               | -10.54%        | -0.2726               | -14.51%        |
| Fitzpatrick Wilderness Area        | -0.3118               | --8.97%        | -0.1755               | -12.95%        |
| Mount Zirkel Wilderness Area       | -0.6458               | -10.69%        | -0.3921               | -10.77%        |
| Popo Agie Wilderness Area          | -0.3619               | -9.08%         | -0.2254               | -16.57%        |
| Savage Run Wilderness Area         | -0.2901               | -9.81%         | -0.1355               | -9.84%         |
| Wind River Roadless Area           | -0.3039               | -8.00%         | -0.1439               | -6.58%         |

#### Acid Neutralizing Capacity of Sensitive Lakes

Modeling results for cumulative sources indicated that there would be no acid neutralizing capacity (ANC) changes at any of the eight lakes that exceed the 10-percent threshold or the  $\Delta\text{ANC} < 1 \mu\text{eq/L}$  threshold for the two extremely sensitive lakes. In addition, the cumulative assessment shows that N and S deposition into the sensitive lakes in 2022 would be lower than in 2008 due to regional emissions reductions. This potentially results in an increase in ANC of the sensitive lakes over this time frame, with the lakes becoming more resilient to acid deposition in future years than during the baseline period.

#### **5.4.1.3.4 Climate Change Impacts**

As discussed in Section 4.2.1, the current scientific consensus is that anthropogenic emissions of GHGs are causing the global climate system to warm, and the amount of GHGs emitted globally will determine the magnitude of climate change throughout this century (U.S. National Climate Assessment - NCA, 2014a). Forecasts of changes in the climate system under different GHG emissions scenarios are made with global climate models. In Wyoming, the number of hot days and warm nights is predicted to increase leading to “increased demand for water and energy and impacts on agricultural practices” (NCA, 2014b).

The GHGs to be emitted by the Project sources and cumulative sources in the study area are CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O, all of which have atmospheric lifetimes on the order of years. Emissions of GHGs from any particular source become well-mixed throughout the global atmosphere. GHG emissions from all sources contribute to the global atmospheric burden of GHGs, and it is not possible to attribute a particular climate impact in any given region to GHG emissions from a particular source. Therefore, no modeled climate change impact predictions from cumulative GHG emissions sources in the vicinity of the Project Area are available.

#### **5.4.2 Geologic Resources**

The CIAA for geologic resources, which encompasses 269,423 acres (see Table 5.4-1), includes the Project Area plus a 10-mile buffer (see Map 5.2-3 and Table 5.2-1). Impacts to geologic resources such as ore removal and changes to physiography and topography are inherent impacts associated with mining that occur within the CIAA as a result of any of the action alternatives and RFFA's. Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 5,057 acres and 978 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,064 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance.

When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 9,768 acres, which is 4 percent of the CIAA.

Project design measures, for the action alternatives, as well as for the past and present actions and RFFAs, would be applied to prevent or minimize effects from slope instability, subsidence, seismic hazards, and chemical hazards; therefore, cumulative effects from geologic hazards would be expected to be minimal.

#### **5.4.3 Mineral Resources**

The CIAA for mineral resources and the estimated surface disturbance is the same as that for geologic resources (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Because mineral resources are relatively limited in and near the Project Area and there are no identified conflicts with development of other mineral resources within the Project Area, effects to mineral resources would be minimal; therefore cumulative effects would be minimal. The indirect impacts created by the increased demand for mineral resources such as sand and gravel or other construction material as a result of the action alternatives to the other mineral users identified as past and present actions or RFFA's would result in cumulative impacts to those minerals. These impacts would be minor considering the action alternatives would generate mineral materials on-site for which there is no competition.

#### **5.4.4 Soils**

The CIAA for soils is the Project Area (see Tables 5.2-1 and 5.4-1), which includes 3,611 acres. Within the Project Area, the Proposed Action would disturb a maximum of 929 acres (26 percent). Of the 3,611 acres, but excluding the Project Area, 740 acres have been previously disturbed, some of which have been reclaimed. Total cumulative disturbance (past plus proposed) would equal 1,669 acres or 46 percent of the CIAA. AML's proposed reclamation of the McIntosh Pit would be a beneficial effect to soils in that part of the Project Area. Following successful reclamation of the action alternatives, cumulative effects to soils, considering other expected activities within the Project Area such as recreation (i.e., hunting and OHV use), would occur but would be minimized in this historically disturbed area.

#### **5.4.5 Water (Surface, Groundwater, and Water Use)**

Surface Water. The CIAA for surface water is the Upper, Middle, and Lower Crooks Creek sub-watersheds, which total 94,505 acres (see Map 5.2-2 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within this CIAA is estimated to be 3,304 and 463 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 1,069 acres and includes the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When added to the Proposed Action effects (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 6,505 acres, which is 7 percent of the CIAA.

In Chapter 4, effects from the Proposed Action to all surface water features were determined to be minimal. Following reclamation, a beneficial effect could be the reestablishment of ephemeral drainages to Crooks Creek. Currently Crooks Creek dissipates before it reaches the Sweetwater River, which continues to the North Platte River. It is not anticipated that flows would be increased to connect Crooks Creek to the Sweetwater River. The North Platte River decrees were issued in 1945 and 1953 and, most recently, in 2001 by the Supreme Court, which decided a new legal distribution of the water of the North Platte River and how it was to

be divided between Nebraska, Wyoming, and Colorado (Wyoming State Geological Survey, 2014). The North Platte River would not be affected.

Surface disturbance associated with past and present actions and RFFA's, may result in adverse impacts to surface water similar to those described in Section 4.2.5, Water Resources. These impacts could include temporary increases in storm-water runoff and increases in suspended and dissolved solid concentrations in runoff during ground disturbance. However, each new project disturbing more than 1 acre would be required to obtain a construction stormwater discharge permit and to prepare and adhere to an approved SWPPP. Once successful reclamation of disturbed ground is complete, the effects to surface water resources would be expected to be minimal. With implementation of appropriate BMPs and adherence to required water quality permits and approvals under all action alternatives, the cumulative effects should be minimal.

Groundwater. The CIAA for groundwater is the Project Area plus a 15-mile buffer, which equals 552,697 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 16,874 and 1,173 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,828 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance is estimated to be 22,544 acres, which is 4 percent of the CIAA.

As described in Chapter 4, groundwater levels within the Project Area would be affected and would be monitored throughout the action alternatives in compliance with the WDEQ process. Water quality effects from all RFFAs should be avoided and/or minimized by adherence to the required permits and approvals required for each project. Cumulative effects would occur but, relative to the quantity of groundwater within the 15-mile buffer area, the amount of groundwater to be pumped would be minimal.

Water Use. Effects, other than those associated with mining, would not be anticipated from the Proposed Action; therefore there would be no cumulative effects.

#### **5.4.6 Invasive, Non-Native Species**

The CIAA for invasive, non-native species includes the Project Area plus a 10-mile buffer as well as the travel route to the Sweetwater Mill and a 5-mile buffer around the route and the mill, which totals 398,621 acres (see Map 5.2-2 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 18,691 and 1,101 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,355 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 23,816 acres, which is 6 percent of the CIAA. Following successful reclamation, including monitoring, of the action alternatives and assuming weed control BMPs would be required for the RFFAs, cumulative effects from invasive species, considering other expected activities within the Project Area such as recreation (i.e., hunting and OHV use), would occur but would be minimized.

### 5.4.7 Vegetation

The CIAA for vegetation is the Project Area (see Tables 5.2-1 and 5.4-1), which includes 3,611 acres. Within the Project Area, the Proposed Action would disturb a maximum of 929 acres (26 percent). Of the 3,611 acres, but excluding the Project Area, 740 acres have been previously disturbed, some of which have been reclaimed. Total cumulative disturbance (past plus proposed) would equal 1,669 acres or 46 percent of the CIAA. One objective of AML's proposed reclamation of the McIntosh Pit would be to promote vegetative success and diversity in that part of the Project Area. Following successful reclamation of the action alternatives, including weed control and monitoring, cumulative effects to vegetation, considering other expected activities within the Project Area such as recreation (i.e., hunting and OHV use), would occur but would be minimized in this historically disturbed area.

### 5.4.8 Wetlands and Riparian Zones

The CIAA for wetlands and riparian zones is the Project Area plus a one-mile buffer, which totals 12,497 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 237 and 117 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 305 acres and includes the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres), and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance is estimated to be 2,328 acres, which is 19 percent of the CIAA. Effects from the action alternatives and from RFFAs to wetlands or riparian zones would be regulated by the USACE and would not occur or would be minimized.

### 5.4.9 Special Status Species

Plants. The CIAA for special status plant species is the Project Area; please refer to Section 5.4.7. Except for limber pine, the action alternatives would not affect special status plant species and, therefore, no cumulative effects would occur. Cumulative effects to limber pine would include the action alternative effects described in Chapter 4/Section 4.3.4 and the effects proposed by AML through reclamation projects such as the McIntosh Pit.

Wildlife. The CIAA for special status wildlife species (except sage-grouse), which encompasses 269,423 acres, includes the Project Area plus a 10-mile buffer (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 5,057 acres and 978 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,064 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 9,768 acres, which is 4 percent of the CIAA. Cumulative effects would be the same as those described in Section 5.4.10 for Wildlife.

Sage-grouse. The CIAA for sage-grouse, which encompasses 398,621 acres, includes the Project Area plus a 10-mile buffer as well as the travel route to the Sweetwater Mill and a 5-mile buffer around the route and the mill (see Map 5.2-2 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 18,691 acres and 1,101 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,355 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as

well as the estimated ROW corridor disturbance. When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 23,816 acres, which is 6 percent of the CIAA. Cumulative effects would be the same as those described in Section 5.4.10 for Wildlife.

In terms of RFFAs, it should be noted that special status species are generally protected and/or avoided for any activities on public land but may not be protected for actions on private land.

#### **5.4.10 Wildlife**

**Big Game.** The CIAA for big game is a 22-mile buffer around the Project Area that includes portions of the pronghorn Beaver Rim and Red Desert herd units, portions of the mule deer Sweetwater Herd Unit, portions of the elk Green Mountain Herd Unit, and portions of the moose Lander Herd Unit. The 22-mile buffer also includes the Sweetwater Mill and the travel route to it. The big game CIAA encompasses 1,118,651 acres (see Map 5.2-4 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 31,520 acres and 2,289 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 3,684 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration, the West Bison Basin Unit Secondary Oil Recovery Project, and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 39,162 acres, which is 4 percent of the CIAA.

**Raptors.** The CIAA for raptors encompasses 269,423 acres and includes the Project Area plus a 10-mile buffer (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 5,057 acres and 978 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,064 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When the past, present, and reasonably foreseeable actions are added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance equals 9,768 acres, which is 4 percent of the CIAA.

**General Wildlife.** The CIAA for wildlife is the Project Area plus a one-mile buffer, which totals 12,497 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 237 and 117 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 305 acres and includes the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), total surface disturbance is estimated to be 2,328 acres, which is 19 percent of the CIAA.

**Fisheries.** The CIAA for fisheries is the same as surface water (Section 5.4.5). No effects to fisheries from the action alternatives would be anticipated; therefore, cumulative effects would not occur.

Cumulative effects to wildlife would be directly related to habitat loss, habitat fragmentation, animal displacement, and direct mortalities. Because the Project Area is a historical mining site, which has been previously disturbed (with some portions in the process of reclamation), habitat

loss and fragmentation have already occurred. Following completion of the Project, the reclaimed areas would be capable of supporting wildlife use.

Cumulative impacts from past and present actions and RFFAs within the CIAA could include:

*Reduction of suitable habitat/habitat fragmentation.* While surface disturbance generally corresponds to associated wildlife habitat loss, accurate calculations of cumulative wildlife habitat loss cannot be determined because the direct impacts of habitat disturbance are species-specific and dependent upon: 1) the status and condition of the population(s) or individual animals being affected; 2) seasonal timing of the disturbances; 3) value or quality of functional habitat of disturbed sites; 4) physical parameters of the affected and nearby habitats (e.g., extent of topographical relief and vegetative cover); 5) value or quality of functional habitats in adjacent areas; 6) the type of surface disturbance; and 7) other variables that are difficult to quantify (e.g., increased noise and human presence). Historic, current, and future developments in the CIAA have resulted, or would result, in the reduction of carrying capacities as characterized by the amount of available cover, forage, and breeding areas for wildlife species. Current or previous surface disturbance in the CIAA primarily results from mining exploration and reclamation as well as oil and gas development. Other activities such as livestock grazing also contribute to cumulative impacts on wildlife habitat (e.g., reduction of biomass).

*Animal displacement.* Displaced individuals of any species could be forced into less suitable habitats, possibly resulting in subsequent effects of deteriorated physical condition, reproductive failure, mortality, and general stress as important habitat is reduced and animals are subjected to density-dependent effects. Loss of habitat/forage consequently could result in increased competition between and among species for available resources, increased transmission and susceptibility to disease, increased predation opportunities, and emigration. Some wildlife species, such as raptors, would be susceptible to these cumulative impacts since encroaching human activities in the CIAA have resulted, or would result, in animal displacement in areas that may currently be at their relative carrying capacity for these resident species. Many of the local wildlife populations (e.g., small game, migratory birds) that occur in the CIAAs likely would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from incremental development.

*Decreased reproduction success.* A decrease in reproductive success and physical condition from increased energy expenditure due to physical responses to disturbance could lead to declining population growth.

*Increased vehicle/wildlife collisions.* An increase in traffic levels on roadways has the potential to increase vehicle/wildlife collisions and increased human utilization of resources through hunting and other recreational activities that would expose wildlife to potential human harassment, either inadvertent or purposeful.

*Increased hunting pressure.* An increase in human activity in the CIAAs may provide the opportunity for additional hunting pressure on game species such as mule deer, pronghorn, and small game species due primarily to increased public access.

*Increased illegal harvest.* An increase in human activity in the CIAAs may lead to poaching game species such as mule deer, pronghorn, elk, and small game species due to increased public presence and public access.

#### **5.4.11 Wild Horse and Burros**

The CIAA for wild horses totals 175,017 acres (see Map 5.2-4 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 66 and 208 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 232 acres and includes the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance is estimated to be 2,175 acres, which is 1 percent of the CIAA. Cumulative effects would include those described in Chapter 4 and Section 5.4.10, above, in addition to the 232 RFFA acres and on-going recreational activities (i.e., hunting and OHV use). Cumulative effects to wild horses would occur but through reclamation of the action alternatives and the RFFAs would not be expected to be significant.

#### **5.4.12 Cultural Resources**

The CIAA for cultural resources is the Project Area plus a 15-mile buffer, which equals 552,697 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 16,874 and 1,173 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,828 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance is estimated to be 22,544 acres, which is 4 percent of the CIAA. As described in Chapter 4, the possibility of discovery of buried cultural features within the Project Area is low. Therefore, cumulative effects would not be expected.

#### **5.4.13 Paleontological Resources**

The CIAA for paleontological resources is the Project Area (see Tables 5.2-1 and 5.4-1), which includes 3,611 acres. Within the Project Area, the Proposed Action would disturb a maximum of 929 acres (26 percent). Of the 3,611 acres, but excluding the Project Area, 740 acres have been previously disturbed, some of which have been reclaimed. Total cumulative disturbance (past plus proposed) would equal 1,669 acres or 46 percent of the CIAA. As stated in Chapter 4, the potential for discovery of paleontological resources within the Project Area is low; therefore, cumulative effects would not be anticipated.

#### **5.4.14 Tribal and Native American Religious Concerns**

The CIAA for tribal and Native American Religious Concerns is the Project Area plus a 15-mile buffer, which equals 552,697 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 16,874 and 1,173 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 2,828 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), the total cumulative surface disturbance is estimated to be 22,544 acres, which is 4 percent of the CIAA. No areas or sites of tribal or Native American concern have been identified within the Project Area. Concern was expressed about possible effects to the Rawlins to Fort Washakie Road, but the Eastern Shoshone agreed that the Project would cause No Adverse Effect. Cumulative effects would, therefore, not be expected.

### 5.4.15 Socioeconomics

The CIAA for socioeconomics is Fremont, Carbon, and Sweetwater counties (see Map 5.2-1 and Table 5.2-1). Past and present actions in the area are described in Section 5.3.1. The social and economic effects of past and present actions are reflected in the discussion of affected socioeconomic conditions in Section 3.4.4, and the potential cumulative effects of past and present actions are reflected in the discussion of environmental consequences to socioeconomic conditions in Section 4.4.5.

In addition to the RFFA projects described in Section 5.3.2, the following proposed energy development projects in Fremont and Carbon counties could combine with the Proposed Action to result in cumulative impacts to socioeconomic conditions:

- **Gas Hills In Situ Recovery (ISR) Uranium Project.** The Gas Hills ISR Project would be located approximately 35 miles north of the Project Area in eastern Fremont County and western Natrona County. In February 2014, the BLM Lander Field Office issued a Record of Decision authorizing Power Resources, Inc., doing business as Cameco Resources, to develop the Gas Hills ISR Project, which includes infrastructure development (processing and waste disposal facilities, wells, header houses, roads, power lines, pipelines); construction, operation and restoration/reclamation of five mine units; and final project reclamation and decommissioning. Direct employment associated with the project is estimated to include between 40 and 92 jobs over a 25-year project life. Total project-related employment is estimated to include an additional 92 indirect and induced jobs per year (BLM, 2013b).
- **Moneta Divide Natural Gas and Oil Development Project.** In January 2013, the BLM Lander Field Office initiated the EIS review process for Encana Oil & Gas (USA) Inc. and Burlington Resources Oil & Gas LP's Moneta Divide Project, which would be located approximately 55 miles north of the Project Area, between the communities of Moneta in northeast Fremont County and Hiland in northwest Natrona County (see Map 5.3-1). The proposed project includes developing approximately 4,250 natural gas and oil wells over 10 to 15 years, with an estimated 280 to 300 wells drilled each year. Additional development would include pipelines to transport natural gas from the Moneta Divide gas field to downstream pipelines near Wamsutter. The life of the proposed project is estimated to be 40 years. Employment associated with the project is estimated to include approximately 600 jobs during development and approximately 300 permanent jobs during full field production (BLM, 2013d).
- **Chokecherry/Sierra Madre Wind Energy Project.** Power Company of Wyoming, LLC (PCW) has proposed to construct a 1,000 turbine wind energy generation facility south of Rawlins and Sinclair and north of Saratoga in Carbon County. The BLM Rawlins Field Office issued a Record of Decision authorizing PCW to develop the Chokecherry/Sierra Madre Wind Energy Project in October 2012 and the WDEQ-Industrial Siting Council approved the project in August 2014. Construction of Phase I would include approximately 500 turbines, and is currently expected to begin in late 2014 and continue through 2018. Construction employment associated with Phase I is expected to peak at 945 jobs in the summer of 2017. Construction of Phase II would also include 500 turbines is expected to begin in mid-2019, depending on federal approval processes (WDEQ, 2014). Permanent employment associated with project operations is expected to include between 114 and 158 jobs (BLM, 2011b).
- **Gateway South Transmission Project.** Doing business as Rocky Mountain Power, PacifiCorp has proposed to construct, operate and maintain approximately 500 miles of overhead transmission line between the Aeolus substation near Medicine Bow in Carbon

County and the Clover substation near Mona, in Juab County, Utah. The BLM's Draft EIS, released in February 2014, evaluated alternative transmission line routes through Carbon County, southwest Wyoming, northwest Colorado, and northeast Utah. Transmission line construction would be conducted over three years, and is expected to include approximately 610 temporary jobs dispersed across the transmission line route (BLM, 2014d).

- **Gateway West Transmission Line Project.** Rocky Mountain Power and Idaho Power's proposal to develop the Gateway West Transmission Line Project would include constructing approximately 1,000 miles of transmission line between the Windstar substation near Glenrock, in Converse County, and the new Hemingway substation near Boise, Idaho. In November 2013 the BLM issued a Record of Decision authorizing the transmission line to enter Carbon County from the northeast, pass through the Rawlins Area, and continue west into and across Sweetwater County. Construction employment would include between 142 and 186 temporary jobs over an approximate 8 to 27 month construction schedule per segment (BLM, 2011c). At the time this report was written, the project remained in the planning stages and no schedules for transmission line segment construction had been identified (Gateway West, 2014).
- **TransWest Express Transmission Line.** TransWest Express LLC has proposed to develop the TransWest Express Transmission Line, an approximate 725 mile transmission line providing energy produced in Wyoming to markets in California, Nevada and Arizona. The proposed project includes a northern terminal near Sinclair in Carbon County. In June 2013 the BLM issued a Draft EIS for the project, which has been in development since 2005. Employment associated with constructing the northern terminal is estimated to include 113 direct jobs and 79 secondary jobs, for a total of 192 jobs over a 27 to 28 month construction period. Transmission line construction would include three 200-mile spreads. Employment associated with each spread is estimated to include approximately 140 direct jobs and 62 secondary jobs, for a total of 202 jobs per spread. These jobs would be temporary and dispersed along the transmission line route (BLM, 2013c).

The direct and secondary employment associated with projects planned in the CIAA would be primary drivers of cumulative socioeconomic effects. Among the RFFA projects, relatively low levels of permanent employment would be expected of the Greater Bison Basin Uranium Project, International Petroleum and Exploration Operating Corporation Green Mountain Federal #1, and West Bison Basin Unit Secondary Oil Recovery Project, as these proposals are limited in size and scope. Low levels of permanent employment would also be expected of the Gateway South, Gateway West, and TransWest Express transmission line projects. RFFA projects with anticipated operational workforce levels that could contribute to labor migration into the CIAA include the Chokecherry/Sierra Madre Wind Energy Project (114 to 158 operational jobs) and the CD-C Project, which is estimated to include 1,600 direct jobs and 2,400 indirect and induced jobs in the final years of drilling (Years 14 and 15) (BLM, 2012b). In addition, if, under the Proposed Action, Sheep Mountain ore was processed off-site, employment in the CIAA would include approximately 55 temporary construction jobs and 120 permanent operational jobs at the Sweetwater Mill.

Combined with the 76 to 204 direct jobs and eight to 30 indirect and induced jobs associated with the Proposed Action, the total estimated employment associated with all RFFA projects planned in the CIAA would range from approximately 600 to 2,800 direct jobs and approximately 2,500 indirect and induced jobs. Many of these jobs would be filled locally. Other jobs would attract non-local workers to the CIAA, some on a temporary basis (construction workers, for example) and some on a permanent basis (operational workers). Cumulative population

increases associated with labor migration would be likely to be distributed across communities in Carbon, Fremont, Natrona, and Sweetwater counties, including Casper, Lander, Rawlins, Riverton, Rock Springs, and Wamsutter.

Several of the RFFA projects in the CIAA require regulatory approval to proceed. If approved, the projects planned in the CIAA would provide a long-term stimulus to the region's economy. Cumulative effects would include fiscal impacts to the State and counties through a long-term increase in severance, property, and sales tax revenues. Depending on the timing of project implementation, moderate cumulative effects could include upward pressure on local housing markets, which, in the short-term, would increase housing costs and decrease the availability of short- and long-term rental housing. The extent of pressure on local housing markets would depend on the timing and location of RFFA projects that may be developed in conjunction with the Proposed Action. Although historic vacancy rates reported by the WHDP indicate the ability of Carbon County to absorb additional renters (see Section 3.4.4.4), this situation would be likely to change if larger projects, such as the CD-C Project, overlapped with the Proposed Action. The extent of potential labor in-migration associated with RFFA projects compared to the current supply of housing in the CIAA (including 4,867 housing units in Riverton, 3,201 units in Lander, and 3,828 units in Rawlins) indicates the need for additional housing in the CIAA if all RFFA projects are developed concurrently with the Proposed Action. Potential housing shortages could arise in select locations as local markets responded to a sustained increase in the demand for housing through new construction. Moderate cumulative effects could also include increased demands on emergency response services and law enforcement agencies, particularly the Carbon, Fremont, and Sweetwater county sheriff's offices and the Wyoming Highway Patrol. Although it is uncertain how many proposed projects would be constructed concurrently with the Proposed Action, construction workforces and schedules associated with present and future cumulative actions and projects may coincide with the Proposed Action's schedule, with moderate effects on housing availability and public services in some local communities, especially in Carbon County.

Indirect impacts to mineral resource development near the Project Area, such as existing and proposed oil and gas operations, could occur through an increase in demand for fuel, equipment, labor, and other products and resources as a result of the Proposed Action. These indirect impacts could decrease productivity and increase costs of other mineral resource users which would impact the development of mineral resources.

#### **5.4.16 Environmental Justice**

The CIAA for environmental justice encompasses Fremont, Carbon, and Sweetwater counties (see Map 5.2-1 and Table 5.2-1). As stated in Chapter 4, the potential direct and indirect effects of the Proposed Action would not be expected to disproportionately affect minority or low-income populations. Therefore, cumulative effects to environmental justice would not occur.

#### **5.4.17 Transportation/Access**

The CIAA for transportation/access is the designated transportation routes within Fremont, Carbon, and Sweetwater counties (see Map 5.2-1 and Table 5.2-1). Based on the analysis in Chapter 4, effects from the Proposed Action would include increased road deterioration and an increase in maintenance requirements on roads affected by traffic increases, increased vehicular noise, increased dust on unpaved roads, and increased opportunities for vehicular crashes. Cumulatively, all other projects within the three counties would result in the same or similar effects. Effects would not be expected to exceed the capacity of any state highway and would not be considered significant.

#### **5.4.18 Public Health and Safety**

The CIAA for public health and safety (including waste) is the Project Area and the travel route between the Project Area and the Sweetwater Mill. All waste (solid, hazardous, radioactive) is required to be disposed of in accordance with the applicable laws and regulations. Any unanticipated spills would be handled under an approved spill plan. Transportation of radioactive or hazardous material would also abide by the state and federal requirements. Therefore cumulative effects would not be expected.

The BLM recognizes the NRC's expertise in, and jurisdiction over, the control and proper use of radiological materials. The NRC will analyze and regulate all radiological effects (i.e., the biological pathways through air, water, food ingestion [vegetation, livestock]) associated with the heap pile and any potential acid generation after the heap has been spent.

#### **5.4.19 Recreation**

The CIAA for recreation is the Project Area plus a 5-mile buffer, totaling 86,585 acres (see Map 5.2-3 and Tables 5.2-1 and 5.4-1). Surface disturbance associated with past and present mining and oil and gas actions within the CIAA is estimated to be 1,576 and 523 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 1,105 acres, which includes the Jab/Antelope Plan of Operations for uranium exploration and the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. Including the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), total surface disturbance is estimated to be 4,873 acres, which is 6 percent of the CIAA. Cumulative effects would be expected to be minimal. While hunting and OHV use may be shifted or restricted from specific areas within the Project Area, they would continue within other parts of the Project Area and the CIAA.

#### **5.4.20 Livestock Grazing**

The CIAA for livestock grazing is 39,696 acres. Surface disturbance associated with past and present mining and oil and gas actions is estimated to be 1,118 and 108 acres, respectively. Surface disturbance associated with RFFAs is estimated to be 196 acres and includes the Green Mountain Federal Well #1 for natural gas production as well as the estimated ROW corridor disturbance. When added to the Proposed Action (929 acres) and the previously disturbed area within the Project Area (740 acres, some of which have been reclaimed), total surface disturbance is estimated to be 3,091 acres, which is 8 percent of the CIAA. One objective of AML's proposed reclamation of the McIntosh Pit would be to promote vegetative success and diversity in that part of the Project Area. Following successful reclamation of the action alternatives, including weed control and monitoring, cumulative effects to forage/vegetation, considering other expected activities within the Project Area such as recreation (i.e., hunting and OHV use), would occur but would be minimized in this historically disturbed area.