
CHAPTER 5 CUMULATIVE IMPACTS ANALYSIS

5.1. Introduction

The National Environmental Policy Act of 1969 (NEPA), as amended, requires an assessment of potential cumulative impacts. Federal regulations (40 Code of Federal Regulations [CFR] 1500 1508) define cumulative impacts as:

"...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Potential cumulative impacts are assessed at the resource level. The cumulative impact analysis area (CIAA) for past, present, and reasonably foreseeable future activities (RFFAs) that may generate cumulative impacts varies depending on the resource under consideration. For example, the CIAA for air quality is regional in nature; therefore, the scope of activities considered is necessarily broad. In contrast, the CIAA for geology and minerals is the area specifically associated with the Proposed Action and alternatives; therefore, the scope of potential cumulative activities considered is much narrower.

This discussion of potential cumulative impacts assumes the successful implementation of the BMPs and mitigation measures discussed in Chapters 2 and 4 of this EIS, as well as compliance with the Kemmerer RMP and all applicable federal, state, and local regulations and permit requirements.

5.2. Past, Present, and Reasonably Foreseeable Future Activities

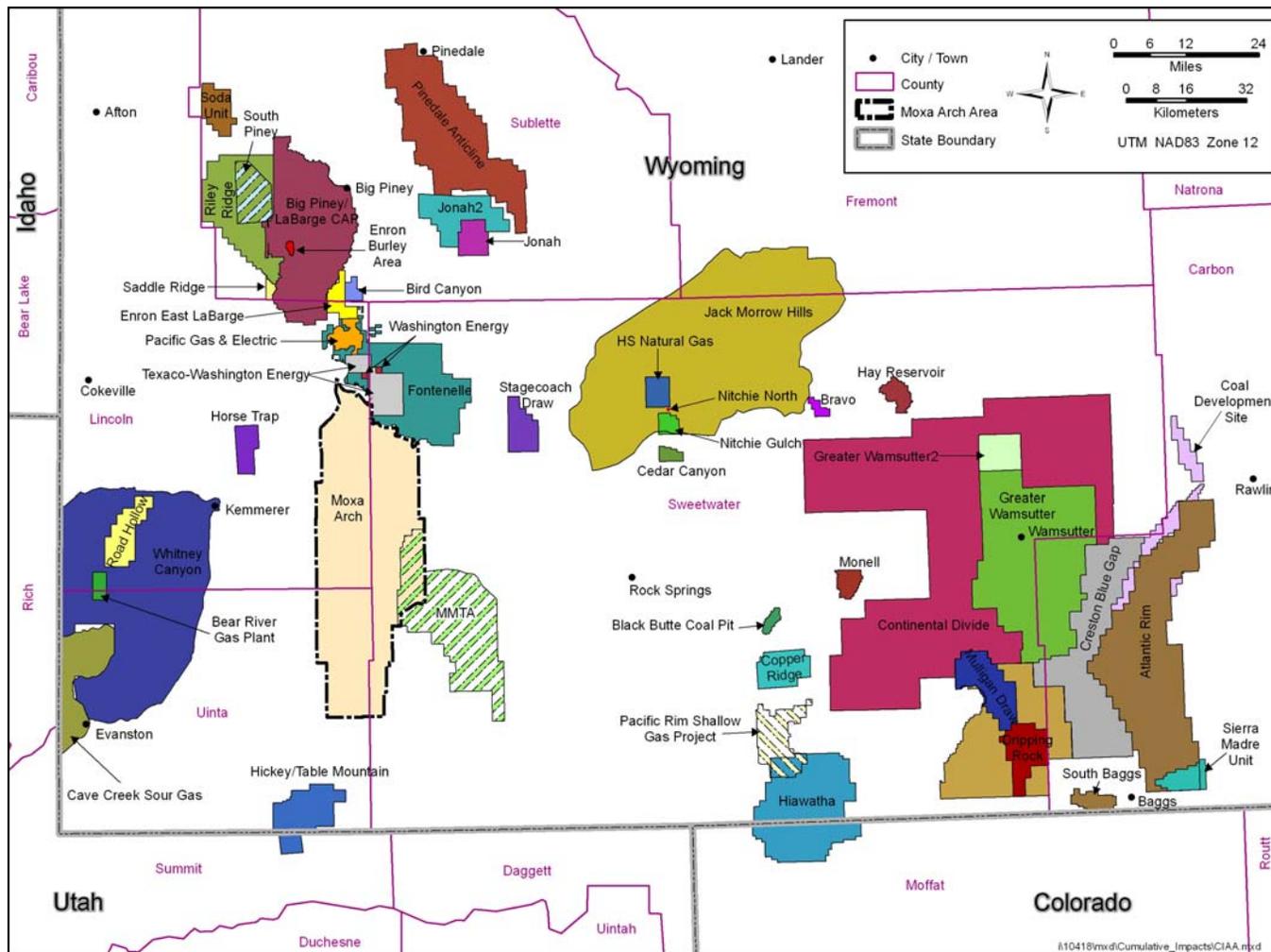
Past and existing development in the MAA and RFFAs are organized by CIAA and include the Moxa Arch Area CIAA, the watershed CIAA, the wildlife and recreation CIAA, the four-county area CIAA, and the air quality CIAA as described below (Map 5-1).

5.2.1. Moxa Arch Area CIAA

In addition to the current disturbance and anticipated future natural gas development previously discussed in this document, RFFAs in the MAA involve natural gas and liquids pipelines, geophysical exploration projects, trona mining, and wind energy projects. The MAA CIAA (Map 5-1) will be used to analyze cumulative impacts to visual resources, noise, cultural resources, geology, minerals, and paleontological resources.

Overthrust Pipeline Project

Overthrust Pipeline Company is seeking authority to construct and operate a new 36-inch-diameter pipeline that is approximately 27.2 miles long. The proposed pipeline facilities would connect Overthrust's existing pipeline in Uinta County, Wyoming to a Kern River Gas Transmission Company (Kern River) pipeline near Opal in Lincoln County, Wyoming. This new pipeline would begin at Overthrust's existing pipeline in Uinta County, approximately 500 feet west of the Sweetwater-Uinta County line. Portions of this pipeline are proposed to cross the MAA.



Map 5-1. Known Projects Falling within the CIAA Boundaries Used in Cumulative Impacts Determinations. This map reflects the extent of the known projects in the air quality cumulative impacts analysis. Cumulative impacts for other resources will not be analyzed at this scale and are described in more detail in this section.

Overland Pass Pipeline

Overland Pass Pipeline Company, LLC (Overland Pass) proposes to construct a 750-mile-long, 14-inch to 18-inch-diameter underground natural gas liquids (NGL) pipeline that would begin at its existing facilities in Opal, Wyoming and end at its existing facilities in Conway, Kansas. The proposed Overland Pass pipeline route would traverse the lower half of Wyoming in a west-to-east direction and would cross the MAA near the intersection of Sweetwater, Uinta, and Lincoln counties.

Jonah Gas Gathering Projects

Jonah Gas Gathering Company (JGGC) proposes to enhance the ability to gather natural gas produced from the Jonah and Pinedale Anticline natural gas fields for the long term (approximately 30 years). This proposal, which consists of constructing multiple large diameter pipelines, building a new compressor facility, expanding the existing Pioneer Gas Plant, and installing two 230 kV powerlines to supply power to the new compressor facility and plant expansion would allow JGGC to deliver to multiple markets and provide for the sale of developed minerals. The Bridger to Opal pipeline follows the existing JGGC pipelines through the Pinedale and Rock Springs Field Office areas and includes a 36-inch-diameter pipeline that traverses portions of the MAA. Future surface disturbance from the above-mentioned projects are expected to be minimal because their proposed locations are adjacent to existing pipelines.

Geophysical Exploration

Geophysical exploration projects will likely continue in the MAA to better define the gas resource in the Project Area. Typically, geophysical operations are necessarily spread over large areas to ensure that data collected are sufficient to define the mineral resources. Generally, geophysical operations in the MAA use vibroseis buggies or small explosive charges buried under the surface to create the seismic waves necessary to map the underlying geologic formations.

5.2.2. Watershed CIAA

The watershed CIAA is the combined watersheds that drain the MAA, Fontenelle Reservoir, the Green River to the Flaming Gorge Dam, and Flaming Gorge Reservoir (Map 3-3). This area of southwestern Wyoming and northeastern Utah includes oil and gas development; grazing and ranching; recreational development and dispersed recreation use; coal and trona mining; soda ash, fertilizer, and electric power production; and residential, commercial, and industrial development. This CIAA covers approximately 2.5 million acres; includes water, soils, and vegetation resources; and also represents the fisheries CIAA. In addition to the projects described above for the MAA CIAA, RFFAs occurring within the watershed CIAA are listed below.

Horse Trap Natural Gas Project – Lincoln County

Condor Exploration, LLC was authorized in 2001 to drill and develop 24 natural gas wells in the Horse Trap Natural Gas Project Area (HTPA) of southwestern Wyoming over a period of approximately two years. The proposed project was in addition to two active producing wells and the accompanying production-related facilities, roads, and pipelines. The 13,680-acre HTPA is located approximately 13 miles northeast of Kemmerer, Wyoming in Lincoln County and approximately 26 miles from the MAA.

Mechanically Mineable Trona Area (MMTA)

On April 15, 2004, an outreach meeting for the public and industry was held at the BLM Rock Springs Field Office in Rock Springs, Wyoming. A proposed solution to the conflict between oil and gas and trona resource recovery in the Known Sodium Leasing Area (KSLA) was described. In response to this conflict, BLM created a special management area called the Mechanically Mineable Trona Area (MMTA). The preferred course of action is to administer the area exclusively for trona extraction until conventional trona mining is complete. Oil and gas leasing and development are prohibited in

the MMTA. The area overlaps with the MAA; although, much of the development in the MMTA is located approximately southeast of the MAA.

5.2.3. Wildlife and Recreation CIAA

The CIAA for recreation is the combination of the MAA CIAA, watershed CIAA, the herd units for big game species (Maps 3-7 through 3-10), and Game Bird Management Areas for sage-grouse (Map 3-12). This CIAA includes recreation, wildlife, and grazing resources; however, the grazing CIAA only includes the grazing leases that intersect the MAA. Past and historic activities occurring in the region surrounding the MAA include oil and gas exploration, development, and production; dispersed recreation; ranching and grazing; mining; and residential, commercial, and industrial development. The projects and the NEPA documents on which potential cumulative impacts in this CIAA were based are listed below.

Black Butte Coal Pit (DEIS 2006) – Sweetwater County

The existing Black Butte coal mine and Lease-by-Application (LBA) tract are located approximately 28 miles southeast of Rock Springs. Existing operations would support coal mining through the use of processing, maintenance, and other ancillary facilities located in the Black Butte Mine permit area.

The proposed project area is 4,359 acres and includes the 1,399-acre LBA tract (federal surface and minerals); 640 acres of previously leased, federally owned surface and minerals; 160 acres of split estate (federal surface, State of Wyoming-owned minerals); and 2,159 acres of privately owned land (surface and mineral estate owned by Anadarko E&P Company, LP). Total surface disturbance associated with the project is estimated to be 2,253 acres, and the LOP is estimated to be 20 years.

Continental Divide - Creston Natural Gas Development Project (EIS) – Carbon and Sweetwater Counties

BP America Production Company (BP) and a number of other companies propose to further develop natural gas resources within the existing Continental Divide and Creston Blue Gap natural gas fields. In April 2005, Devon Energy Corporation, representing itself and other lease holders, proposed to drill and develop up to 1,250 additional natural gas wells and associated facilities within an area previously approved for up to 275 natural gas wells on up to 250 well pads. The Devon proposal was initiated and named the “Creston/Blue Gap II Natural Gas Project.”

In November 2005, BP, representing itself and other leaseholders, proposed to drill and develop up to 7,700 additional wells and associated facilities within a portion of the previously approved (May 2000) Continental Divide/Wamsutter II Natural Gas project area. After reviewing the Continental Divide and Creston Blue Gap II proposals, and in view of their timing, proximity, and similarity of the projects, the BLM determined the two projects should be combined into one project, now known as the “Continental Divide – Creston Gas Development Project.” The project area is located approximately 122 miles from the MAA.

Copper Ridge Shallow Gas Exploratory and Development Project – Sweetwater County

This project authorized exploration and possible development of federal oil and gas leases in conjunction with exploration and development of its privately held minerals. The project involves drilling, completing, and operating a maximum of 89 shallow gas wells and related production and water disposal facilities in the Copper Ridge Project Area (CRPA), which is located approximately 72 miles from the MAA. The project area includes approximately 11,565 acres of public land administered by the BLM, 12,108 acres of privately owned land, and 1,280 acres of land owned by the State of Wyoming, for a total of 24,953 acres. The CRPA overlies an area already developed by two existing oil and gas projects: the Brady and the Jackknife Springs Fields.

Fontenelle Natural Gas Infill Drilling Project (EIS) – Sublette County

This project authorized drilling of up to approximately 1,322 infill wells in the Fontenelle II Unit and Lincoln Road Development Area over a 10-year period beginning in 1995.

The project areas are located approximately 30 miles northeast of Kemmerer, Wyoming and 70 miles northwest of Rock Springs, Wyoming and encompass a 179,760-acre natural gas field, where 1,070 existing wells were already active at the time of the project proposal. The project area is approximately 29 miles from the MAA.

Hay Reservoir Unit Natural Gas Infill Development (ROD 2004) – Sweetwater County

This project authorized infill drilling of additional natural gas wells within the existing Hay Reservoir Federal Oil and Gas Unit (HRU), located in Sweetwater County, Wyoming, approximately 30 miles northwest of the town of Wamsutter and 92 miles from the MAA. The project entails constructing, drilling, completing, and producing up to 25 infill natural gas well locations within the project area (Unit), along with the construction, utilization, and maintenance of appurtenant access roads, pipelines, production facilities, and subsequent reclamation.

Vermillion Basin Natural Gas Development and Hiawatha Regional Energy Development Project EIS (DEIS anticipated 2007) – Sweetwater County

Questar Exploration and Production Company and Wexpro Company propose to drill exploratory and development wells on their leasehold acreage within the greater Hiawatha and Canyon Creek gas field area in Sweetwater County, Wyoming and Moffat County, Colorado. The project area includes 157,000 acres located approximately 60 miles southwest of the MAA along the Colorado/Wyoming border.

The Hiawatha project proponents propose to drill as many as 4,208 new wells beyond the number that currently exists in the project area. If approved, proposed wells would be drilled during a 30-year period. If all wells are determined to be technically feasible, as many as 200 wells could be drilled each year. Ongoing development in the Hiawatha project area was authorized by the Vermillion Basin EA.

Jack Morrow Hills (JMH) Coordinated Activity Plan (CAP) (ROD 2006) – Sweetwater County

The Green River RMP was published in October 1997. Because of concerns raised by the public and BLM regarding resource uses and conflicts in the JMH area, the RSFO deferred decisions on fluid mineral leasing, withdrawals for mineral location, and related mining activities until a CAP for the area was completed. The Green River RMP deferred these decisions in a “core” area, which included the eastern portion of the Greater Sand Dunes Area of Critical Environmental Concern (ACEC), the entire Steamboat Mountain ACEC, and the area of overlapping crucial big game habitats surrounding and adjacent to the Greater Sand Dunes and Steamboat Mountain ACECs.

The core area encompasses approximately 90,000 acres; however, the JMH CAP area includes about 622,000 acres surrounding and including the core area. The BLM administers approximately 574,800 acres of the planning area through the RSFO in Rock Springs, Wyoming. Parts of Fremont, Sweetwater, and Sublette counties lie within the planning area, which is approximately 66 miles from the MAA.

5.2.4. Four-County CIAA

The four-county region of Lincoln, Uinta, Sweetwater, and Sublette is used primarily for the analysis of socioeconomic impacts. It includes many of the projects described for the MAA, watershed, and recreation CIAAs. Past and historic activities occurring in the region surrounding the Project Area include oil and gas exploration, development, and production; dispersed recreation; ranching and grazing; mining; and residential, commercial, and industrial development in the communities of

Kemmerer, Rock Springs, Green River, Pinedale, and others. RFFAs in areas adjacent to the MAA primarily involve natural gas development and pipelines. The projects and the NEPA documents on which potential cumulative impacts in this CIAA were based are listed below.

Big Piney/LaBarge Coordinated Activity Plan – Lincoln and Sublette Counties

The approved CAP provided for managing the Big Piney-LaBarge area in a manner that balances multiple uses, sustains long-term yield of resources, and recognizes the area as one that will continue to be developed for its oil and gas resources. Approximately 135,785 acres of public land surface and 196,841 acres of federal mineral estate are within the area, which is located roughly 54 miles from the MAA. The CAP refined and elaborated on decisions made in the Pinedale RMP that pertain specifically to the Big Piney-LaBarge area.

Jonah Infill Drilling Project (JIDP) EIS and ROD (2006) – Sublette County

The JIDP guides the development of natural gas resources in the Jonah planning area, located 60 miles north and east of the MAA in Sublette County, Wyoming. The JIDP Area includes approximately 30,500 acres in Sublette County, Wyoming northeast of the MAA. The EIS authorizes development of natural gas resources on 3,597 new well pads at a pace of 250 wells per year. The LOP is anticipated to be 76 years. Approximately 14,030 to 20,344 acres of surface disturbance is projected during the LOP, with 4,267 to 6,020 acres disturbed after reclamation. Approximately 488 to 710 miles of new roads would be built, with an average daily traffic volume of 312 to 610 round trips to and from JIDP per day.

Monell Enhanced Oil Recovery (EOR) Project (EA-March 2006) – Sweetwater County

This EOR project in the Patrick Draw Field Monell Unit in Sweetwater County, Wyoming. The project area is approximately 70 miles east of the MAA and encompasses approximately 10,120 acres. In total, 146 producing wells have been drilled and developed prior to EOR activity. To date, 123 non-producing wells have been plugged, abandoned, or reclaimed. Of the 23 wells that remain from the original Monell unit, 9 are active oil and gas wells, and 14 are monitoring wells.

Anadarko proposes to drill a maximum of 126 new wells, which would require constructing and upgrading approximately 32 miles of access roads and 95 miles of gathering lines (facility corridors). An estimated 12 miles of new roads would be built on federal land, and 20 miles of roads would be built on private or state land. Drilling is expected to begin in 2006 and continue for 3 to 6 years, with a projected LOP of 20 to 25 years. The overall estimated disturbance on federal land would be approximately 385 acres initially and 89 acres after reclamation.

Pacific Rim Shallow Gas Exploration and Development Project (ROD 2004) – Sweetwater County

This project authorized the drilling of a maximum of 120 wells within the administrative boundary of the BLM RSFO, with a projected LOP of 15 to 20 years. The total project area encompasses approximately 47,597 acres and is located approximately 75 miles southeast of the MAA. Access to the area is via U.S. 430, Sweetwater County Road No. 24, and other existing or newly constructed roads. The project area overlies an area mostly unexplored for natural gas.

Pinedale Anticline Oil and Gas Exploration and Development Project (ROD 2000) – Sublette County

This project was approved in 2000, and it authorized the development of 700 producing well pads within the Pinedale Anticline Project Area over a 15-year period. The Pinedale Anticline Project Area comprises 197,345 acres of federal, state, and private land located within an area that extends from the town of Pinedale, Wyoming, south (25 to 30 miles) to the Jonah Natural Gas Field, west to the Green River, and east to Wyoming Highway 191.

Riley Ridge Natural Gas Development Project (ROD 1984) – Sublette County

This project included the construction, operation, maintenance, and abandonment of a deep gas well field in western Wyoming, gathering lines for the transportation of sour gas within the well field, trunk

lines for shipment of sour gas to the treatment plants, sales gas pipelines for delivery of sales gas to existing gas transmission pipelines, and facilities for the handling and transportation of by-products to markets. The final project represented three individual projects proposed by three operators. The project area is located approximately 61 miles northwest of the MAA.

South Piney Natural Gas Development Project EIS – Sublette County

This project proposes to develop oil and gas leases in the South Piney area of Sublette County, Wyoming. The area of proposed development encompasses approximately 31,230 acres within the Pinedale Field Office Management Area north of the MAA. The companies propose to drill a minimum of 100 to a maximum of 210 natural gas wells within the overall project area.

5.2.5. Air Quality CIAA

The regional CIAA includes the southern half of Wyoming, northern Colorado, and northeast Utah and is used primarily for the analysis of air quality impacts. The regional CIAA includes extensive oil and gas development; grazing and ranching; recreational development and dispersed recreation use; coal and trona mining; soda ash, fertilizer, and electric power production; and residential, commercial, and industrial development. Several highways and Interstate 80 (I-80) must also be considered in the analysis of cumulative air quality impacts.

5.3. Potential Cumulative Impacts by Resource

Table 5-1 presents a description of CIAAs by resource.

5.3.1. Air Quality

For consistency and clarity, cumulative air quality impacts are discussed with the direct and indirect impacts presented in Section 4.2.

5.3.2. Geology, Geohazards, Mineral Resources, and Paleontology

Cumulative impacts that would affect geologic or paleontologic resources are largely related to oil and gas development or mining activities.

5.3.2.1. Geology, Geohazards, and Mineral Resources

The CIAA for topography, geohazards, and mineral resources is confined to the MAA and the KSLA. Cumulative impacts affecting the CIAA are limited to oil and gas development. No trona mining within the MAA has been proposed; although, the presence of the MMTA indicates the possibility in the future. Because impacts to these resources are identical to MAA impacts, there are no additional cumulative impacts beyond those described in Chapter 4.

Table 5-1. CIAAs by Resource, MAA Infill Gas Development Project, Wyoming, 2006.

| Resource | CIAA | Map |
|--|---|-----------------------------|
| Air Quality | Air Quality CIAA; CALPUFF model domain (Map 3-1); Project Area and Nearby Class I and sensitive Class II areas | 3-1 |
| Geology | | |
| Geohazards | MAA CIAA and Known Sodium Leasing Area (KSLA) | 3-2 |
| Paleontology | MAA CIAA | 1-1 |
| Mineral Resources | MAA CIAA and KSLA | 3-2 |
| Soils | Watershed CIAA | 3-3 |
| Water Resources | | |
| Surface Water | Watershed CIAA | 3-3 |
| Groundwater | MAA CIAA and adjacent potential draw-down areas | 1-1 |
| Noise | MAA CIAA and 1-mile buffer | 1-1 |
| Vegetation | | |
| Plant Communities | Watershed CIAA | 3-3 |
| Riparian/Wetlands | Watershed CIAA | 3-3 |
| Wildlife and Fisheries | | |
| Fisheries | Watershed CIAA | 3-3 |
| Raptors | Entire ranges for affected species within the KFO | 1-1 |
| Big Game Species | Recreation CIAA plus CIAAs for each species herd unit | 1-1, 3-7 through 3-10 |
| Threatened, Endangered, Candidate, Proposed, and BLM-Sensitive Species | Entire ranges for affected species within the KFO, except greater sage-grouse (below); Green and Upper Colorado River area for Endangered Colorado River fish species | 1-1 |
| Greater Sage-Grouse | Recreation CIAA within upland Game Bird Management Areas 4, 5, and 6 | 3-12 |
| Cultural Resources | MAA and trails within the four counties that intersect the MAA | 1-1 |
| Socioeconomics | Four county CIAA and communities most likely to be affected by the proposed project | 1-1 |
| Land Use | | |
| Grazing | All portions of grazing allotments that occur partially or entirely within the MAA | 3-13 |
| Recreation | Recreation CIAA plus CIAAs for big game species and sage grouse | 1-1, 3-7 through 3-10, 3-12 |
| Transportation | The MAA and the county roads and state and federal highways in the four-county area that provide access to the site | 3-14 |
| Visual Resources | MAA CIAA and a surrounding 1-mile radius | 1-1 |

5.3.2.2. Paleontology

Bedrock formations in the MAA are those deposited in or marginal to Lake Gosiute, which formed during the Eocene and was limited to a large portion of the current Bridger Basin. Accordingly, the CIAA for paleontology is the area of bedrock exposure or the Bridger Basin roughly south of the Pinedale Anticline. Fossil resources that provide information about the history, flora, and fauna of the lake and its environs form a related dataset. As indicated in Section 5.2.1, a number of extensive oil and gas development projects are ongoing or proposed for the southern Bridger Basin. Excavation activity associated with each of these projects has the potential to destroy or uncover fossils of potential scientific importance. Mitigation measures similar or identical to those discussed in Section 4.2 would preserve paleontological resources recovered during federally administered oil and gas development activities.

5.3.3. Soils

Oil and gas development as part of the proposed project would generate temporary construction disturbance and long-term (LOP) disturbance within the soils CIAA but would create little potential for erosion and sedimentation. This is due principally to the absence of long, steep slopes in the MAA and CIAA and the corresponding limited potential for significant soil transport by erosion and sedimentation across project boundaries.

Final reclamation of decommissioned and/or abandoned facilities after oil and gas production, mining, pipeline construction, and other surface disturbances would result in a reduction in project-related disturbance acreages. Remaining disturbance in the CIAA would mostly be associated with roads constructed for oil and gas development that would be retained as part of the federal, state, and county roads network.

5.3.4. Water Resources

The CIAA for surface water resources is the watershed CIAA. Existing and reasonably foreseeable future disturbance would impact approximately 1% to 2% of the CIAA, primarily within the Blacks Fork watershed. The RFFA disturbance could potentially impact the quality and quantity of downgradient receiving water in the CIAA due to additional surface runoff, sedimentation, and water use.

Key water quality impacts to the CIAA would include salt loading to the Colorado River System and increases in total suspended solids (TSS) above existing levels. Currently, waters in the Wyoming portion of the Colorado River System are rated good to very good for salinity, and no waters are listed for salinity-related impacts. Thus, no significant cumulative salinity impacts from the MAA and projects in the CIAA are anticipated. However, combined impacts from the Proposed Action and other projects in the CIAA may increase TSS to above background levels.

Approximately 3,722 acre-feet of water would be required over the life of the Proposed Action, or approximately 374 acre-feet per year. As existing water rights would be used for future development in the MAA and most projects in the CIAA, noticeable changes in downstream discharge are not anticipated.

5.3.5. Noise

The CIAA for noise is the MAA and a surrounding 1-mile buffer. Noise levels cumulatively exceeding 55 dBA may disturb residents and recreators and could displace area wildlife. Disturbance depends on distance from the source and the nature of the ground surface, atmospheric conditions, and topography. Most noise impacts in the CIAA would be short-term and should be less than 55 dBA at

1 mile or less from the source. Some on-going impacts would occur at ancillary facilities and compressor sites and from traffic on access roads.

5.3.6. Vegetation and Wetlands

The CIAA for vegetation resources is the watershed CIAA. Existing activities in this area include historical and ongoing oil and gas development, ranching and grazing, mining, and proposed or reasonably foreseeable future oil and natural gas development. These activities have all contributed to the removal of native vegetation. Significant impacts to vegetation from oil and gas development in the CIAA have occurred as a result of past and ongoing development in the MAA and several other development projects that overlap the CIAA.

According to Gap Analysis Program (GAP) vegetation data (PIC Technologies 1996), the mixed desert shrub and sagebrush community is the dominant vegetation type in the MAA and the CIAA. Regardless of the development alternative selected, the mixed desert shrub and sagebrush community would experience the greatest amount of cumulative disturbance. Disturbance from RFFAs in the CIAA would cause further loss to this plant community. In addition, increased dust accumulation on vegetation would reduce photosynthetic activity and growth and result in long-term alteration of species composition, cover, and productivity. If not mitigated, these impacts could create impacts across the CIAA and include all vegetation cover types.

Reclamation and revegetation efforts would be required for all oil and gas and pipeline projects in the CIAA. These efforts typically involve recontouring and planting native grasses. This often results in increased dominance of herbaceous vegetation and a general decrease in the shrub stratum, at least temporarily. Recovery of habitat functionality for shrubs in treatments generally occurs within 20 to 50 years; whereas, recovery of shrubs in reclamation tends to take longer. Due to limited annual precipitation and poor soil quality in the CIAA, reclamation efforts have been relatively unsuccessful, resulting in long-term impacts to the diversity of native vegetation.

The invasion and establishment of invasive weed species has already resulted in an increase to the local and regional cumulative effects of undesirable plant species in native ecosystems. Invasive species have caused a decrease in habitat quality for wildlife and loss of desirable forage for livestock. Additional disturbance in the MAA and from RFFA in the CIAA would contribute cumulatively to the local and regional invasive weed populations by increasing the vulnerability of soils to invasion and increasing the vectors (i.e., vehicles, construction equipment, and transported topsoil) for the introduction of invasive species.

Riparian and wetland habitats within the CIAA are found along drainages, ponds, and reservoirs. Current impacts to these habitats include roads, livestock grazing, and recreational use. Waters of the U.S, riparian areas, and wetlands would be avoided where possible in the MAA and CIAA. Activities on BLM lands would not occur within 500 feet of surface waters. All activities are required to comply with Section 404 of the CWA and EO11990. Therefore, no significant cumulative impacts to these habitats are expected.

5.3.7. Wildlife and Fisheries

The CIAA for wildlife differs by species. This analysis examines the proportion of the wildlife habitat within respective CIAAs that may be disturbed from all past and present development and RFFAs. Cumulative impacts for wildlife were assessed using estimates of total surface disturbance from past, present, and known future projects within the CIAA. RFFAs within the CIAA that would impact wildlife include exploration and mineral resource extraction, road construction, and livestock grazing.

Surface disturbance and habitat fragmentation currently exist in the MAA, and some species have habituated to human intrusion. Additional disturbance in the CIAA would likely cause new behavioral adaptations, movement, and avoidance of activity areas for some time. Displaced species would be impacted if there were not adequate habitat in the CIAA to support those animals.

The cumulative indirect effects from the Proposed Action or alternatives to most wildlife species would result from the increase in roads and traffic noise. As roads are developed within and adjacent to the Project Area, habitat is fragmented and animal movement is restricted. As wildlife move to other areas to avoid dust and noise from roads, adjacent habitats throughout the CIAA are also impacted. All species would be affected by the cumulative removal of habitat, fragmentation, and reduced vertical habitat structure throughout the area, mostly as a result of MAA and adjacent developments. These direct and indirect impacts could affect population size of wildlife and species diversity in the area.

5.3.7.1. Fisheries and Aquatic Habitat

The CIAA for fisheries is the watershed CIAA. As no significant impacts are expected under any project alternatives, future development in the MAA is not anticipated to add to cumulative impacts.

5.3.7.2. Raptors

The CIAA for raptors varies by species and is the raptor's range within the Kemmerer Field Office (KFO) area. RFFAs within the KFO include Horse Trap, Road Hollow, Whitney Canyon, Bear River Gas Plant, Cave Creek Sour Gas, and Hickey/Table Mountain, which are primarily other oil and gas well developments. Impacts from these RFFAs would be similar to the impacts described in Chapter 4 of this DEIS and include decreased nesting habitat and decreased available prey.

For activities on BLM lands, seasonal restrictions around raptor nests would be enforced. Much of the land within the CIAA for raptors is managed by BLM; however, cumulative impacts to nesting raptors could occur if seasonal restrictions are not enforced on private and state land within the CIAA. Some raptor species may be cumulatively impacted by reduced foraging habitat. Increased energy-related construction and maintenance traffic in the CIAA would result in increased roadkill, leading to increased scavenging and death of raptors.

5.3.7.3. Big Game Mammals

Cumulative impacts were assessed based on seasonal ranges and migration corridors located within the big game CIAAs. Cumulative impacts to big game would generally include short-term and long-term loss of habitat, as well as increased stress due to human/wildlife encounters, potential reductions in birth/survival rates, and possible alterations of migration routes. Increased energy-related traffic in the CIAAs would likely result in an increase in roadkill, and subsequent poaching, of big game. The big game populations could remain below objectives set by WGFD and overall health of populations could be affected. In addition, displaced big game may impact other wildlife or livestock.

5.3.7.3.1. Pronghorn

A majority of the pronghorn CIAA is comprised of seasonal habitat. RFFAs within the pronghorn CIAA include the Horse Trap and MMTA projects. These projects, as well as the MAA, fall within pronghorn seasonal ranges and migration routes. For example, the pronghorn displaced by activities within crucial winter range in the MAA would be further limited by the MMTA project, which also impacts crucial winter range. Cumulative impacts may limit the available pronghorn seasonal habitats within the CIAA, cause a decrease in habitat function, or disrupt the life history requirements of pronghorn.

5.3.7.3.2. *Mule Deer*

Although mule deer seasonal range within the MAA is limited, range is available throughout much of the CIAA for mule deer. RFFAs within this CIAA may impact mule deer seasonal ranges or migration routes. Because mule deer range within the MAA is limited to riparian areas, BLM protection measures should limit project impacts to this species. Therefore, mule deer displacement by the project would be minimal, and the project is not expected to contribute to cumulative impacts.

5.3.7.3.3. *Elk*

Elk habitat within the MAA is limited to an area of crucial severe winter relief habitat. No other crucial severe winter relief range is available within the elk CIAA, except a small portion just outside the MAA boundary. Therefore, cumulative impacts to this elk habitat would be significant during harsh winters when herds from outside the MAA move into the relief area. Elk typically only use crucial severe winter relief areas during harsh winters, but potentially could use this range when activities in the CIAA displace elk from their usual winter ranges. Therefore, some cumulative impacts to elk winter range are expected.

5.3.7.3.4. *Moose*

Moose seasonal range within the MAA is limited to major riparian corridors; however, range is available throughout much of the CIAA for moose. RFFAs within this CIAA may impact moose seasonal ranges or migration routes. Because moose range within the MAA is limited to riparian areas, BLM protection measures should limit project impacts to this species. Therefore, moose displacement by the project would be minimal, and the project would not contribute to cumulative impacts.

5.3.8. Threatened, Endangered, Proposed, and Candidate Species and Wyoming BLM Sensitive Species

The CIAA for affected federally listed species is the species' entire range within the KFO. Cumulative impacts to listed wildlife generally include direct loss of habitat, as well as indirect impacts from increased fragmentation, noise, and human presence. Specific cumulative impacts for listed species that may be impacted are discussed below.

5.3.8.1. Colorado River Fishes

The CIAA for Endangered Colorado River fish species is the Green River Basin downstream from the Project that would be subject to project-related depletions. Cumulative impacts would be the same as described for fisheries and aquatic habitats.

5.3.8.2. Ute Ladies'-tresses Orchid

The CIAA for Ute ladies'-tresses orchid is riparian habitat within the KFO. Cumulative impacts to potential Ute ladies'-tresses habitat on BLM lands within the CIAA are limited due to stipulations that protect riparian habitat and require site-specific surveys for this plant. Cumulative impacts could occur to this plant if activities on private and state lands within the CIAA result in the take of multiple populations.

5.3.8.3. Western Yellow-billed Cuckoo

The CIAA for the western yellow-billed cuckoo is the riparian habitat within the KFO. Riparian habitat in the area is limited, and this species is unlikely to occur regularly in the CIAA. RFFAs in the CIAA could cumulatively impact this bird by decreasing available habitat from road stream crossings

that remove habitat. Cumulative impacts to BLM lands within the CIAA are limited due to stipulations that protect riparian habitat. Cumulative impacts could occur if activities on private and state lands within the CIAA displace this species.

5.3.9. Wyoming BLM Sensitive Species

The CIAA for affected BLM sensitive species, except for greater sage-grouse, is the species' entire range within the KFO area.

5.3.9.1. BLM Sensitive Bird Species

Cumulative impacts to sensitive raptor species would be similar to those described for non-sensitive raptors and their nests. The cumulative loss of prairie dogs and their habitat within the CIAA would impact the prey base for some raptors and nesting habitat for the burrowing owl.

Cumulative impacts to sagebrush obligate birds would occur due to the collective removal of mature sagebrush habitat and increased fragmentation within the CIAA. Sagebrush habitat is currently the dominant vegetation type within the CIAA and would experience the greatest amount of acreage loss from this project and RFFAs. Sagebrush obligate birds displaced by this project and RFFAs would have increasingly limited habitat to move into due to the overall decrease in sagebrush within the CIAA and the slow rate of regrowth. These impacts could reduce populations of sagebrush obligate birds in the area and/or increase the populations of other bird species that are adapted to the altered habitat.

5.3.9.2. Greater Sage-Grouse

The CIAA for greater sage-grouse is the combined area of Upland Game Bird Management Areas 4, 5, and 6 (Map 3-12). RFFAs within the greater sage-grouse CIAA include the several oil and gas projects. Many of these projects fall within known greater sage-grouse lek areas, nesting, and brood-rearing habitat. Activities on BLM lands within the CIAA require buffers around leks to protect the lek and nesting area although some nests fall outside of the 2-mile protective buffer. In addition, sage-grouse lek areas, nesting, and brood-rearing habitat that occur on private or state lands are not subject to these restrictions. Therefore, significant cumulative impacts to greater sage-grouse could occur within the CIAA.

There are several known greater sage-grouse leks within project boundaries and within 2 miles of RFFAs in the CIAA, including the MMTA, Whitney Canyon, and Horse Trap projects. This project would cumulatively increase the leks potentially impacted in the CIAA, and sage-grouse displaced by the project would have a decreasing amount of habitat to move into as RFFAs are developed. Therefore, sage-grouse displacement and nest abandonment from habitat fragmentation, dust, noise, human activities, and long-term loss of sagebrush habitat would be cumulatively significant, leading to lower productivity and potentially a long-term decline in the population of this species.

5.3.9.3. Bald Eagle

Because of the recent removal of the bald eagle from ESA protections, potential impacts are discussed as part of the BLM sensitive species sections. Bald eagles may be affected by reduced foraging habitat in the MAA. RFFAs occur in potential prairie dog habitat and may further reduce available prey. A cumulative reduction of prairie dog colonies in the CIAA could impact individual bald eagles. Increased energy-related construction and maintenance traffic in the MAA would result in increased roadkill, leading to increased scavenging and death of bald eagles.

5.3.9.4. BLM Sensitive Mammals

Cumulative impacts to pygmy rabbit and its habitat would occur if projects within the CIAA removed large stands of mature sagebrush in mixed desert shrub/sagebrush and vegetated sand dune communities. Cumulative loss of habitat is likely over time because much of the sagebrush habitat would be impacted and would not reach the old growth/mature age, which this species prefers.

5.3.9.5. BLM Sensitive Amphibians

The CIAA for amphibians is riparian and open water habitat in the KFO. Cumulative impacts in the CIAA for amphibians would be minimal because these habitats are protected on BLM land and by the CWA.

5.3.9.6. BLM Sensitive Fish

Cumulative impacts would be the same as described for fisheries and aquatic habitats.

5.3.10. Cultural Resources

The CIAA for cultural resources is the MAA and trail segments in the four-county area that intersect the MAA. Cumulative impacts to cultural and historical resources within the MAA would occur as a result of additional non-project-related ground disturbance and vandalism/illegal collection activities primarily associated with energy development in the surrounding region, such as the pipeline development and expansion of Bridger Basin mineral fields.

Since 1995, human presence at formerly remote cultural/historical resource sites has increased. Regulatory agency personnel and consultants have noted illegal artifact collection in the area, evidenced by collector's piles and pits on archaeological sites. Illegal artifact removal has made the evaluation of surficial archaeological sites difficult, due to the absence of diagnostic artifacts and tools (which aid in the determination of site function) and the resultant alteration of site context and setting. Off-road vehicle traffic in the area and across cultural/historical resource sites is also more commonly noted.

Increased surface-disturbing activities and human presence primarily resulting from expanded energy development activities in the CIAA would result in cumulative adverse effects. Furthermore, because many of these impacts are indirect (illegal artifact collecting or digging), they are difficult to minimize or mitigate. Under any project development alternative, significant cumulative effects to cultural and historical resources could occur if undocumented and unrecognized NRHP-eligible sites are impacted and unmitigated.

Development activities within the MAA would also have beneficial cumulative impacts on cultural/historical resources. Generally, the greater the increase in permitted activity, the greater the data acquisition of cultural/historical resource information. The MAA has already produced the greatest body of archaeological site information known in the BLM KFO area, including a majority of the benchmark sites that aid in defining regional prehistoric culture history contexts. Inventory, recordation, and data recovery projects triggered by ground-disturbing actions would continue to increase the cultural/historical resource database, likely improving future cultural/historical resource management decisions. Cumulatively, archaeological investigations in the MAA have made notable positive impacts on knowledge of the region's archaeology.

5.3.11. Socioeconomics

The CIAA for socioeconomics is the four-county region described in Section 5.2.4 above. Lincoln, Uinta, Sweetwater, and Sublette counties all depend on the oil and gas industry for a portion of their economic activity and tax base.

Development from existing activity and RFFAs would have significant adverse and beneficial impacts on the study area. Development activities in the MAA, along with other oil and gas developments, proposed and approved industrial projects (pipelines, coal mines, plant expansions), and commercial and residential projects, would increase employment opportunities, expand the tax base, and improve the counties' ability to maintain and increase services and infrastructure for residents.

Existing projects and RFFAs would not have a long-term positive economic impact on the area, but could have short-term (2 to 5 years) adverse social and economic impacts. Rapid population growth due to increased employment and the impacts associated with inadequate public facilities and services would cause short-term, but significant, negative impacts. Short-term impacts would occur in the areas of housing availability, housing affordability, daycare services, medical care, schools, social services, and law enforcement.

Increased industrial, commercial, and residential development would result in impacts related to population, employment, tax base/revenues, and general economic health. This level of development would also impact existing infrastructure carrying capacity and the ability for local private and governmental businesses and agencies to provide for the growing population effectively and expediently. Although oil and gas wells would add to the area's economic benefits, population growth associated with oil and gas jobs would contribute to the demand for housing and other public facilities and services. In addition, the demand for higher-paying oil and gas jobs would lead to a limited workforce for secondary service jobs.

Local communities would experience economic impacts from an increase in consumption of local goods and services and increased sales tax revenues, but they would also be stretched to budgetary limits by new demands for governmental services. Actual impacts would depend on the rate of development and the number of wells authorized. Because Rock Springs is the regional trade area and largest urban center within the study area, current growth levels would continue to impact the city's incorporated and unincorporated areas. Sweetwater County would also continue to be affected by the high level of development occurring throughout the region.

Increases in regional development over a short period can cause notable changes in employment and income. These variables can also cause changes in population trends, which could have impacts on community services, social structures, and lifestyles. Under all alternatives, increased oil and gas development and other activity is expected to cause an increase in taxes and revenues to all governments in the study area. Increases in ad valorem taxes would be expected to occur in all four counties, but particularly in Sweetwater County. Additional revenues would accrue to the United States in the form of personal and corporate income taxes. Sweetwater, Lincoln, Uinta, and Sublette Counties, as well as the State of Wyoming in general, are highly dependent on mineral revenues, and the funds anticipated from the proposed projects would add to those revenues.

A portion of the resident population places great value on preserving the natural character of the area and is not in favor of the high level of oil and gas development proposed in the MAA. These individuals may be affected on an aesthetic and moral level by one, several, or all projects proposed within the CIAA.

5.3.12. Land Use

Potential cumulative impacts to land uses, including grazing, recreation, and transportation, are described in the following sections.

5.3.12.1. Grazing

The CIAA for grazing is the combined area of all grazing allotments that intersect with or are contained within the MAA (Map 3-13). Based on the current grazing allotment arrangement, the CIAA extends approximately 30 miles east of the MAA and 20 west of the MAA. As a result, the CIAA encompasses a portion of five large development projects whose impacts must be considered when analyzing the cumulative effect on regional rangeland resources from development of the MAA. These five projects include Horse Trap, Hickey-Table Mountain, MMTA, Fontenelle, and Texaco-Washington Energy, most of which are oil and gas well developments. The exception is MMTA, a proposed iron mining area that would result in additional surface disturbance and loss of rangeland resources.

Impacts from these and other RFFAs would be similar to the impacts from the MAA and include vegetation and soil disturbance associated with construction activities, reclamation, weed control, road construction and use (i.e., dust and animal collisions), and rangeland functionality. Long-term, cumulative impacts would likely include a small net loss in total annual forage production from road construction and other permanently maintained areas. Assuming that successful revegetation occurs, this decrease in quantity would be partially offset by a temporary increase in quality, provided by younger, more nutritious herbaceous vegetation. Lower vegetation palatability from dust cover and the threat of health issues such as dust pneumonia could potentially create more significant impacts on grazing livestock than the effects associated with direct loss of vegetation.

Disruptions to livestock management, damage to facilities, and direct mortality of animals due to collisions and ingestion of non-native poisonous plants are impacts that are of more serious concern for the livestock ranches throughout the region. With each new development in the region, these impacts would be compounded by density of development and could potentially affect the viability of the industry in the region.

With proper consultation and stipulations set forth by the responsible agencies, effects of these issues can be minimized in the MAA and throughout the region. In particular, animal death loss can be minimized through adherence to standard traffic stipulations and an adequate weed reduction and management program. Because the weed halogeton (*Halogeton glomeratus*) is especially toxic to sheep, impacts related to poisonous plants are of greatest concern to sheep producers. This invasive species has not been adequately controlled and is expanding as new disturbances occur, increasing sheep death loss and reducing the amount of grazing land that is free of halogeton. It is not likely that this issue alone could affect the viability of sheep operations in the region, but when combined with loss of adequate grazing land from future development and increased available land for the spread of halogeton, these cumulative impacts could potentially create significant impacts to the economics of sheep ranching.

In addition to the factors mentioned above, the level of impact on livestock would depend on the rate and extent of development in the region and in the MAA. Each ranch would be affected differently. The larger ranches would be able to move livestock to minimize disturbance and the smaller ranches may be forced to suspend grazing during the development phase. Development at a slower pace allows operators to deal with problems as they arise and minimize disruptions. At times, often because of market and production requirements, oil and gas development occurs at a rapid pace and some impacts to grazing animals would be unavoidable during this phase. However, once development is completed, long-term cumulative impacts would be reduced to effects from increased

traffic and small-scale activities associated with maintenance of existing facilities. During the production phase, livestock grazing would likely return to previous levels of use.

5.3.12.2. Recreation

The CIAA for recreation is the combination of CIAAs for big game species and sage grouse. Existing activities in this area include historical and ongoing oil and gas development and proposed or reasonably foreseeable future oil, natural gas, and mining development.

Cumulative impacts to hunting, the main recreational activity in the CIAA, would occur because of the extensive impacts of natural gas development on wildlife. The increased road density, traffic, noise, and dust of development displace big game species and lead to declines in hunting success. Wildlife and hunters have already been displaced by existing development in portions of the CIAA. Development from ongoing activities and RFFAs in the CIAA would tend to concentrate game and hunters in undeveloped adjacent areas, which would impact the quality and quantity of forage, and therefore the health of the animals. There would also be an increase in the probability of hunting accidents due to increased hunter density in these adjacent undeveloped areas.

Relatively undisturbed scenery is an integral part of the recreation experience for many recreators. The visual impacts of development would make the area increasingly undesirable for many hunters as development progresses. Activities such as wildlife viewing and mountain biking also tend to be scenery-dependent. Thus incremental increases in development have corresponding decreases in the desirability of the recreational setting. Long-term cumulative impacts in the CIAA would be significant because they are likely to make the area less desirable for hunters, wildlife viewers, and other recreators.

5.3.12.3. Transportation

The CIAA for transportation includes the MAA and the county roads and state and federal highways in the four-county area that provide access to the site. Historic and existing traffic within the MAA has been associated with grazing uses, recreation, and oil and gas exploration and development. This traffic is minimal and seasonal in nature and is not anticipated to increase substantially. Cumulative transportation impacts within the Project Area are anticipated to be similar to those of the Proposed Action and alternatives. Table 5-2 displays WYDOT AADT projections for 2015 on Wyoming highways. AADT for individual highways was derived by using the percentage of total AADT for each highway from the BLM approved Expanded Moxa Arch Area Draft EIS, April 1995, and extrapolating the data to the same highways using current estimated AADT data. According to WYDOT, traffic on all highways is anticipated to increase by 2015.

Table 5-2. Proposed Action Peak Drilling Year (Year 10) AADT Compared with 2005 AADT and 2012 AADT on Affected Highways.

| Highway Segment | 2005 AADT | Projected 2015 AADT | % Projected 2015 AADT |
|------------------------------|--------------------------|--------------------------|-----------------------|
| I-80 (MP 6.26-107.09) | 13,146 (5,877 Trucks) | 15,652 (6,696 Trucks) | 1.4 |
| U.S. 30 (MP 55.13-100.03) | 1,983 (928 Trucks) | 2,554 (1,684 Trucks) | 7.2 |
| U.S. 189 (MP 0.0-66.86) | 1,232 (162 Trucks) | 1,443 (189 Trucks) | 2 |
| WY 372 (MP 0.114- 48.59) | 1,207 (321 Trucks) | 1,344 (358 Trucks) | 1.5 |
| WY 240 (MP 0.0-12.29) | 399 (120 Trucks) | 484 (121 Trucks) | 1.7 |

Natural gas development-related traffic increases on highways providing access to the MAA are likely to peak over the next 10 years. Cumulative natural gas-related traffic increases would be evident on all roads in the MAA. Although the cumulative gas field traffic would accelerate maintenance requirements on the highways and increase the probability of accidents, the State of Wyoming would receive substantial revenues from severance taxes and federal mineral royalties, which could offset maintenance costs.

5.3.13. Visual Resources

The CIAA for visual resources is the MAA and a surrounding 1-mile radius. A majority of this area is classified as VRM Class IV; however, Class II and III areas are found along major roads and waterbodies.

The Proposed Action, along with other existing development and RFFAs in the CIAA, could lead to oil and gas facilities becoming the predominant visual feature in the landscape of southwest Wyoming. As development in the area increases, visual quality decreases incrementally. Additional wells and associated surface disturbance in the visual CIAA would become noticeable to recreators or those traveling through the CIAA. Portions of the existing and proposed disturbance from wells, roads, and pipelines are visible from VRM Class II and Class III areas. Cumulative impacts would be significant during construction and production because these features attract attention and dominate the view of the casual observer. During interim reclamation, these features become less noticeable and visual impacts decrease.

In some parts of the CIAA, establishing mature vegetation after final reclamation would take 30 years; therefore, the CIAA is not likely to return to its predisturbance character for up to 100 years (cumulative LOP plus 30 years). Because of the checkerboard land ownership, mineral development would likely continue on private and state land without regard to visual impacts. Therefore, significant cumulative impacts to regional visual resources would occur within the CIAA.