Chapter 5

Cumulative Impacts Analysis

5 Cumulative Impacts Analysis

NEPA requires an assessment of potential cumulative impacts. Federal regulations (40 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 area of the cumulative impact analysis (CIA) area for past, existing, and RFFAs that may generate cumulative impacts varies depending on the resource under consideration. For example, the CIA area for air quality effects is regional in nature; therefore, the scope of activities considered is necessarily broad. In contrast, the CIA area for geology and minerals considers the project area 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 environmental protection and mitigation measures discussed in the various appendices and chapter 4 of this EIS, as well as compliance with the Great Divide RMP and all applicable federal, state, and local regulations and permit requirements. The analysis of cumulative impacts addresses both potential negative and positive impacts.

5.1 Past, Existing, and Reasonably Foreseeable Future Activity

Past, existing, and RFFAs are organized by CIA area and include the following:

- ARPA,
- Southeastern Sweetwater County/southwestern Carbon County CIA area,
- Watershed CIA area, and
- Regional CIA area.

5.1.1 Atlantic Rim Project Area

Historic and existing activities in the ARPA include livestock grazing; dispersed recreation; and oil and gas exploration, development, and production. RFFAs within the ARPA are the action alternatives and the no action alternative.

While additional natural gas proposals are possible, this analysis incorporates all reasonably foreseeable natural gas development activity within the project area based on current knowledge of the area's geology and natural gas drilling and development technology. Other potential developments are also possible, such as coal mining, wind power development, and hydropower. Such activities have not been proposed and therefore are not reasonably foreseeable. If these factors change and additional proposals are submitted, assessment under NEPA would likely be required.

Existing disturbance from oil and gas development within the ARPA is approximately 600 acres, for a total existing disturbance of around 0.22 percent of the 270,080 acres comprising the

project area. During the construction phase, the Proposed Action alternative would disturb up to 15,800 acres. Under Alternative A (No-Action), no additional surface disturbance would occur. Alternative C could shift some disturbance on federal minerals from higher sensitivity areas to lower sensitivity areas through the use of protection measures, with maximum disturbance of 13,286 acres. Alternative D would cap unreclaimed disturbance at 7,600 acres or 2.8 percent of ARPA. Disturbance areas within the ARPA would be reduced upon reclamation of pipeline ROWs and unused portions of drill pad and ancillary facility disturbances during the production phase for each alternative. Under the Proposed Action and Alternative C reclamation would reduce impacts to 6,200 acres for a cumulative impact of 6,800 acres or 2.5 percent of the ARPA. Reclamation would reduce impacts to 5,000 acres under Alternative D. There would be no impacts to reduce under Alternative A (No Action).

5.1.2 Southeastern Sweetwater County/Southwestern Carbon County CIA Area

Past and historic activities occurring in the area surrounding the proposed project include oil and gas exploration, development, and production; dispersed recreation; ranching and grazing; and residential, commercial, and industrial development in the communities of Rawlins, Wamsutter, and Baggs.

RFFAs in adjacent areas primarily involve natural gas development (map M-5). The Proposed Action is located in a region of extensive natural gas development. The projects and the NEPA documents from which potential cumulative impacts were obtained are listed below.

- **The Desolation Flats Natural Gas Field Development Project Environmental Impact Statement (USDI-BLM 2004a)** provided analysis associated with a maximum development of 385 natural gas wells at 361 locations, along with associated access roads, pipelines, and other ancillary facilities. The Desolation Flats Project Area encompasses 233,542 acres, located about 20 miles west of the ARPA. The Desolation Flats project area included two other EIS project areas with RODs in effect, namely Mulligan Draw and Dripping Rock. These two areas were included in the Desolation Flats project area EIS to analyze the potential for increased well density.

- **The Greater Wamsutter Area II Natural Gas Development Project Environmental Impact Statement (USDI-BLM 1995)** provided an analysis of impacts associated with a maximum development pattern of 750 new production wells at 300 locations within this area and associated access roads, pipelines, and other ancillary facilities. This analysis area is located to the northwest of the ARPA and includes approximately 334,191 acres.

  Development within this area reached the levels analyzed in the EIS for that project (300 well locations). Directional drilling proved to be technically impractical or uneconomical in many areas within the Greater Wamsutter II project area, and additional well locations beyond those analyzed in the EIS were required to develop the anticipated 750 production wells. The expansion of development in this project area and development in the Continental Divide area were combined in one analysis to make NEPA compliance more efficient and to facilitate the analysis of cumulative impacts.

- **The Continental Divide/Wamsutter II Natural Gas Development Environmental Impact Statement and ROD (USDI-BLM 2000a)** includes the Continental Divide area combined with the Greater Wamsutter II project area. The combined project area is generally located in Townships 15 through 23 North, Ranges 91 through 99 West, in Sweetwater and Carbon Counties, Wyoming. The total combined area encompasses approximately 1,061,200 acres. This project is located west of the ARPA.

  The EIS for this combined area provides an assessment of environmental impacts associated with development of 3,000 natural gas wells. Based on that assessment, the BLM approved development of up to 2,130 wells in 1999, 50 percent of which are on federal lands within the project area. The project is to continue for approximately 20 years with a project life of 30 to 50 years. Various associated facilities (e.g., roads, pipelines, power lines, water wells, disposal wells, evaporation ponds, and compressor stations) would also be constructed.

- **Creston/Blue Gap Natural Gas Project Environmental Impact Statement (USDI-BLM 1994)** was approved on October 4, 1994, and provides an assessment of the environmental consequences of a proposed natural gas development project located immediately west of the ARPA. The BLM's decision allowed a maximum of 275 wells on 250 locations on a 160-acre spacing pattern. This natural gas development overlaps slightly on the ARPA's western edge.

- **The Hay Reservoir Unit Natural Gas Infill Development Environmental Assessment (USDI-BLM 2004d)** involved a natural gas production area located northwest of the ARPA and the Greater Wamsutter II project area. It analyzed impacts of an increase of up to 25 additional wells over 3 years over the existing 44 wells.

- **The South Baggs Area Natural Gas Development Project EIS (USDI-BLM 2000b)** analyzed potential impacts of drilling 50 additional natural gas wells in the South Baggs area which is located south of the ARPA.

- **The Vermillion Basin Natural Gas Exploration and Development Project Environmental Assessment (USDI-BLM 2002f)** analyzed potential impacts of drilling up to 56 wells in the 92,490-acre Vermillion Basin Project Area, located approximately 55 miles southwest of the ARPA.

5.1.3 Watershed CIA Area

Cumulative analysis of natural resources that relate to watershed function and stability should occur at the watershed level. Thus, the CIA area for soils, water resources, vegetation, and wetlands includes two components: (1) an analysis of potential cumulative impacts within the ARPA and (2) an analysis of potential cumulative impacts within watersheds that contain the ARPA.

The watershed area (map M-14) considered in the CIA was based on the USGS-delineated watershed boundaries that are contained in or are adjacent to the ARPA. The ARPA falls predominantly within the Little Snake River drainage basin and the Great Divide drainage basin; however, a very small portion of the ARPA drains into Little Sage and Sugar Creeks, tributaries of the North Platte River. The total CIA area is approximately 6,913,600 acres in size. The CIA

area includes the Creston/Blue Gap, Continental Divide/Wamsutter II, and South Baggs EIS study areas that fall entirely within the Little Snake River drainage and Great Divide basins.

Cumulative disturbance within the watershed CIA area includes estimated disturbance associated with the Atlantic Rim project and existing and future disturbance associated with those portions of the Creston/Blue Gap, Continental Divide/Wamsutter II, and South Baggs projects located within the Little Snake River and Great Divide drainage areas. No other permitted projects or RFFAs within the CIA area are reasonably foreseeable at this time.

5.1.4 Regional CIA Area

The regional perspective is useful primarily for the analysis of air quality and socioeconomic impacts. The south half of Wyoming, northern Colorado, and northeast Utah region 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 other residential, commercial, and industrial development. There are also several highways, and major railroad and Interstate 80, which must be considered in the analysis of cumulative air quality impacts.

5.2 Potential Cumulative Impacts by Resource

5.2.1 Geology/Minerals/Paleontology

With the exception of petroleum resources, the geology and mineral resources within the ARPA have not been significantly affected by present and existing activities and are not anticipated to be notably affected by the Proposed Action or the alternatives if mitigation measures specific to resources are adopted. Therefore no cumulative impacts are anticipated for geology or mineral resources other than oil and gas and potentially construction materials. As discussed in section 4.1, successful oil and gas and CBNG development would result in natural gas production and depletion which is the purpose of this proposal and not considered an adverse impact. In addition, as discussed in that same section, construction-grade materials are likely to be used from local sources for surfacing materials (gravel) for petroleum and CBNG facilities in the ARPA and other areas. If development is extensive, known accumulations of local materials may become depleted and additional sources would need to be identified and used.

Potential cumulative impacts to paleontology include cumulative loss of scientifically significant resources at both known and as-yet undiscovered fossil localities. Fossil localities producing scientifically significant vertebrate fossils are rare and unevenly distributed through rocks that occur in the ARPA and adjacent areas of southern Wyoming. Those that yield fossils of great scientific importance are extremely rare. Several such localities are known from the ARPA and others may exist that have yet to be discovered within the ARPA as well as adjacent parts of southern Wyoming. These localities may preserve rare and scientifically significant fossils including remains of species not yet known to science or more complete specimens of known species.

The magnitude of the potential impact increases as additional oil and gas development projects are permitted in southwestern Wyoming on federal, state, and private lands that have not been evaluated for paleontology. Once a fossil locality that produces significant resources is lost by excavation or buried it is effectively removed from the possibility of scientific study and that information is lost.

Cumulative beneficial consequences, including the recovery of scientifically significant fossil resources at known and as-yet undiscovered fossil localities, could occur anywhere in the project area. To be most beneficial, a site-specific mitigation plan for recovery and curation of newly discovered specimens and recording associated geologic data should be adopted.

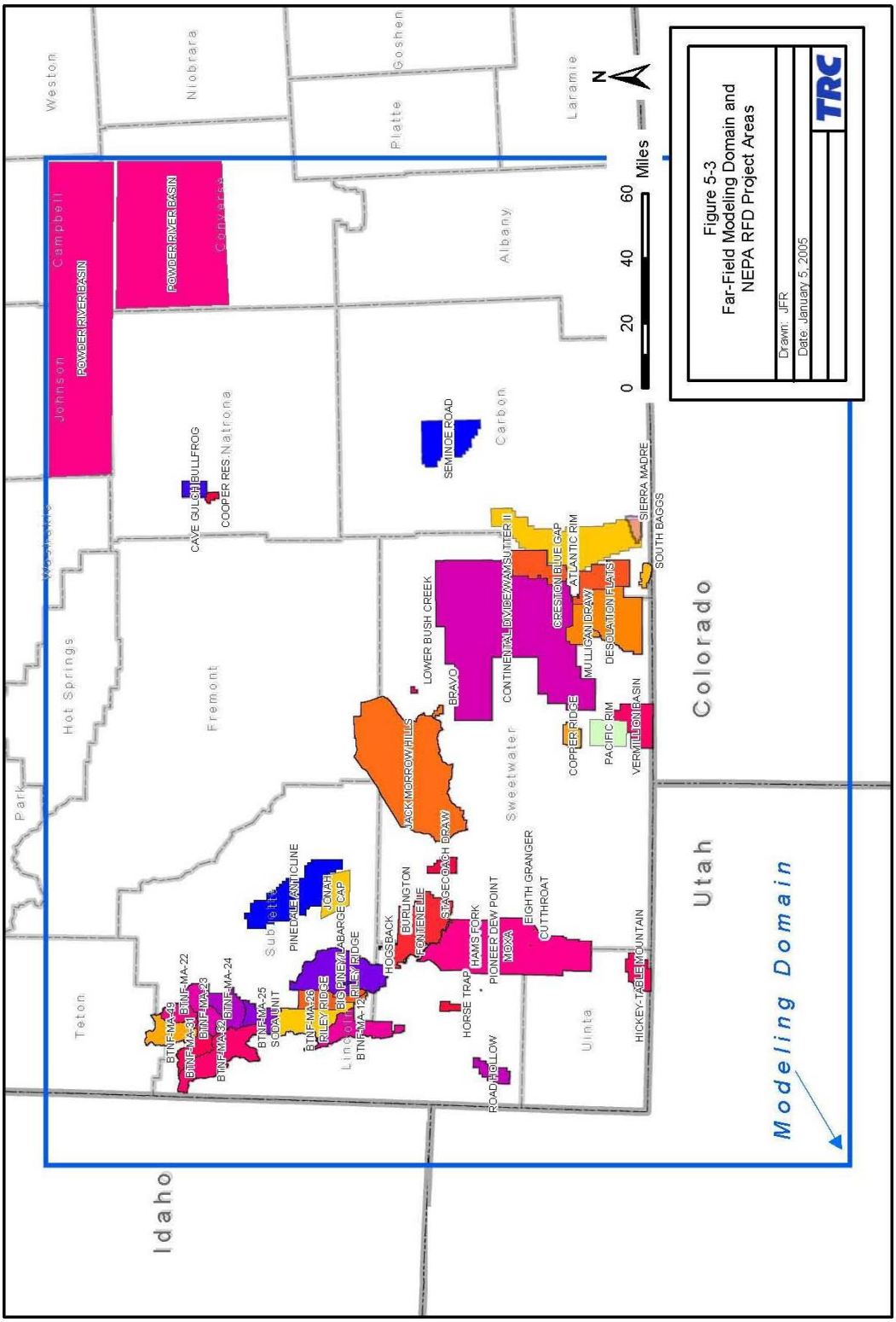
5.2.2 Climate and Air Quality

The CALPUFF model was used to estimate the cumulative air quality impacts of NO_x, SO_2, PM_{10}, and $PM_{2.5}$ resulting from project sources, state-permitted sources, reasonably foreseeable developments (RFDs), and RFFAs located within the model domain (map M-44). Project source emissions are described and quantified in section 4.2. State-permitted sources include NO_x, SO_2, or $PM_{10}/PM_{2.5}$ sources that began operation after January 1, 2001, and were permitted before March 31, 2004. Sources permitted within 18 months before January 1, 2001, but not yet operating, were included as RFFAs. RFD was defined as the undeveloped portion of (1) an authorized NEPA project or (2) a proposed NEPA project for which quantified air emissions data were available at the time of the analysis. RFD projects included in the CIA are listed in table 5-1. State-permitted RFFA, and RFD emission rates modeled in the CIA are shown in section 4.2.

Table 5-1. RFD Projects Included in the Cumulative Analysis.

Big Piney-LaBarge	Little Greys River - MA 31
BTA Bravo	Lower Bush Creek CBM (Kennedy Oil)
Burley	Lower Greys River - MA 32
Burlington Little Monument	Moxa Arch
Cave Gulch	Mulligan Draw
Cliff Creek - USFS Management Area (MA) 22	Pacific Rim
Compressor Station, Pipeline- Williams	Pinedale Anticline Project
Continental Divide/Wamsutter II EIS	Piney Creeks - MA 26
Cooper Reservoir (1998)	Pioneer Gas Plant
Copper Ridge Shallow Gas Proj.	Powder River Basin
Cottonwood Creek - MA 25	Riley Ridge
Creston-Blue Gap	Road Hollow
Cutthroat Gas Processing Plant	Seminoe Road
Desolation Flats	Sierra Madre
Eighth Granger Gas Plant Expansion	Soda Unit
Fontenelle Natural Gas Infill Drilling	South Baggs
Ham's Fork Pipeline	South Piney
Hickey Mountain-Table Mountain	Stage Coach
Horse Creek - MA 24	Upper Hoback - MA 23
Horse Trap	Vermillion Basin
Jack Morrow Hills	Willow Creek - MA 49
Jonah Infill Drilling Project	Wind River (Bureau of Indian Affairs lead agency)
LaBarge Creek – MA 12	

Map M-44. Far-Field Modeling Domain and NEPA RFD Project Areas.



While there may be additional gas processing or transmission requirements due to the development of this and other natural gas projects regionally and nationally, the potential effects of these developments are not quantified herein since these developments are speculative and would likely require additional WDEQ-AQD permitting if they eventually are proposed. A portion of the Powder River Basin Oil and Gas Development Project (PRBP), located approximately 68 miles east-northeast of the ARPA, is located within the far-field modeling domain. A ratio of total PRBP field development equal to the geographical portion within the ARPA far-field modeling domain was included as an RFD in this analysis. The PRBP identified significant project-specific and cumulative potential impacts in the Bridger Wilderness and other sensitive areas also analyzed for this project. Further information on potential air quality impacts associated with the PRBP may be found in the PRBP EIS Technical Support Document prepared by BLM (USDI-BLM 2002d).

Cumulative potential impacts were analyzed at each of the nine Class I and sensitive Class II areas listed and at in-field locations within the ARPA. Ambient concentrations were estimated at each Class I and sensitive Class II area and at locations within the ARPA, and were compared to applicable ambient air quality standards and PSD increments. Atmospheric deposition calculations were performed for each Class I and sensitive Class II area and at acid-sensitive lakes within these areas. Cumulative deposition was used to compute ANC change, which was compared to applicable LACs for each of the analyzed acid sensitive lakes. Total deposition impacts (cumulative impacts plus background) at Class I and sensitive Class II areas were compared to USDI-FS levels of concern, 5 kg/ha-yr for sulfur and 3 kg/ha-yr for nitrogen. Visibility (regional haze) potential impacts were computed for each Class I and sensitive Class II area. Potential changes in regional haze were estimated using CALPUF-modeled impacts and two sets of background visibility conditions, FLAG and IMPROVE, as described in section 4.2. Potential changes to regional haze were compared to a 1.0 dv threshold.

5.2.2.1 Proposed Action Far-Field Cumulative Impacts

Maximum potential cumulative impacts of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ were estimated for each of the analyzed PSD Class I and sensitive PSD Class II areas. These potential impacts were added to ambient background pollutant concentrations for comparison to the WAAQS, CAAQS, and NAAQS. The predicted potential cumulative impacts are below applicable ambient air quality standards and PSD increments.

Potential visibility impacts are predicted to be above the "just noticeable visibility change" (1.0 dv) threshold at the Bridger Wilderness Area and Popo Agie Wilderness Area using the FLAG background visibility data and at Bridger Wilderness Area, Popo Agie Wilderness Area, and Wind River Roadless Area using the IMPROVE background visibility data. Potential visibility impacts at all other sensitive areas were predicted to be below the "just noticeable visibility change" threshold for all days.

The maximum potential visibility impacts are primarily a result of the cumulative “non-project” regional source emissions. The maximum direct project potential visibility impacts (0.2 dv), as described in section 4.2, were estimated to be less than the 1.0 dv threshold. In addition, as defined in the FLAG report, a 0.4-percent change in extinction (0.04 dv) is considered a project-specific significance level for cumulative visibility analyses. Specifically, if the direct project contribution to a cumulative potential visibility impact of 1.0 dv or greater is less than 0.04 dv, the project is regarded as having an insignificant contribution to the cumulative visibility impact. Additional analyses were performed following the FLAG report criteria for visibility significance

determination. The results of this analysis indicated that for all days where the cumulative (project and regional sources) potential visibility impact was 1.0 dv or greater, the direct project potential impacts were below the 0.04 dv significance threshold. Based on these results, the Atlantic Rim project emissions would not cause or contribute to any significant visibility degradation at any of the Class I and sensitive Class II areas.

Potential cumulative atmospheric deposition impacts at the fourteen sensitive lakes are below the ANC LACs. In addition, cumulative total nitrogen and sulfur depositions are well below the 5-kg/ha-yr (for sulfur) and 3-kg/ha-yr (for nitrogen) LOCs.

5.2.2.2 Proposed Action In-Field Cumulative Impacts

Model-predicted concentrations of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ at locations within the ARPA resulting from Proposed Action and regional source emissions were added to monitored background concentrations and compared to ambient air quality standards. The estimated potential cumulative impacts from project and regional sources were below applicable ambient air quality standards.

5.2.2.3 Alternative A (No Action) Far-Field Cumulative Impacts

The CALPUFF modeling performed and reported in the Technical Support Document for Alternative A assumed no field development within the ARPA beyond levels currently authorized. Far-field CALPUFF modeling performed for the Proposed Action, which included emissions from project sources and from inventoried regional sources within the model study domain, indicated that while project sources contributed insignificantly to total far-field impacts, regional sources were the primary contributors to far-field impacts.

5.2.2.4 Alternatives C and D Far-Field Cumulative Impacts

The cumulative analysis performed for the Proposed Action modeled ARPA sources under a worst-case scenario, assuming one full year of construction in conjunction with nearly full-field development. Alternative C and D air emissions would be equal to or less than those which would occur under the maximum scenario analyzed for the Proposed Action. Furthermore, all other state-permitted sources, RFDs, and RFFAs would be identical to those analyzed for the Proposed Action and shown on map M-44. Model results from the Proposed Action indicated that while project sources contributed insignificantly to total far-field impacts, regional sources were the primary contributors to far-field impacts.

Cumulative impacts of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ from Proposed Action sources and inventoried regional sources within the model study domain, when added to ambient background pollutant concentrations, would be below applicable ambient air quality standards and PSD increments. Potential cumulative visibility impacts analyzed for the Proposed Action are predicted to be above the “just noticeable visibility change” (1.0 dv) threshold at the Bridger Wilderness Area and Popo Agie Wilderness Area using FLAG background visibility data, and at the Bridger Wilderness Area, Popo Agie Wilderness Area, and Wind River Roadless Area using IMPROVE background visibility data. Potential cumulative visibility impacts from the Proposed Action at all other sensitive areas were predicted to be below the “just noticeable visibility change” threshold for all days. Potential cumulative atmospheric deposition impacts from the Proposed Action at the fourteen sensitive lakes would be below the ANC LACs. In addition, cumulative total nitrogen and sulfur deposition would be below the 5 kg/ha-yr (for sulfur) and 3 kg/ha-yr (for nitrogen) LOCs.

5.2.2.5 Unavoidable Adverse Impacts

Some increase in air pollutant emissions would occur as a result of the Proposed Action and regional source emissions. Near-field potential impacts from these emissions are predicted to be below applicable significance thresholds. However, there is a potential for cumulative visibility potential impacts to exceed visibility thresholds within PSD Class I Bridger Wilderness Area, Popo Agie Wilderness Area, and Wind River Roadless Area. The Proposed Action is regarded as having an insignificant contribution to the cumulative visibility impact.

5.2.3 Soils

Existing and cumulative disturbances within the ARPA are described in section 5.1.1 for the various alternatives. For all alternatives, the cumulative post-reclamation disturbances are relatively low, and the successful implementation of erosion, runoff, and sediment controls and revegetation measures described in section 4.3 and the Reclamation Plan (appendix B) would reduce the contribution of the Proposed Action or the alternatives to cumulative impacts on soil resources. These would not remove the impact. Locally, there would still be areas exceeding the significance criteria, which would be combined with those areas outside this project area that are also exceeding the significance criteria. New development adjacent to this project area would also contribute to the increased erosion and sedimentation within the watersheds. The action alternatives could add to the cumulative removal of biological soil crusts within the area. The cumulative impact on soil crusts cannot be fully predicted due to the lack of inventory data. Initial reconnaissance has shown them to be scattered and mostly not well developed.

The ARPA contains such a small portion of the North Platte River drainage that even cumulative impacts are insignificant. Erosion within the Great Divide Basin is generally low and site-specific due to terrain. Also, because there are no drainage outlets, erosion does not affect any other watersheds. The upper Colorado River drainage has listed both salinity and sediment as significant factors for many years. Water quality sampling in the 1980s documented the Muddy Creek drainage as the principle source of sediment for the upper Little Snake River. Conservation efforts over the past 20 years have achieved success in improving watershed cover and riparian health while reducing soil erosion, in part using 319 Clean Water funding from the USEPA. These efforts have focused for the most part on livestock management; however, watershed assessments identified increased sedimentation due to oil and gas development (primarily due to runoff from roads). This project, along with other adjacent oil and gas development, would only lead to increased and accelerated erosion, and exacerbate sedimentation (and salinity) issues within the upper Colorado River drainage.

5.2.4 Water Resources

Cumulative impacts include water resource impacts from ongoing activities, RPDs, and RFFAs. Cumulative impacts are assessed for the ARPA and the watershed CIA area that includes the Little Snake River, the Great Divide, and a very small part of the North Platte River drainage areas.

5.2.4.1 ARPA Cumulative Impact Analysis Area

Existing and cumulative surface disturbances within the ARPA are described in section 5.1 for all the alternatives.

Ranch management, grazing activities, and other resource uses within the EIS analysis area would be required to meet Standards for Healthy Rangelands (USDI-BLM 1997) and therefore are not expected to have measurable effects to surface water resources. Because livestock tend to concentrate around stock ponds and in drainage areas in search of water, there would be localized effects to surface waters, which could lead to greater erosion where surface disturbance occurs and livestock concentration areas coincide.

Recreational activities, such as fishing, hunting, and camping, would continue to have minimal effects on surface water, but could be more pronounced in localized areas due to off-road travel and potential additional access provided by the project. Off-road travel in drainage areas will cause local effects to surface waters, but these effects would be limited in the EIS analysis area given restricted travel through the checkerboard federal and private ownership of many of the lands. Where there is continuous federal land and the project improves or creates new access, these impacts could be significant depending on the alternative selected.

No serious groundwater pollution problems have been detected in the watershed CIA area. Current oil and gas exploration and development activities must comply with federal and state environmental quality laws; thus, serious water quality and quantity impacts are not expected on a cumulative scale.

5.2.4.2 Watershed Cumulative Impact Analysis Area

Downstream demands for water in the Little Snake River drainage would continue to influence water management in the basin. Additional reservoir construction and associated irrigation systems would most likely be constructed with regard to the Yampa River Basin Management Plan and the recovery program for Colorado River native fish downstream (http://www.r6.fws.gov/crrip/). In addition, regional surface water quality would continue to be influenced by local and regional land use trends and activities, which include ranching and farming, oil and gas exploration and development, coal mining (none currently planned), and recreational use. Irrigation activities and municipal water systems below the ARPA would contribute additional salt loading into the Colorado River system.

Surface discharge using the offsets at the Cow Creek Pod can be expected to continue through the life of the project according to the WYPDES permits #WY0042145 and #WY0035858, which allow for 1.34 tons/day of salts and 180,600 gallons/day of total discharge under both permits. As described in chapters 3 and 4, this is an offset for an oil well (as defined by the Colorado River Salinity Control Forum), and the permit allows for the same volume of water and salt as was discharged by the oil well plugged (#1X-12). This discharge is into a reservoir on a tributary of Dry Cow Creek. This reservoir will be improved and maintained according to this use. The discharge permit is currently being revised to allow for water releases from the reservoir in a similar manner as what occurred historically when #1X-12 was in operation. The permit has a point of compliance upstream of the confluence with Cow Creek that should not allow water from the project to enter Cow Creek.

The proposed action did not propose any surface discharge of produced water from non-federal leases into facilities on private land. It is therefore assumed that all water produced from the coal formation would be re-injected with the exception of off-set uses for flowing wells as described for Cow Creek. Therefore, the WDEQ permit #WY0048437 for the Doty Mountain Pod would not be used.

A recently approved WYPDES permit for treated surface discharge of water (WDEQ permit #WY0054038) can be described as a pilot project. This discharge was permitted under the freshwater waiver conditions for the Colorado River Salinity Forum and would require treatment of the water to below 500 mg/L. BLM is considering this discharge under a separate analysis to determine significance. If the proposal is determined to be significant, a separate EIS will be required. If surface discharge of water becomes a significant method for produced water disposal in the ARPA, separate analysis may be needed that would consider the entire ARPA. This EIS does not consider any method of disposal besides injection and the offsets described above.

This project allows for closed system livestock or wildlife watering facilities under all alternatives subject to state permitting. Water from CBNG wells can be used for construction and drilling activities, subject to state permits. Owners of any state-permitted water wells documented to be impacted by the project would be offered a well water agreement to mitigate any drawdown impacts (See appendix H).

Additional oil and gas exploration and development will occur in the areas within and surrounding the EIS analysis area. Cumulative post-reclamation disturbances would be a significant impact to surface water as discussed under section 4.4. Combined impacts from the Creston Blue Gap area combined with the Atlantic Rim project can be expected to change the surface runoff characteristics above background levels and would likely be detrimental to the Muddy Creek section west of WY 789 listed as having threats on the State of Wyoming 303d list. Furthermore, salt and sediment contributions to Muddy Creek from these projects can be expected to increase above background levels due to surface disturbance. This increase would impact the Colorado River Basin with a portion contributing to the Little Snake River, as more conservative salts move downstream and sediments are stored in local channels.

Current water usage in the general area of the ARPA from all combined surface water and groundwater sources is estimated to be approximately 90,000 acre-feet per year (Collentine et al. 1981). This estimate includes uses outside the watershed CIA. Using this estimate as an environmentally conservative indication of total existing water usage, the Atlantic Rim project under the Proposed Action would use approximately 1,100 acre-feet of water. Because the Creston/Blue Gap, Continental Divide/Wamsutter II, and South Baggs project areas fall entirely within the Little Snake River and Great Divide Basins, 100 percent of the total water usage from these projects within the watershed CIA (approximately 2,700 acre-feet, 7,000 acre-feet, and 150 acre-feet, respectively) could be as much as 11,000 acre-feet over the life of the projects. If the total water usage from the Desolation Flats project (approximately 900 acre-feet) is included, even though it falls outside the watershed CIA, the total water usage for the general area could be as much as 12,000 acre-feet or approximately 13 percent of the current water usage in the general area. This cumulative water usage estimate is relatively small because it would be distributed over the lives of these projects. Also, much of the water use for the ARPA will be from coal formations.

5.2.5 Vegetation and Wetlands

5.2.5.1 ARPA Area

All the action alternatives would add to the cumulative removal of vegetation within the area. Because of the widespread distribution and abundance of the mountain and Wyoming big sagebrush cover types in the project area and south-central Wyoming, minor reductions in these

upland cover types would not be a significant impact following successful reclamation and the long-term reestablishment and establishment of native shrubs. Vegetation cover types such as alkali sagebrush and silver sagebrush/bitterbrush could be significantly impacted by disturbance due to their low abundance across the region.

Wildfires in this area occur infrequently and are usually of such small size that they add about 100 acres annually to the total amount of disturbed vegetation. There has only been one large wildfire in the general area within the last 30 years, occurring in 1993 in the Sand Hills, which burned 2,900 acres. These areas recover quickly with herbaceous species, but more slowly with shrubs and trees. Prescribed burns have primarily occurred in mountain big sagebrush sites. In limited cases, prescribed burns have occurred in aspen, mountain big sagebrush/mountain shrub mix, and basin big sagebrush cover types. The timing and conditions at the time these treatments are executed are beneficial in terms of stimulating species to improve their health, or in the case of sagebrush helping to reoccupy these habitats within 20 to 30 years instead of a longer time span. Future prescribed burns would need to factor other developments into both long-term objectives and the size and management of treatments, and would likely lead to more chemical and mechanical treatments.

The combination of activities that require reclamation and vegetation treatments increase the amount of acreage dominated by herbaceous vegetation versus those dominated by shrubs. In general, this would affect 5 to 10 percent of the overall landscape. Recovery of habitat functionality for shrubs in treatments generally occurs within 30–50 years; whereas, recovery of shrubs in reclamation tends to take longer. Because the majority of shrubland and woodland cover types consist of mature to overmature woody plants, which increases the amount of early succession, it is desirable to include younger-aged stands to diversify cover and age-class structures. Currently, there is a lack of native seed sources for forbs (and some grasses and shrubs) to use in reclamation, particularly in the 7- to 9-inch precipitation zone. This lack of seeds will continue to prevent meeting long-term species composition objectives.

Indirect effects from the action alternatives would come from road issues of dust and desertification that increase in a cumulative manner with adjacent existing and proposed oil and gas development. Dust accumulation on vegetation, reduced photosynthetic activity and growth, and lower palatability for herbivores would result in long-term alteration of species composition, cover, and productivity. If not mitigated, these impacts could affect 20–35 percent of the region and include all vegetation cover types. Desertification impacts from road modification of upland hydrology would also increase on a cumulative basis, but in more site-specific areas. In generally flat to gently rolling terrain, these impacts would be minimal, but in the Flattops, Powder Rim, and Willow Creek areas, these impacts would be similar to the ARPA with one-third or more of the area affected.

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. This project would contribute cumulatively to the local and regional invasive weed populations. An aggressive and constant-monitoring program by all involved parties (federal, state, county, and private) would be mandatory to contain or prevent this threat. Operators would coordinate and support county weed and pest districts to help control the introduction and spread of weeds resulting from the operator's activities.

5.2.5.2 Watershed CIA Area

On the broader scale of watersheds, there would be negligible impacts to vegetation within the North Platte River drainage and minimal impacts to vegetation in the Great Divide Basin. Cumulative impacts in the upper Colorado River drainage would be low to moderate due to dust and desertification from roads and their influence on overland hydrology. These alterations would affect 5 to 10 percent of the drainage within the upper Little Snake River and relate to long-term reduction of vegetative cover, species diversity, and productivity, primarily in the Wyoming big sagebrush cover type. However, due to the wide range of this species, overall impacts would be low. The acreage of vegetation disturbance due to permitted activities and naturally occurring events would be less than 2 percent of the overall landscape.

Cumulative impacts also include wild horses in the Adobe Town HMA. Although not in the ARPA, this management area overlaps the southern portion of oil and gas field development west of WY 789. Lack of funding for roundups led to population increases through 2002 and 2003 resulting in forage consumption by wild horses equal to that normally consumed by wild horses and livestock combined. Because of concurrent drought conditions, species composition decreased, vegetation cover decreased, and plant spacing increased, which will require years for recovery. Roundups in 2003 and 2005 have returned wild horse numbers to desired levels, but if allowed to expand to the high numbers recently observed, it would have negative affects on reclamation, weeds, and erosion, in addition to the affects already described above.

5.2.6 Range Resources

5.2.6.1 ARPA Area

In the long-term, cumulative impacts to the grazing resource would likely result in a small net loss in total annual forage production. This small decrease in quantity, assuming successful revegetation occurs, would be offset by an increase in quality that would be provided by a younger and more nutritious herbaceous cover. Although native shrubs would re-establish in the long-term, dominance of herbaceous vegetation would benefit livestock operations that currently run 90 percent cattle, whose diets are primarily grasses. Dust impacts to vegetation would lower palatability. Lowered palatability would cause health and weight gain issues like dust pneumonia, which are larger issues than direct loss of vegetation. On a cumulative basis, these impacts would increase, but the actual affect to each operation would depend on the operation size and how much of the operation was included within a development area. These impacts would occur in both the development and production phases of oil and gas development.

The more important impacts to grazing relate to disruptions to livestock management, damage to facilities, and death loss of animals to collisions and poisonous plants. The first two relate more to the development phase and can be minimized with adequate consultation. Unfortunately, the scope of this impact is not well understood by people or documented in terms of actual impact. For instance, in 2005, one operator had to roundup cattle three times rather than once from a 60,000 acre allotment and neighboring allotments due to pipeline construction and open fences. In 2006, this same allotment had fifteen fence locations cut by new pipelines and roads that were not adequately rebuilt to contain cattle when the grazing season started. These types of problems increase labor costs, reduce weight gains, increase potential disease transmission, and reduce time available for other planned work. Animal death loss can occur at anytime, but can also be minimized with adherence to standard compliance stipulations.

However, improved roads often just lead to greater vehicle speeds and potential for collisions with animals. The weeds issue is more serious for sheep producers due to the death loss from halogeton. This invasive species has not been adequately controlled and is expanding with new disturbances, increasing sheep death loss and reducing the grazing land available that is free of halogeton. Whether this issue alone would eliminate economic sheep operations in this area is unknown, but currently this issue is the greatest threat to these operations.

In summary, impacts to livestock operations include the above factors, but the level of impact will be dependent on the rate and extent of development upon each ranch. Development at a slower pace allows operators to keep up with what is happening and deal with problems as they arise. Development in one pasture or one allotment at a time still allows operators to work around development to minimize disruptions. However, the pace of development tends to be faster rather than slower, and 80 percent of the grazing operators run entirely within oil and gas development areas, limiting options for grazing operations. Under this scenario, there is likely to be both reduced grazing use and in some cases requests for total non-use by the operator for up to 5 years during the development phase. Once field development is completed and the production phase begins, livestock grazing would likely return to initial levels of use.

5.2.6.2 Watershed CIA Area

Expanding the area for cumulative analysis of impacts to livestock operations does little to change the analysis above. If operators reduce their animal numbers or duration of use or if they request total non-use to avoid disruptions due to oil and gas development, some additional grazing use could occur in areas not affected by this development. This could be in watersheds within the CIA area or in others further distant. However, this would likely only be during the next 5 to 10 years and not continue once gas field operations became primarily production orientated.

As described above under section 5.2.5, the population of wild horses in the Adobe Town HMA could affect livestock operations under cumulative impacts with oil and gas development. If populations of wild horses are allowed to expand beyond desired population levels, flexibility of livestock operations to adjust to impacts from oil and gas development would be reduced. In the case of the 2003 and 2004 grazing seasons, nearly all livestock use (24,000 AUMs) was eliminated due to impacts from wild horses and the 2002 drought. If this situation reoccurs in conjunction with responding to management disruptions related to oil and gas development, additional reductions in livestock use may be required.

5.2.7 Wildlife

The CIA areas for wildlife resources differ with respect to species. This analysis examines the proportion of the wildlife habitat within respective CIA areas that may be disturbed from all past, present, and RFFAs. In assessing cumulative impacts, it was not possible to specifically determine where future impacts would occur within CIA areas. Therefore, estimates of total disturbance were made based upon the location of past, present, and known future projects within the CIA areas and the expected amount of disturbance associated with each project. The proportion of the estimated total disturbance within the CIA areas was used to estimate the cumulative area of wildlife habitats that may be disturbed by past, present, and RFFAs.

The combination of the individual projects is resulting in a large area of increased fragmentation, disturbance of wildlife and their habitats, and the loss of refuge areas. Additional effects are

expected upon wildlife dispersal, the reduction of non-fragmented habitats, competition with livestock, and inter- and intra-specific competition with other wildlife species. The generalized increase of human presence and associated disturbance across such a broad scale are a concern. Remaining ranges with increased competition for forage leading to reduced carrying capacity and juvenile survival can also be expected. Mitigations, COAs, and other BMPs will reduce the impacts of these developments, but not eliminate them. Reduced populations and population viability can be expected.

Cumulative indirect effects from the Proposed Action or alternatives to all wildlife species in general would come from roads and traffic noise. As roads are developed within and adjacent to the project area, habitat is fragmented. Roads can serve as barriers to some animal movement. The displacement of species away from roadsides can be reasonably predicted. Insects, birds, and amphibians all avoid dust and noise from roads, which compounds impacts to adjacent habitats throughout the CIA area. Sagebrush-obligate species would be affected by the cumulative removal of habitat (reduction or fragmentation of patch size or vertical habitat structure) throughout the area.

5.2.7.1 Big Game

Construction such as building well pads and roads can reduce use of surrounding habitat by wildlife. Although this construction reduces forage due to the direct loss of native vegetation, there is an area surrounding these sites that tends not to be used due to increased human activity. This “zone” can extend up to 0.625 miles from the developed area for pronghorn (Easterly et al. 1991) and from 0.6 to 1.2 miles for elk depending upon the season (Powell 2003). Consequently, disturbance to wildlife can extend further off site than the actual disturbed area. Some individual animals can habituate to the increased infrastructure; however, it is generally assumed that, overall, the increased human presence in an area is detrimental to big game species. Dust accumulation on vegetation lowers the palatability for big game. This, along with the physical removal of vegetation, reduces the availability of forage. The significance of this forage reduction is greater in big game crucial winter range, especially as development cumulatively and concurrently occurs outside the project area in adjacent oil and gas development areas.

Big game populations are managed within herd units designated for each species and cumulative impacts are discussed in the context of these areas. Cumulative big game habitat losses for pronghorn, mule deer, and elk herds resulting from development of the ARPA, and adjacent EIS areas (section 5.1) are presented in table 5-2. Implementation of the proposed project would affect crucial winter/yearlong and winter/yearlong range for all three big game species. The specific locations of future disturbances within the ARPA and the remainder of the herd units are unknown; therefore, the area of each type of seasonal big game ranges that may be impacted is unknown. The potential impacts to big game habitats are estimated for the portions of each herd unit that contain designated big game seasonal ranges. The cumulative disturbance to big game seasonal ranges expected to result from development activities from the combination of existing, proposed, and RFFA disturbances for each of the three big game species are listed in table 5-2. Cumulative impacts to big game would include permanent, short-term, and long-term loss of habitat. It would also include increased stress due to human/wildlife encounters, potential reductions in birth/survival rates, and possible alterations of migration routes.

Table 5-2. Estimated Cumulative Surface Disturbance (acres) within Big Game Seasonal Ranges, Included within the ARPA.

		Project Related Development		Cumulative Development[1,2]		Total Disturbance
	Acreage Available	Initial	LOP	Existing	Potential Future	Acres
Pronghorn – Baggs Herd Unit						
Proposed Action	890,743	15,800	6,241	5,804	743	12,788
No Action (A)	890,743	0	0	5,804	743	6,547
Alternative C	890,743	15,800	6,241	5,804	743	12,788
Alternative D	890,743	13,000	5,000	5,804	743	11,547
Mule Deer – Baggs Herd Unit						
Proposed Action	1,843,543	15,800	6,241	23,536	17,751	47,528
No Action (A)	1,843,543	0	0	23,536	17,751	41,287
Alternative C	1,843,543	15,800	6,241	23,536	17,751	47,528
Alternative D	1,843,543	13,000	5,000	23,536	17,751	46,287
Elk – Sierra Madre Herd Unit						
Proposed Action	1,525,644	15,800	6,241	883	0	7,124
No Action (A)	1,525,644	0	0	883	0	883
Alternative C	1,525,644	15,800	6,241	883	0	7,124
Alternative D	1,525,644	13,000	5,000	883	0	5,883

Notes:

[1] Sources: Creston/Blue Gap EIS (USDI-BLM 1994), Continental Divide/Wamsutter II (CD/WII) EIS (USDI-BLM 2000a), Desolation Flats EIS (USDI-BLM 2003g); these numbers do not reflect acreage disturbed within the ARPA from existing natural gas development or the Interim Drilling Policy.

[2] Numbers reflect reclaimed acreage, not total shrub habitat loss as a result of the projects, therefore, the numbers are conservative.

Pronghorn. The cumulative impact analysis area for pronghorn is the herd units impacted by the project. Cumulative impacts upon pronghorn migration routes are unknown at this time; however, the current fencing along WY 789 creates a barrier to pronghorn attempting to migrate across this highway. Wyoming Game and Fish Department has constructed a lay down fence along a portion of this area.

It is assumed that most, if not all, of the Baggs herd transition range is located within the ARPA. The Baggs Herd Unit has 43.5 percent of its crucial winter range located within the ARPA (map M-21). An additional 39.6 percent of this herd unit's crucial winter range lies within other oil and gas project EIS boundaries adjacent to the ARPA. Therefore, 83.1 percent of the Baggs pronghorn crucial winter range may lie within one or more of several oil and gas project boundaries.

Mule Deer. The cumulative impact analysis area for mule deer is the herd units impacted by the project. Cumulative impacts upon mule deer migration routes within the Baggs Herd Unit are unknown. Currently, an industry sponsored mule deer study is ongoing. Completion of the first phase of the study has provided BLM and WGFD better information on migration routes. It is assumed that most, if not all, of this herd's transition range is located within the ARPA. The Baggs Herd Unit has 27 percent of its crucial winter range located within the ARPA. An additional 23.3 percent of this herd unit's crucial winter range lies within other oil and gas project EIS boundaries adjacent to the ARPA. Therefore, 50.3 percent of the Baggs mule deer crucial winter range might lie within one or more of several oil and gas project boundaries.

Elk. The cumulative impact analysis area for elk is the herd units impacted by the project. The Sierra Madre Herd Unit has 25 percent of its crucial winter range located within the ARPA (map M-24). No additional acreage of this herd unit's crucial winter range lies within other oil and gas project EIS boundaries adjacent to the ARPA. It is assumed that a portion of this herd's transition range is located along the eastern third of the ARPA. Current collaring studies within the ARPA by the WGFD show more movement of elk in a north-south direction along the eastern third of the ARPA than was originally suspected. However, elk movement may not always be the most direct route from winter to summer range. It is likely that project activities will disturb elk to a degree that they may move to new areas outside the ARPA. Elk are more sensitive to human activities than Mule Deer or Pronghorn Antelope, and may be displaced up to 1.2 miles, depending on the season (Powell 2003). This displacement could have consequences for livestock operators and other wildlife habitat.

5.2.7.2 Greater Sage-Grouse and Columbian Sharp-Tailed Grouse

Greater sage-grouse inhabit the ARPA and surrounding area year-round and require a wide range of seasonal habitats. The ARPA is located primarily within the Sierra Madre Upland Game Bird Management Area (UGBMA), but a small section is also located in the Bitter Creek UGBMA. These two areas were used as the CIA area for greater sage-grouse breeding and nesting habitats.

There are a total of 185 greater sage-grouse leks (150 occupied, 14 unoccupied, and 21 with unknown status) within the Bitter Creek and Sierra Madre UGBMAs. The area of potential nesting habitat consists of a 2-mile buffer placed around all occupied and unknown status leks within the Bitter Creek and Sierra Madre UGBMA. This area encompasses an additional 662,080 acres outside the ARPA, which is within EIS boundaries that have current, and could receive future, oil and gas development.

There are 145 greater sage-grouse leks within a 2-mile buffer of all current EIS project boundaries for oil and gas development including the ARPA. This project would cumulatively increase the leks potentially impacted by 88 leks. Furthermore, within the boundaries of the South Central Conservation Area (SCCA), 45 percent of this area's grouse are found within a 2-mile buffer of these same EIS boundaries and 28 percent are found within a 2-mile buffer of the ARPA. Data collected at seven sites in Wyoming documented that 45 percent of nests occur within 2 miles of a lek and that 64 percent of nests occur with 3 miles of a lek. In addition, nest success probability suggests increased nesting success rates beyond 5 miles of a lek (Holloran 2005). Until all existing and suitable habitat is mapped within the ARPA beyond the 2-mile lek buffer, there is a potential to have a significant direct and indirect impact to grouse.

Within Wyoming nearly half of the leks found within the SCCA are within oil and gas fields being developed. Development might cause bird displacement and nest abandonment from direct and indirect impacts, such as habitat fragmentation, dust, noise, human activities, and long term loss of sagebrush habitat. These direct and indirect impacts would be cumulatively significant and would lead to lower productivity and a long-term decline in the population of this species.

Columbian sharp-tailed grouse inhabit the ARPA along the eastern edge and southern portions. The only populations found within Wyoming are within and adjacent to the ARPA. Wyoming's populations are a northern extension of those found within northwestern Colorado (133 leks). Currently, there are 27 leks in Wyoming, all of which occur on or within 16 miles of the east ARPA boundary. Only seven of these leks are afforded protection (BLM or USDI-FS); the remaining 20 leks are found on state or private lands. Cumulative impacts to sharp-tailed grouse may occur from current and future county land use planning and community development, loss of Conservation Reserve Program (CRP) lands, mining and energy development in Colorado (Hoffman 2001). This development may cause bird displacement and nest abandonment from direct and indirect impacts, such as habitat fragmentation, dust, noise, human activities, and long term loss of mixed shrub habitat. These direct and indirect impacts would be cumulatively significant and would lead to lower productivity and long-term decline in the population of this species.

5.2.7.3 Raptors

The CIA area for raptors includes the ARPA plus a 1-mile buffer. This area covers approximately 400,000 acres, all of which would be considered raptor foraging habitat. Approximately 290,000 acres of this area were located within 1 mile of a known raptor nest and are considered to be potential raptor nesting habitat.

Cumulative impacts from the creation of additional nesting sites (artificial nesting structures and tanks) are unknown from other conventional oil and gas EIS projects in the vicinity of the ARPA. In the Continental Divide/Wamsutter II EIS area, raptor nesting success is static to improving. In addition, raptor fledgling numbers increase from three per natural nest to four per artificial nest. Additional research is needed to evaluate impacts on raptors and their prey by creating additional nesting structures in areas that previously were limited by natural nesting substrates.

5.2.8 Special Status Plant, Wildlife, and Fish Species

Potential impacts to threatened, endangered, proposed, and sensitive species in this area of Wyoming are likely to be primarily associated with minerals development.

5.2.8.1 Plants

The area of influence assessed for special status plants includes the area described in section 5.1.2, southeastern Sweetwater County and southwestern Carbon County. Indirect concerns across the assessment area includes the possibility of a general reduction or loss of pollinators, invasion of weeds from adjacent development into occupied habitats, and increased risk of habitat disturbance from increased human presence.

Given the BLM policy of avoiding disturbance activities within identified special status plant habitats, direct cumulative effects upon these species should be avoided. While no special status plant populations are known to exist within the ARPA, site-specific surveys will be

conducted for each disturbance proposal to identify any unknown populations at risk from development. Standard mitigation and BMPs will allow for avoidance of impacts if such a population(s) should be found.

5.2.8.2 Wildlife

The area of influence assessed for special status wildlife includes the area described in section 5.1.2, southeastern Sweetwater County and southwestern Carbon County. As detailed in that section, several large oil and gas development projects are occurring within the area, and others are expected. None of the projects, other than Atlantic Rim, predict significant effects upon wildlife individually or cumulatively. Atlantic Rim predicts significant effects upon big game, greater sage-grouse, and sagebrush obligates.

The combination of the individual projects is resulting in a large area of increased fragmentation, disturbance of wildlife and their habitats, and the loss of refuge areas. Additional effects are expected upon wildlife dispersal, the reduction of non-fragmented habitats, competition with livestock, and inter- and intra-specific competition with other wildlife species. The generalized increase of human presence and associated disturbance across such a broad scale are a concern. It can also be expected that competition for forage will increase in the remaining ranges leading to reduced carrying capacity and juvenile survival. Mitigations, COAs, and other BMPs will reduce the impacts of these developments, but not eliminate them. Reduced populations and population viability can be expected.

5.2.8.3 Fish

Cumulative impacts to fish species include the effects of the Atlantic Rim project and those found upstream in Muddy Creek from the ARPA. Of primary concern would be water depletions resulting in changed water conditions including salinity, volume, and temperature. At this time there are no known additional proposals to analyze or assess.

Sensitive fish, described in section 4.8, would be significantly impacted by the project. Impoundments downstream of the ARPA may be blocking sensitive fish movement into Muddy Creek, but are not attributable to the ARPA. As detailed in chapter 4, additional impoundments and alterations to natural flow characteristics (such as crossings) within Muddy Creek could have serious additional impacts to fish populations. Alteration of hydrology from roads, culverts, and other disturbances that result in re-channeling of overland flows into new channels or increasing the intensity/volume of flows within existing channels can affect sensitive fish. Blockage of fish migration within the ARPA from channel crossings would seriously impact the viability of fish populations if it should occur.

Under Alternative C, development protection measures would be applied to the Muddy Creek SMA and would effectively protect these fish populations within the ARPA.

5.2.9 Recreation Resources

The CIA area for recreation resources includes the ARPA plus parts of southwestern Carbon County and southeastern Sweetwater County that generally lie in the area bounded by Rawlins, Creston Junction, Savery, and Baggs, Wyoming. Existing mineral activities in this area include historical, ongoing, proposed, and reasonably foreseeable future oil and gas development.

Cumulative impacts to hunting, the main recreation activity in the CIA, 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 (See section 5.2.7). When big game species leave an area, hunters soon leave as well, because hunting success declines. Wildlife and hunters have already been displaced by existing development in portions of the CIA. Displacement of game and hunters would occur in areas as they are developed. As development spreads, so does displacement. This could have a serious financial effect on commercial big game outfitters that rely on wildlife and knowledge of the CIA for successful hunts. It would also 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 recreationists. 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.

Cumulative impacts would be greatest during the development phase in the ARPA, with its associated drill rigs, vehicles, human presence, noise, and dust. Even after field development and interim reclamation are completed, the day to day maintenance of production operations would continue to displace much of the wildlife with noise, traffic, dust, and habitat fragmentation (section 3.7). The area would still be undesirable for non-consumptive visitors such as sightseers, wildlife viewers, and mountain bikers because of the poor scenery cluttered with facilities and their associated network of roads. These visitors would be forced to travel elsewhere to find natural-appearing landscapes with the aesthetics they desire.

The re-establishment of mature vegetation after final reclamation would take 30 years in some parts of the ARPA. Localized areas may not successfully revegetate for much longer. The life of the project may be up to 50 years, so the ARPA is not likely to return to its predisturbance wildlife habitat conditions for 70–80 years. Long-term cumulative impacts in the CIA would be likely to affect at least two generations by making the area less desirable for hunters, wildlife viewers, and other recreationists.

5.2.10 Visual Resources

The CIA area for visual resources includes the ARPA and parts of southwestern Carbon County and southeastern Sweetwater County that generally lie within the area bounded by Rawlins, Creston Junction, Savery, and Baggs, Wyoming. Existing mineral activities in this area include historic, ongoing, proposed, and reasonably foreseeable future oil and gas development.

The action alternatives would increase the amount of visual resources in the CIA affected by historical, ongoing, and reasonably foreseeable oil and gas development. Sixty-eight percent of the ARPA is visible from the interstate, state, county, or BLM roads, so development of the ARPA would have a high visual impact on the CIA (section 4.10). Incremental increases in development have corresponding decreases in the quality of visual resources in proximity to the development.

Cumulative impacts would be significant because development in the CIA would exceed VRM Class III management objectives by dominating the view of the casual observer. The establishment of mature vegetation after final reclamation would take 30 years in some parts of the CIA. Localized areas may not successfully revegetate for much longer. The life of the project may be up to 50 years, so the CIA is not likely to return to its predisturbance character for up to 80 years.

5.2.11 Cultural Resources

The CIA area for cultural resources is the project area and adjacent areas in southeastern Sweetwater County and southwestern Carbon County (map M-45). Table 5-3 summarizes contributing and non-contributing trail segments within the CIA, and contributing segments (only) within the ARPA. In examining the CIA, which incorporates previous EIS areas west of the ARPA within the BLM RFO boundary, approximately 130 total miles of historic trails (Overland, Cherokee and Rawlins-Baggs Road) have been subjected to potential impacts from gas development. The ARPA includes approximately 47 miles of contributing historic trail segments.

Table 5-3. Cumulative Impacts to Historic Trails

Trails Eligible for the NRHP	Total Acres (Miles) of Trails in CIA*	Total Acres (Miles) of Contributing Trails in ARPA*
Cherokee Trail	15,360 (48)	3,840 (12)**
Overland Trail	11,520 (36)	3,520 (11)
Rawlins-Baggs Road	14,720 (46)	7,680 (24)
Total	41,600 (130)	15,040 (47)

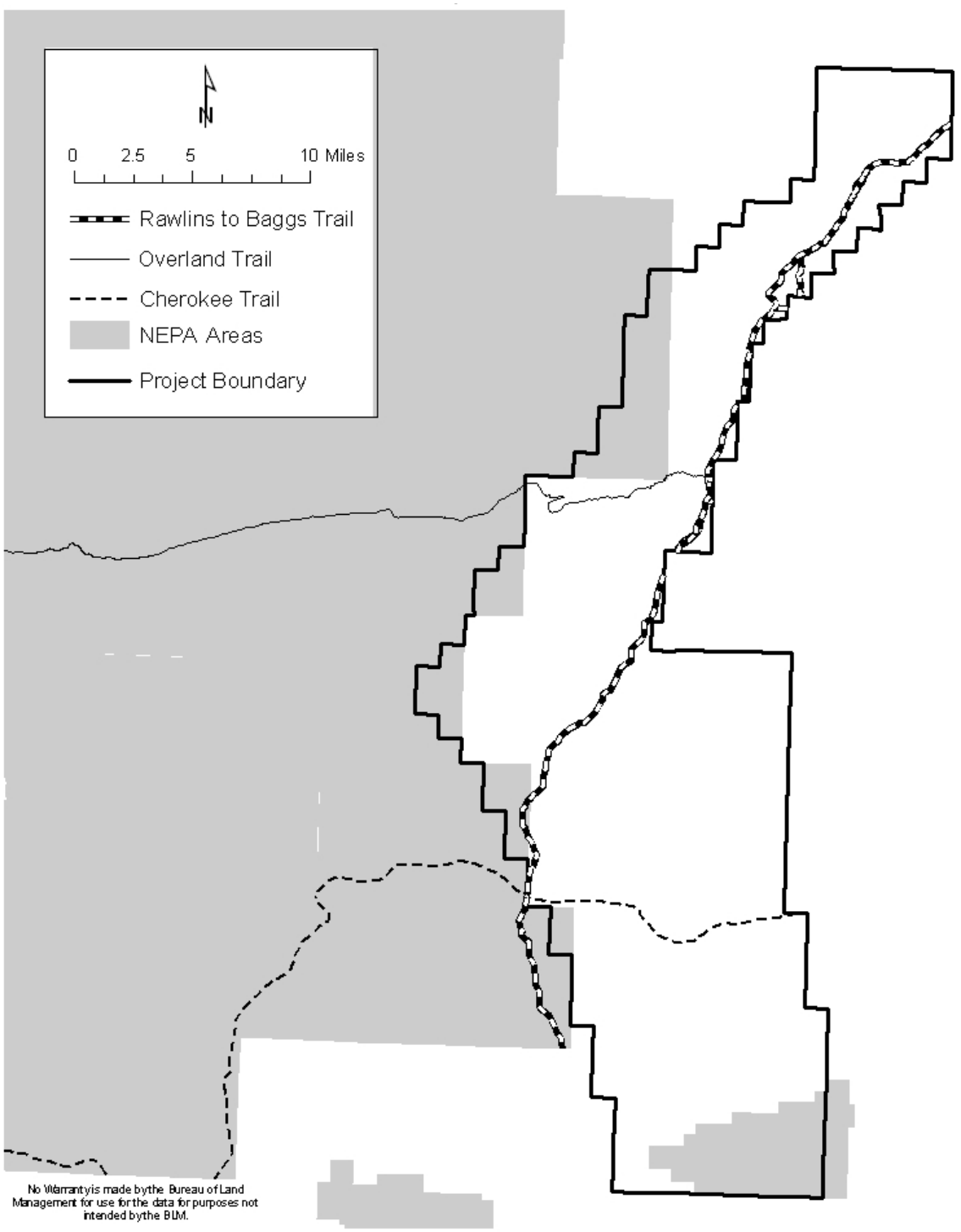
Note:
*Calculations based on ¼ mile buffer either side of trails (i.e. ½ mile corridor) or 320 acres per trail mile.
** 100% of the Cherokee Trail is considered contributing to the trail eligibility pending receipt and acceptance of the historic trail study report.

The ARPA involves about 12 contributing miles of the Cherokee Trail, 11 contributing miles of the Overland Trail, and 24 contributing miles of the Rawlins-Baggs Road. All but about 7 miles of the total length of the Rawlins-Baggs Road is included within the ARPA.

5.2.12 Socioeconomic Resources

The CIA area for socioeconomic resources includes western Carbon and eastern Sweetwater Counties and the communities of Rawlins, Baggs, Dixon, and Wamsutter, Wyoming. Although Carbon and Sweetwater Counties contain an abundance of oil, coal, uranium, trona, and other resources, the current potential for cumulative socioeconomic effects in the CIA is associated with the pace and timing of natural gas resources and the projects listed in section 5.1. The pace of gas development depends in large part on national and global factors, such as demand, supply, prices, and production disruptions, as well as local factors, such as transmission capacity, productivity of specific fields, rig and worker availability, and individual company development strategies.

Map M-45. Cumulative Impacts Historic Trails.



CHAPTER 5. CUMULATIVE IMPACTS ANALYSIS

One of the key findings of a 2003 National Petroleum Council energy policy study was that "There has been a fundamental shift in the natural gas supply/demand balance that has resulted in higher prices and volatility in recent years. This situation is expected to continue, but can be moderated" (NPC 2003).

As a result of this volatility, predicting the pace of natural gas development in the CIA is difficult to do with certainty. The U.S. Department of Energy's Energy Information Administration prepares an Annual Energy Outlook that forecasts supply, demand, and prices for a variety of energy commodities, as well as analyzes the underlying trends for these forecasts. The 2005 Annual Energy Outlook includes forecasts for natural gas. The national average wellhead prices increase from the 2004 level of $4.98/MCF to $5.30/MCF in 2005, and fall to $3.64/MCF by 2010 (all estimates in 2003). The January 2005 CREG Wyoming State Government Revenue Forecast assumed that Wyoming natural gas average annual prices would fall from the 2004 level of $5.05/MCF to $4.75/MCF in 2005 and to $4.25/MCF beyond 2005. During late fall and early summer of 2005, however, increased global demand and the effects of hurricanes Katrina and Rita drove natural gas prices at Wyoming hubs above $10/MCF. As a result, in October 2005 CREG issued new gas price forecasts of $7.00/MCF for 2005 and $6.00/MCF for 2006 and beyond.

Based on anticipated gas demand and resultant high prices, the pace of drilling and field development in western Carbon County and eastern Sweetwater County is likely to increase. Local governments within the Atlantic Rim study area have experienced previous energy booms and some state and local officials believe that southwestern Wyoming is on the leading edge of another sustained energy boom (Rawlins Daily Times 2006). In anticipation of that possibility, the State of Wyoming and Carbon County have mechanisms in place to assess the capabilities of community infrastructure, services, and housing and to fund and develop needed facilities. Carbon County has initiated a Community Impact Forum to examine impact issues and explore solutions.

At the state level, the 2006 Wyoming legislature funded a $105 million energy impact assistance grant program for communities experiencing energy impacts. In June 2006, the Carbon County Commissioners approved $19.5 million in requests for energy impact assistance funds to improve public facilities.

The rate of employment and population increase in the study area, at least in the near term, is likely to be constrained by the availability of drilling rigs and qualified workers. However, sustained high gas prices would encourage construction of new rigs and attract workers to the drilling and field development trades. The time required for buildup of drilling and field development activity would provide an opportunity for development of housing resources and expansion of local government services. The overall increase in production-related tax revenues both at the state and local levels would also provide resources to expand local government services.

Two interstate pipelines are being constructed through western Carbon County and eastern Sweetwater County; one is scheduled to be completed before the activity associated with the Atlantic Rim project would begin, but a portion of the compressor station construction phase for the Entrega pipeline may coincide with initiation of drilling and field development for the Atlantic Rim project. Completion of these pipelines could provide transportation to additional markets for locally produced gas and possibly further accelerate the pace of development.

Assuming continued increases in drilling and field development activities over the next several years, potential cumulative impacts on area socioeconomic conditions would include:

- Positive effects on local economic conditions;
- Increased employment opportunities associated with the Atlantic Rim project and the projects listed in section 5.1;
- Increased demand for temporary and long-term housing resources and community services from in-migrating employees associated with the projects; and
- Increased federal, state, and local tax and royalty revenues generated from gas development and production.

The increased employment opportunities in the relatively higher paying energy industry would result in competition for workers to the detriment of existing businesses and government who could lose existing employees and experience difficulty in recruiting new employees. On the other hand, workers would benefit from the increased wages that would result from this competition.

Increased demand for housing and local government services from cumulative natural gas development would impact affected communities differently. Both temporary and longer-term housing demand from substantial overall increases in drilling activity would likely exceed current housing resources in all communities in the assessment area during drilling and field development seasons. In Rawlins, vacant spaces in mobile home parks and available motel rooms could be absorbed although some currently dormant motels might be reopened, which would provide additional resources. In communities in the Little Snake River Valley and in Wamsutter, temporary housing resources are typically full during the annual drilling and field development seasons, although there is some turnover from time to time. Cumulative increases in demand for temporary housing resources would likely exceed current availability in these communities on a seasonal basis.

Deficits in temporary housing resources could be mitigated by the development of drilling and construction camps. One 80-person drilling camp with capacity to expand to 150 persons has been developed along WY 789 north of Dad. Also, BP intends to develop a 400-person housing facility near Wamsutter. There are preliminary plans to develop other drilling camps in the area and to expand a mobile home/RV park in Wamsutter.

The pace of construction of new housing units in Rawlins, the Little Snake River Valley, and Wamsutter would need to increase substantially over current levels to accommodate cumulative demand for longer-term housing units. However, the development of substantial numbers of rig camp or construction camp units could free up spaces in mobile home parks, providing a resource for longer-term demand until the conventional housing market is able to respond.

Demands on most public facilities and services would be seasonal. Given the excess capacity in critical public facilities (water and sewer) in most communities, demands would be within capacity constraints. Because a large percentage of the workforce would be temporary, school enrollment would not be anticipated to increase substantially and could likely be accommodated with the existing capacity of area schools, although Rawlins might need to add modular units at the elementary school until the new school is completed. Community services, such as law

enforcement, emergency response, social services and road and bridge departments, are all currently experiencing increased development-related demand for services. These services would experience even higher demand, particularly during drilling and field development seasons. However, given the levels of drilling that have occurred in recent years, county general funds and services funded by special district mill levies should see substantial increase in natural gas production-related revenues. These revenues could be used to offset the costs of increases in service. In contrast, municipalities would receive few direct revenues from natural gas development and would likely face challenges in funding needed service increases to meet cumulative demand.

Cumulative development within the CIA also holds potential to affect local attitudes, opinions, and lifestyles, which are likely to be mixed. Natural gas development in Carbon and Sweetwater Counties would result in economic growth and increased employment opportunities in relatively high-paying jobs. Therefore the financial status of many residents of these counties is likely to improve, which would correspondingly increase support for cumulative development activities. On the other hand, those residents whose economic activities or recreation activities occupy the same areas as natural gas activities, such as ranchers, grazing operators, outfitters, hunters, and other recreationists, are among those most likely to be dissatisfied. Moreover, if area residents perceive that wildlife habitat and other resources are being degraded by gas development, levels of dissatisfaction could become greater and more widespread.

Although state officials are predicting a sustained energy boom (Rawlins Daily Times 2006), it is possible that energy prices could fall dramatically resulting in sudden “bust” conditions. Businesses that have expanded or been developed to accommodate drilling and field development activities would suffer economic shock under a rapid bust situation. As a consequence, communities would likely experience some out-migration of population. In the near term, a bust would be moderated by the fact that much of the drilling and field development workforce relocates to the study area in single status and stays in rig camps or construction camps. Consequently, communities near the study area would be unlikely to have substantial unoccupied conventional housing if a slowdown in drilling were to occur. Similarly, the use of energy impact assistance grants to finance needed community infrastructure should help communities avoid substantial debt that would be difficult to service under a bust scenario.

As with the Atlantic Rim project, drilling forecasts for the socioeconomic CIA typically average 10 to 20 years. Annual drilling rates are likely to be high in the early years for most fields, tapering off as drilling is completed. This forecasted gradual reduction in drilling activity should help avoid a sudden bust as these fields transition from drilling/field development to production, which has substantially lower employment requirements. As gas production gradually diminishes, production employment will correspondingly diminish. However, this gradual reduction in production employment is currently anticipated to occur over a 30- to 50-year period, which should help avoid a precipitous post-gas-development bust.

It is possible that substantial shortages of natural gas could result in accelerated rates of drilling beyond those contemplated in this assessment, with resultant energy boom-related socioeconomic impacts greater than those described above. However, such circumstances would apply to gas-producing regions throughout the country, and the lead time required to build rigs and train drilling and field development workers should correspondingly allow time for communities, companies, and state and federal governments to plan for the boom.

5.2.13 Transportation

The CIA for transportation includes the ARPA and the county, state, and federal road that provide access to the site. This area is the same as that analyzed in section 4.13; therefore, cumulative impacts are the same as summarized in section 4.13.

5.2.14 Health and Safety

The area of analysis for potential cumulative impacts to health and safety is the ARPA. The Proposed Action and other action alternatives are the only RFFAs anticipated for the project area other than the existing grazing and recreation activities. Therefore cumulative impacts to health and safety conditions are anticipated to be similar to those described for the direct and indirect impacts of the Proposed Action or other action alternatives in section 4.14.

5.2.15 Noise

The area for potential cumulative noise impacts is the ARPA. Existing sound disturbances within the ARPA are limited to those associated with grazing activities, dispersed recreation, aircraft flights, and traffic on area roads and highways. The Proposed Action and other action alternatives are the only RFFAs anticipated for the ARPA that would create additional sound disturbance. Therefore, cumulative noise impacts would be similar to those associated with the Proposed Action and other action alternatives in section 4.15.