

## 2.4 Wildlife, Fisheries, and Related Habitat Values

### 2.4.1 Study Area

The cumulative effects study area for wildlife, fisheries, and related habitat values includes the following subwatersheds in portions of Sheridan, Johnson, Campbell, and Converse counties: Upper Powder River, Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, Antelope Creek, and Dry Fork Cheyenne River (**Figure 1-1**). It includes portions of the area administered by the BLM Buffalo and Casper field offices and a portion of the TBNG, which is administered by the FS (**Figure 1-2**).

### 2.4.2 Cumulative Impacts

Based on the information in Appendices A and D of the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005c), a total of approximately 220,688 acres (5 percent) of wildlife habitat have been disturbed by development activities in the cumulative effects study area (as of 2003). Of the 220,688 acres of total habitat disturbance, approximately 68,794 acres (31 percent) have been associated with coal mine development.

Of the 220,688 acres of total cumulative habitat disturbance, approximately 111,786 acres (51 percent) have been reclaimed. The remaining 108,901 acres of habitat would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 68,794 total cumulative acres of habitat disturbance associated with coal mine development, approximately 21,238 acres (31 percent) have been reclaimed (as of 2003). Of the remaining 47,556 acres of disturbance, approximately 24,097 acres currently are not available for reclamation, as they are occupied by long-term facilities which are needed to conduct mining operations. These areas would be reclaimed near the end of the mine life. Reclamation of the remaining 23,459 acres, which represent areas of active mining and areas where coal has been recovered but reclamation has not been completed, would proceed concurrently with coal mining. (Note: minor discrepancies in acreages are the result of rounding.)

Potential impacts to wildlife within the cumulative effects study area would be similar to those discussed in the Task 1D Report for the PRB Coal Review, Current Environmental Conditions (ENSR 2005b). In general, impacts to wildlife can be classified as short-term and long-term. Potential short-term impacts arise from habitat removal and disturbance associated with a project's development and operation (e.g., coal mines, CBNG wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects (e.g., power plant facilities, rail lines, etc.). Direct impacts to wildlife populations as a result of development activities in the study area could include direct mortalities, habitat loss or alteration, habitat fragmentation, or animal displacement.

Habitat fragmentation from activities such as roads, well pads, mines, pipelines, and electrical power lines also can result in the direct loss of potential wildlife habitat. Other indirect habitat fragmentation effects such as increased noise, elevated human presence, dispersal of noxious and

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invasive weed species, and dust deposition from unpaved road traffic can extend beyond the surface disturbance boundaries. These effects result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. However, the severity of these effects on terrestrial wildlife would depend on factors such as sensitivity of the species, seasonal use, type and timing of project activities, and physical parameters (e.g., topography, cover, forage, climate) (see the Task 1D Report for the PRB Coal Review, Current Environmental Conditions [ENSR 2005b]).

The effects to terrestrial wildlife from development activities within the PRB study area under two production scenarios (lower and upper production scenarios) for the years 2010, 2015, and 2020 are presented below.

### **2.4.2.1 Year 2010 – Lower Production Scenario**

#### **Terrestrial Wildlife**

Under this scenario, RFD activities in the study area are projected to result in disturbance to approximately 119,224 additional acres of habitat by 2010, resulting in a total cumulative disturbance of approximately 339,912 acres of habitat. Of the 339,912 acres (approximately 7.6 percent of the study area), it is estimated that 98,662 total acres (29 percent) of cumulative habitat disturbance would be associated with coal mining activities.

Of the 339,912 acres of total cumulative habitat disturbance, approximately 205,113 acres (60 percent) of habitat would be reclaimed by 2010. The remaining 134,799 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and project-specific permit requirements. Of the 98,662 acres of total cumulative habitat disturbance associated with coal mining activities, it is projected that approximately 44,938 acres (46 percent) would be reclaimed by 2010. Of the remaining 53,724 acres of coal mining-related disturbance, it is estimated that approximately 26,338 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 27,386 acres of disturbance would proceed concurrently with mining operations.

**Game Species.** Potential direct impacts to big game species (i.e., pronghorn, white-tailed deer, mule deer, elk, and moose) would include the incremental loss or alternation of approximately 119,224 additional acres of potential forage (native vegetation and previously disturbed vegetation) and ground cover associated with construction and operation of RFD activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). The total cumulative area of potential habitat disturbance would be approximately 339,912 acres. Indirect impacts to big game species would include increased habitat fragmentation effects as a result of increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic.

Assuming that adjacent habitats would be at or near carrying capacity, the variabilities associated with drought conditions, and given the human activities in the study area, displacement of wildlife species (e.g., big game) as a result of RFD activities would create some unquantifiable reduction in wildlife populations.

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As discussed in the Task 1D Report for the PRB Coal Review, Current Environmental Conditions (ENSR 2005b), a number of big game habitat ranges occur within the cumulative effects study area. Certain habitat ranges are considered crucial for maintenance of game populations. In Wyoming, the Wyoming Game and Fish Department (WGFD) and the BLM have established several categories based on seasonal use of the habitat. For example, crucial winter range areas are considered essential in determining a game population's ability to maintain itself at a certain level over the long term. Big game ranges that could be affected by RFD activities would include up to 4,055,519 acres of pronghorn ranges, 216,801 acres of white-tailed deer ranges, 3,795,100 acres of mule deer ranges, and 198,711 acres of elk ranges within the cumulative effects study area. No designated moose ranges occur within the cumulative effects study area. As discussed in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Activities (ENSR 2005c), discrete locations for most RFD disturbance and reclamation areas cannot be determined based on existing information. As a result, the spatial relationship between projected future disturbance and reclamation areas for the RFD scenarios and the resource-specific information in the GIS layers cannot be determined. However, GIS layers for future coal reserves are available and have been used to provide some level of quantification of potential future coal mining-related impacts to big game ranges. This information is presented in **Table 2.4-1**.

**Table 2.4-1**  
**Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development**  
**under the Year 2010 – Lower Production Scenario**  
**(acres and percent affected)**

Species	Big Game Ranges <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,472 (3 percent)	33,196 (2 percent)	32,099 (1 percent)
White-tailed Deer	N/A	N/A	N/A	1,411 (0.6 percent)
Mule Deer	N/A	N/A	6,808 (0.4 percent)	25,390 (1 percent)
Elk	24 (0.4 percent)	N/A	375 (1 percent)	1,444 (0.9 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2010 (based on GIS mapping of coal reserves for the 2010 lower production scenario) and existing (2003) disturbance from coal mine development.

Direct and indirect effects to small game species (i.e., upland game birds, waterfowl, small game mammals) within the study area as a result of RFD activities would be the same as discussed above for big game species. Impacts would result from the incremental surface disturbance of approximately 339,912 total cumulative acres of potential wildlife habitat, increased noise levels and human presence, dispersal of noxious and invasive weed species, and dust effects from unpaved road traffic.

Operations associated with RFD activities in the cumulative effects area would result in the use of groundwater. As of 2010, the annual water production associated with coal mine and CBNG activities would be approximately 36,803 mmgpy. Most, if not all, of the coal mine-produced water

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would be consumed during operation. Up to approximately 34,545 mmgpy of CBNG-produced water would be discharged and would be available for area wildlife (e.g., waterfowl). Although much of the water would evaporate or infiltrate into the ground, it is anticipated that substantial quantities of water would remain on the surface and would result in the expansion of wetlands, stock ponds, and reservoirs, potentially increasing waterfowl breeding and foraging habitats. As discussed in the Task 1D Report for the PRB Coal Review, Current Environmental Conditions (ENSR 2005b), the median sodium concentration of CBNG-produced water from the Fort Union Formation is 270 milligrams (mg/L). If sodium concentrations are maintained below 17,000 mg/L in the evaporation ponds, the potential adverse effects to waterfowl would be minimal.

**Nongame Species.** Potential direct impacts to nongame species (e.g., small mammals, raptors, passerines, amphibians, and reptiles) would include the incremental loss or alteration of approximately 119,224 additional acres of potential foraging and breeding habitats (native vegetation and previously disturbed vegetation) from construction and operation of RFD activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). The total cumulative area of potential habitat disturbance would be approximately 339,912 acres. Impacts also could result in mortalities of less mobile species (e.g., small mammals, reptiles, amphibians, invertebrates), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic. Assuming that adjacent habitats would be at or near carrying capacity, the variability's associated with drought conditions, and given the human activities in the study area, displacement of wildlife species from the study area would result in an unquantifiable reduction in wildlife populations.

As discussed in the Task 1D Report of the PRB Coal Review, Current Environmental Conditions (ENSR 2005b), a number of migratory bird species have been documented within the cumulative effects area. In the event that RFD activities were to occur during the breeding season (April 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. Loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of the Migratory Bird Treaty Act (MBTA) and potentially could affect populations of important migratory bird species that may occur within the study area.

Breeding raptor species that occur within the cumulative effects study area include eagles (golden eagle), buteos (red-tailed hawk, Swainson's hawk, and rough-legged hawk), falcons (American kestrel and prairie falcon), northern harrier, and owls (short-eared owl and great-horned owl). Potential direct impacts to raptors would result from the surface disturbance of nesting and foraging habitat in the cumulative effects study area. In the event that RFD activities were to occur during the breeding season (February 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season. As discussed above for migratory bird species, loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of the MBTA.

New power line segments in the cumulative effects study area incrementally would increase the collision potential for migrating and foraging bird species (e.g., raptors and waterfowl) (Avian Power Line Interaction Committee [APLIC] 1994). However, collision potential typically is dependent on variables such as the location in relation to high-use areas (e.g., nesting, foraging, and roosting),

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line orientation to flight patterns and movement corridors, species composition, visibility, and design. In addition, new power lines could pose an electrocution hazard for raptor species attempting to perch on the structure. Configurations less than 1 kilovolt (kV) or greater than 69 kV typically do not present an electrocution potential, based on conductor placement and orientation (APLIC 1996). It is assumed that future permitting for power lines would require the use of appropriate raptor-detering designs, thereby minimizing potential impacts. For example, SMCRA requires that surface coal mine operators use the best technology currently available to ensure that electric power lines are designed and constructed to minimize electrocution hazards to raptors. In addition, many of the power lines for CBMG development currently are being constructed underground.

### Fisheries

Potential cumulative effects on fisheries as a result of RFD activities in the study area would be closely related to impacts on groundwater and surface water resources, which are discussed in the Task 3B Report for the PRB Coal Review, Cumulative Water Resources Impacts (ENSR 2005e). In general, RFD activities could affect fish species in the following ways: 1) alteration or loss of habitat as a result of surface disturbance; 2) changes in water quality as a result of surface disturbance or introduction of contaminants into drainages; and 3) changes in available habitat as a result of water withdrawals or discharge. Under this scenario, approximately 134,799 total cumulative acres of unreclaimed surface disturbance would exist within the study area by 2010. This would be a 24 percent increase in unreclaimed surface disturbance in comparison to existing (2003) conditions. Approximately 40 percent of the unreclaimed acreage in the study area would be related to coal mining activities. The potential effects of RFD activities on aquatic communities are discussed below for each of these impact topics.

**Habitat Loss.** RFD activities under this scenario could result in the loss of aquatic habitat as a result of direct surface disturbance. As discussed in Chapter 2.0 of the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Activities (ENSR 2005c), discrete locations for RFD disturbance and reclamation areas cannot be determined based on existing information. However, the RFD would involve the construction of additional linear facilities (e.g., Bison Pipeline Project, product gathering lines and road systems associated with conventional oil and gas and CBNG activities) and site facilities (e.g., coal mine expansions) that could result in the loss of aquatic habitat. Although information relative to the stream crossing locations for the majority of the linear facilities is not available at this time, based on current information, it is assumed that the Bison Pipeline Project would cross Cottonwood Creek, a tributary of the Little Powder River. Typically, the associated disturbance would consist of a 100-foot-wide construction right-of-way; however, site-specific stream crossing methods and reclamation would be determined at the time of project permitting. Future coal mining also could remove intermittent or ephemeral streams and stock ponds in the Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, and Antelope Creek subwatersheds. As discussed in the Task 1B Report for the PRB Coal Review, Current Water Resources Conditions (ENSR 2005b), coal mine permits provide for removal of first-through fourth-order drainages. During reclamation, third- and fourth-order drainages must be restored; first- and second-order drainages often are not replaced (Martin et al. 1988). Due to a lack of water on a consistent basis in the potentially affected streams, existing aquatic communities mainly are limited to invertebrates and algae that can persist in these types of habitats. The removal of stock ponds would eliminate habitat for invertebrates and possibly fish species. It is assumed that surface disturbance activities would not be allowed in perennial stream segments or reservoirs on public land that contain game fish species. It is assumed that other types of RFD activities would

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not occur within stream channels nor remove ponds or reservoirs as part of construction or operation and, therefore, would not result in the direct loss of fish habitat.

**Water Quality Effects on Habitat.** Past and projected activities would result in surface disturbance in each of the six study area subwatersheds, with unreclaimed disturbance areas ranging from 1,731 acres in the Dry Fork Cheyenne River Subwatershed to 40,180 acres in the Upper Belle Fourche River subwatershed. In general, perennial stream habitat in the study area is limited to the Little Powder River. Warmwater game fish and nongame species are present in the perennial stream segments and numerous scattered reservoirs and ponds. The predominant type of aquatic habitat in the study area consists of intermittent and ephemeral streams and scattered ponds and reservoirs.

Surface disturbance activities can result in sediment input to water bodies, which affects water quality parameters such as turbidity and bottom substrate composition. Contaminants also can be introduced into water bodies through chemical characteristics of the sediment. Potential related effects on aquatic biota could include physiological stress, movement to avoid the affected area, or alteration of spawning or rearing areas (Waters 1995). Studies have shown that total dissolved solids levels in streams near reclaimed coal mine areas have increased from 1 to 7 percent (Martin et al. 1988). Typically, sedimentation effects are short-term in duration and localized in terms of the affected area. Suspended sediment concentrations would stabilize and return to typical background concentrations after construction activities have been completed. It is anticipated that sediment input associated with RFD disturbance areas would be minimized by implementation of appropriate erosion control measures, as would be determined during future permitting.

The contribution of effects of coal mine development on fish species and their habitat was assessed using surface disturbance information. Of the approximately 134,799 acres of unreclaimed surface disturbance that is projected to exist within the study area subwatersheds under this scenario, approximately 53,724 acres (40 percent) would be associated with coal mine development. This percentage provides a relative indicator of coal mining's potential contribution to water quality effects on fish habitat. However, as discussed in the Task 1B Report for the PRB Coal Review, Current Water Resources Conditions (ENSR 2005d), the release of storm water runoff from mine disturbance areas would be regulated by each mine's National Pollution Discharge Elimination System (NPDES) permit and, therefore, should have little effect on drainages. Based on these permit requirements and implementation of required erosion control measures, it is assumed that coal mine-related impacts to fisheries as a result of storm water discharge would be low.

The removal of streamside vegetation and the resultant reduction in shade and potential for increased bank erosion also could degrade aquatic habitats. It is assumed these types of impacts would be limited to intermittent and ephemeral streams, since a buffer protection zone typically is required for development activities near perennial streams. ROW clearing for linear projects could remove riparian vegetation at stream crossings. However, effects on aquatic habitat would be limited to a relatively small portion of the stream (up to 100 feet in width depending on the RFD activity). It is anticipated that reclamation procedures to restore riparian vegetation would be required during future project permitting, thereby minimizing impacts.

**Water Quantity Effects on Habitat.** Of the RFD activities, CBNG and coal mining are the main types of development that use or manage water as part of their operations. As of 2010, the annual water production associated with CBNG and coal mine activities would be approximately

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water production associated with CBNG and coal mine activities would be approximately 36,803 mmgpy. Based on current trends, it is assumed that most, if not all, of the coal mine-produced water would be consumed during operation, and any discharge that would occur would report to intermittent and ephemeral streams in four subwatersheds (Antelope Creek, Little Powder, Upper Belle Fourche, and Upper Cheyenne). Increased flows in these drainages would be expected to have little or no effect on flows in the perennial streams due to high conveyance losses as discussed in the Task 1B Report for the PRB Coal Review, Current Water Resources Conditions (ENSR 2005a). As discussed in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Future Activities (ENSR 2005c), although the number of future CBNG wells has been projected for each scenario in this study, the discrete locations for future well sites cannot be determined at this time. However, it is assumed that future permitting would allow a portion of CBNG-produced water to be discharged to intermittent and ephemeral drainages as currently allowed in the six subwatersheds in the study area. Under this scenario, it is projected that up to approximately 34,545 mmgpy of CBNG-produced water would be discharged. Based on past monitoring in receiving streams, no change in surface flows would be expected beyond approximately 2 miles from the discharge points (BLM 2003). Therefore, water quantity changes are not expected to affect fish populations in perennial streams in the study area subwatersheds.

**POTENTIAL DRAWDOWN EFFECTS TO BE EVALUATED PENDING COMPLETION OF GROUNDWATER MODELING.**

**Special Status Species**

**Special Status Wildlife Species.** Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species that are protected under the Endangered Species Act (ESA), or are considered candidates for such listing by the USFWS, and BLM, FS, and WGFD sensitive species. Special status species potentially occurring in the PRB study are identified in Section 2.4.3.5 of the Task 1D Report of the PRB Coal Review, Current Environmental Conditions (ENSR 2005b).

Potential impacts to special status terrestrial species would be similar to those discussed above for nongame wildlife (e.g., small mammals, birds, amphibians, and reptiles). Potential direct impacts would include the incremental loss or alternation of approximately 119,224 additional acres of potential habitat (native vegetation and previously disturbed vegetation) from construction and operation of RFD activities (e.g., vegetation removal for coal mines and CBNG wells, ancillary facilities, and transportation and utility corridors). The total cumulative area of potential habitat disturbance would be approximately 339,912 acres (approximately 7.6 percent of the study area). Impacts also could result in mortalities of less mobile species (e.g., small mammals, reptiles, and amphibians), nest or burrow abandonment, and loss of eggs or young as a result of crushing from vehicles and equipment. Indirect impacts would include increased noise levels and human presence, dispersal of noxious weeds, and dust effects from unpaved road traffic.

In general, direct and indirect impacts to special status species would result in a reduction in habitat suitability and overall carrying capacity in the cumulative effects study area. Development within potential habitat for special status species likely would decrease its overall suitability and potentially would reduce or preclude use of a species habitat due to increased activity and noise. Although

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degree of these potential impacts would depend on a number of variables including the location of the nest or den site, the species' relative sensitivity, breeding phenology, and possible topographic shielding.

As discussed in Task 1D of the PRB Coal Review, a number of special status bird species have been identified as occurring within the cumulative effects study area including water birds (common loon, American white pelican, snowy egret, American bittern, black-crowned night heron, white-faced ibis, trumpeter swan, greater sandhill crane, mountain plover, upland sandpiper, long-billed curlew, black tern) and perching birds (yellow-billed cuckoo, Lewis' woodpecker, olive-sided flycatcher, purple martin, pygmy nuthatch, sage thrasher, loggerhead shrike, Baird's sparrow, sage sparrow, fox sparrow, and Brewers sparrow). In the event that RFD activities were to occur during the breeding season (April 1 through July 31), these activities could result in the abandonment of a nest site or territory or the loss of eggs or young, resulting in the loss of productivity for the breeding season.

A number of special status raptor species have been documented in cumulative effects study area including eagles (bald eagle), buteos (ferruginous hawk and osprey), accipiters (northern goshawk), falcons (merlin and peregrine falcon), and owls (western burrowing owl, flammulated owl) (see the Task 1D Report for the PRB Coal Review [ENSR 2005b]). Potential direct impacts to raptors would result from the surface disturbance of breeding and foraging habitat within the cumulative effects study area. If present in or adjacent to the RFD activities, breeding raptors could abandon breeding territories, nest sites, or lose eggs or young as a result of construction and operation of these activities. As discussed above for wildlife, loss of an active nest site, incubating adults, eggs, or young would not comply with the intent of the MBTA and potentially could affect populations of important migratory bird species that may occur within the study area.

New power line segments in the cumulative effects study area incrementally would increase the collision potential for migrating and foraging bird species (e.g., raptors and waterfowl) (APLIC 1994). However, collision potential typically is dependent on variables such as the location in relation to high-use areas (e.g., nesting, foraging, and roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and design. In addition, new power lines could pose an electrocution hazard for raptor species attempting to perch on the structure. Configurations less than 1 kV or greater than 69 kV typically do not present an electrocution potential, based on conductor placement and orientation (APLIC 1996). It is assumed that future permitting for power lines would require the use of appropriate raptor-detering designs, thereby minimizing potential impacts. As discussed above, SMCRA requires that surface coal mine operators use the best technology currently available to ensure that electric power lines are designed and constructed to minimize electrocution hazards to raptors. In addition many of the power lines for CBNG development currently are being constructed underground.

As presented in the Task 1D Report for the PRB Coal Review, Current Environmental Conditions (ENSR 2005b), a total of 239 greater sage-grouse lek sites were identified in the six subwatersheds in the cumulative effects study area as of 2003. As discussed above for game species, based on existing information, the spatial relationship between projected future disturbance and reclamation areas for the RFD scenarios and the resource-specific information in the GIS layers cannot be determined. However, GIS layers for future coal reserves have been used to provide some quantification of potential future coal mining-related impacts. Based on the GIS mapping of future coal reserves and existing (2003) disturbance from coal mine development, 10 leks would be

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directly disturbed by coal mine development and 47 lek sites would occur within 2 miles from coal mining activities by 2010. However, an unquantifiable number of these lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development. Potential direct impacts to sage grouse, if present, could include abandonment of a lek site, or loss of eggs or young as a result of RFD activities.

**Special Status Fish Species.** Six special status fish species potentially occur in the study area subwatersheds: flathead chub (Little Powder River, Antelope Creek, and Upper Cheyenne River subwatersheds), plains topminnow (Upper Cheyenne River subwatershed), goldeye (Little Powder River subwatershed), lake chub (Little Powder River subwatershed), mountain sucker (Little Powder River subwatershed), silvery minnow (Little Powder River subwatershed), and plains minnow (Little Powder River, Upper Cheyenne River, and Upper Belle Fourche River subwatersheds). Potential impacts to special status fish species as a result of RFD activities would be similar to effects discussed for fisheries under the 2010 – Lower Development Scenario. Surface disturbance in three subwatersheds (Little Powder River, Upper Bell Fourche River, and Upper Cheyenne River) could alter habitat or affect water quality conditions for special status fish species. The projected total cumulative unreclaimed disturbance would be 22,688 acres for the Little Powder River, 40,180 acres for Upper Belle Fourche River, and 17,397 acres for the Upper Cheyenne River. Based on the Task 2 database information, approximately 37, 44, and 82 percent, respectively, of these disturbance areas would be related to coal mining activities. Erosion control measures, as required by existing (2003) and future permits, and NPDES permit requirements would be implemented for each project. These measures would help minimize increased sediment input to stream segments that may contain one of more of the special status fish species. Therefore, it is anticipated that impacts to special status fish species would be low.

### 2.4.2.2 Year 2010 – Upper Production Scenario

#### Terrestrial Wildlife

Potential impacts to wildlife habitat under this scenario would be similar to those described under the 2010 – Lower Production Scenario, except approximately 3,786 additional acres of habitat would be disturbed. Under this scenario, past and projected activities in the cumulative effects study area would result in the total cumulative disturbance of approximately 343,698 acres of habitat (or approximately 7.7 percent of the study area) by the year 2010. Of the 343,698 acres of total disturbance, it is estimated that 102,448 acres (30 percent) would be associated with coal mining activities.

Of the 343,698 acres of total cumulative habitat disturbance, approximately 206,946 acres (60 percent) would be reclaimed by 2010. The remaining 136,752 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 102,448 acres of habitat disturbance associated with coal mining activity, it is estimated that approximately 46,771 acres (46 percent) would be reclaimed by 2010. Of the remaining 55,677 acres of coal mining-related disturbance, it is estimated that approximately 25,688 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 29,989 acres of disturbance would proceed concurrently with mining operations.

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**Game Species.** Impacts to game species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except there would be slightly higher impacts to pronghorn and mule deer ranges. Potential impacts to white-tailed deer and elk ranges would be the same as presented above under the 2010 - Lower Production Scenario. Potential impacts to big game ranges from coal mine development in the cumulative effects area are presented in **Table 2.4-2**. Impacts to small game species as a result of RFD activities would be the same as discussed under the 2010 – Lower Production Scenario, except approximately 3,786 additional acres of potential habitat would be disturbed under this scenario.

**Table 2.4-2**  
**Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development**  
**under the Year 2010 – Upper Production Scenario**  
**(acres and percent affected)**

Species	Big Game Range <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,472 (3 percent)	34,760 (3 percent)	33,172 (1 percent)
Mule Deer	N/A	N/A	6,924 (0.4 percent)	26,641 (1 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2010 (based on GIS mapping of coal reserves for the 2010 upper production scenario) and existing (2003) disturbance from coal mine development.

**Nongame Species.** Potential impacts to nongame species as a result of RFD activities would be the same as discussed for the 2010 – Lower Production Scenario, except approximately 3,786 additional acres of potential habitat would be disturbed under this scenario.

**Fisheries.** Under this scenario, impacts to fisheries as a result of past and projected activities would be the same as described under the 2010 – Lower Production Scenario, except the amount of cumulative unreclaimed surface disturbance would be slightly higher (an additional 1,953 acres as a result of increased coal mine production). The higher level of unreclaimed surface disturbance could result in slightly higher sediment input to drainages. However, impacts to stream habitat that may support fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

### **Special Status Species**

**Special Status Wildlife Species.** Potential impacts to special status species as a result of RFD activities would be the same as discussed for the 2010 – Lower Production Scenario, except that approximately 3,786 additional acres of potential habitat would be disturbed under this scenario.

**Special Status Fish Species.** Under this scenario, impacts to special status fish species as a result of RFD activities would be the same as described for the 2010 – Lower Production Scenario, except the amount of cumulative unreclaimed surface disturbance would be slightly higher (an additional 994 acres in the three subwatersheds where special status fish species potentially occur). The higher level of surface disturbance could result in slightly higher sediment input to drainages.

The higher level of surface disturbance could result in slightly higher sediment input to drainages. However, it is anticipated that impacts to special status fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

### **2.4.2.3 Year 2015 – Lower Production Scenario**

#### **Terrestrial Wildlife**

Potential impacts to wildlife habitats under this scenario would be similar to those described under the 2010 – Lower Production Scenario, except that approximately 86,172 additional acres of habitat would be disturbed. Under this scenario, RFD activities in the cumulative effects study area are projected to result in the total cumulative disturbance of approximately 426,084 acres of habitat (or approximately 9.5 percent of the study area) by the year 2015. Of the 426,084 acres of total disturbance, it is estimated that 117,236 acres (27 percent) would be associated with coal mining activity.

Of the 426,084 acres of total cumulative habitat disturbance, approximately 286,614 acres (67 percent) would be reclaimed by 2015. The remaining 139,472 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. (Minor discrepancies in total acreages are the result of rounding.) Of the 117,236 acres of habitat disturbance associated with coal mining activities, it is projected that approximately 61,188 acres (52 percent) would be reclaimed by 2015. Of the remaining 56,048 acres of coal mining-related disturbance, it is estimated that approximately 27,549 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 28,499 acres of disturbance would proceed concurrently with mining operations.

**Game Species.** Impacts to game species as a result of RFD activities would be the same as discussed under the 2010 – Lower Production Scenario, except there would be slightly higher impacts to some big game ranges. Potential impacts to big game ranges from coal mining activities in the cumulative effects study area are presented in **Table 2.4-3**. Impacts to small game species as a result of RFD activities would be the same as discussed for the 2010 – Lower Production Scenario, except approximately 86,172 additional acres of potential habitat would be disturbed under this scenario.

Potential impacts associated with RFD-related groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Up to approximately 2,791 mmgpy of additional CBNG-produced water would be discharged and would be available for area wildlife (e.g., waterfowl).

**Nongame Species.** Potential impacts to nongame species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except approximately 86,172 additional acres of potential habitat would be disturbed under this scenario.

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**Table 2.4-3**  
**Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development**  
**under the Year 2015 – Lower Production Scenario**  
**(acres and percent affected)**

Species	Big Game Range <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,460 (3 percent)	32,649 (2 percent)	34,828 (1 percent)
White-tailed Deer	N/A	N/A	N/A	1,497 (0.7 percent)
Mule Deer	N/A	N/A	6,956 (0.4 percent)	26,420 (1 percent)
Elk	24 (0.4 percent)	N/A	351 (1 percent)	1,161 (0.7 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2015 (based on GIS mapping of coal reserves for the 2015 lower production scenario) and existing (2003) disturbance from coal mine development.

**Fisheries.** Under this scenario, impacts to fisheries as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. RFD activities would result in an additional 4,673 acres of unreclaimed surface disturbance. The higher level of unreclaimed surface disturbance and construction of a river crossing could result in higher sediment input to drainages. Most of the increased surface disturbance would occur in the Antelope Creek, Upper Belle Fourche River, and Upper Cheyenne River subwatersheds. The contribution of effects from coal mine development on fisheries would increase to 40 percent when comparing unreclaimed surface disturbance from coal mining to total unreclaimed surface disturbance within the six subwatersheds. However, it is anticipated that impacts to fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

Under this scenario, construction of an additional linear facility would result in the crossing of at least one perennial stream (Belle Fourche River). Related construction activities would result in temporary surface disturbance and potentially the loss of riparian vegetation on either side of the river. However, these impacts are not anticipated to affect habitat quality for fisheries in the overall section of the stream.

CBNG-related groundwater discharge would be slightly higher under this scenario (approximately 2,791 additional mmgy); however, increased flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

**Special Status Species**

**Special Status Wildlife Species.** Potential impacts to special status species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except that approximately 86,172 additional acres of potential habitat would be disturbed under this scenario.

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Based on GIS mapping of future coal reserves and existing (2003) disturbance from coal mining activities, potential impacts to sage grouse habitat would be similar to those described under the 2010 – Lower Production Scenario, except that 15 leks would be directly disturbed by coal mining activities in the cumulative effects study area. However, an unquantifiable number of these lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development.

**Special Status Fish Species.** Under this scenario, impacts to special status fish species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. As a result of ongoing reclamation, approximately 1,566 fewer acres of unreclaimed surface disturbance would exist in the three subwatersheds where special status fish species potentially occur. Approximately 53 percent of the unreclaimed surface in these subwatersheds would be related to coal mining activities. The lower level of surface disturbance could result in slightly lower sediment input to intermittent drainages. It is anticipated that associated impacts to special status fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

Under this scenario, construction of an additional linear facility would result in the crossing of at least one perennial stream (Belle Fourche River). Related construction activities would result in temporary surface disturbance and potentially the loss of riparian vegetation on either side of the river. One special status fish species (plains minnow) occurs in the upper portion of this drainage. As habitat for the plains minnow is located upstream of the likely proposed crossing, no impacts to this species are expected.

CBNG-related groundwater discharge would be slightly higher under this scenario (approximately 2,791 additional mmgpy); however, increased flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

#### **2.4.2.4 Year 2015 – Upper Production Scenario**

##### **Terrestrial Wildlife**

Potential impacts to wildlife habitat as a result of RFD activities would be similar to those described under the 2010 – Lower Production Scenario, except approximately 93,480 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative effects study area are projected to result in the total cumulative disturbance of approximately 433,392 acres of habitat (or approximately 9.6 percent of the study area) by the year 2015. Of the 433,392 acres, it is estimated that 124,545 acres (29 percent) would be associated with coal mining activities.

Of the 433,392 acres of total cumulative habitat disturbance, approximately 290,822 acres (67 percent) would be reclaimed by 2015. The remaining 142,570 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 124,545 acres of habitat disturbance associated with coal mining activities, it is projected that approximately 65,396 acres (53 percent) would be reclaimed by 2015. Of the remaining 59,149 acres of coal mining-related disturbance, it is estimated that approximately 27,009 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life.

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Reclamation of the remaining 32,140 acres of disturbance would proceed concurrently with mining operations.

**Game Species.** Impacts to game species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except there would be slightly higher impacts to some big game ranges. Potential impacts to big game ranges from coal mine development in the cumulative effects study area are presented in **Table 2.4-4**. Impacts to small game species would be the same as discussed for the 2010 – Lower Production Scenario, except approximately 93,480 additional acres of potential habitat would be disturbed under this scenario.

**Table 2.4-4  
Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development  
under the 2015 – Upper Production Scenario  
(acres and percent affected)**

Species	Big Game Range <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,460 (3 percent)	34,177 (2 percent)	36,999 (1 percent)
White-tailed Deer	N/A	N/A	N/A	1,495 (0.7 percent)
Mule Deer	N/A	N/A	7,285 (0.5 percent)	27,205 (1 percent)
Elk	24 (0.4 percent)	N/A	351 (1 percent)	1,162 (0.7 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2015 (based on GIS mapping of coal reserves for the 2015 upper production scenario) and existing (2003) disturbance from coal mine development.

Potential impacts associated with RFD-related groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Coal mining and CBNG activities in the cumulative effects study area would result in the annual use of approximately 5,049 mmgpy of additional water than under the 2010 – Lower Production Scenario. Most, if not all, of the coal mine-produced water would be consumed during operation. Up to approximately 2,791 mmgpy of additional CBNG-produced water would be discharged and would be available for area wildlife (e.g., waterfowl).

**Nongame Species.** Potential impacts to nongame species as a result of RFD activities would be the same as discussed for the 2010 – Lower Production Scenario, except that approximately 93,480 additional acres of potential habitat would be disturbed under this scenario.

**Fisheries.** Under this scenario, impacts to fisheries as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. RFD activities would result in an additional 7,771 acres of unreclaimed surface disturbance. The higher level of unreclaimed surface disturbance could result in higher sediment input to drainages. Most of the increased surface disturbance would occur in the Antelope Creek, Upper Belle Fourche River,

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and Upper Cheyenne River subwatersheds. The contribution of effects from coal mine development on fisheries would increase slightly to 41 percent when comparing unreclaimed surface disturbance from coal mining to total disturbance within the six subwatersheds. However, it is anticipated that impacts to fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

Under this scenario, construction of one additional linear facility would cross the Belle Fourche River. Related construction activities would result in temporary surface disturbance and potentially the loss of riparian vegetation on either side of the river. However, these impacts are not anticipated to affect habitat quality for fisheries in the overall section of the stream.

CBNG-related groundwater discharge would be slightly higher under this scenario (approximately 2,791 additional mmgpy); however, increased flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

**Special Status Species**

**Special Status Wildlife Species.** Potential impacts to special status species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except that approximately 93,480 additional acres of potential habitat would be disturbed under this scenario.

Based on GIS mapping of future coal reserves and existing (2003) disturbance from coal development, potential impacts to sage grouse habitat would be similar to those described under the 2010 – Lower Production Scenario, except 15 leks would be directly disturbed by coal mine development and 49 lek sites would occur within 2 miles of coal mining activities in the cumulative effects study area by 2015. However, an unquantifiable number of these lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development.

**Special Status Fish Species.** Under this scenario, impacts to special status fish species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. RFD activities would result in an additional 12 acres of cumulative unreclaimed surface disturbance in the three subwatersheds where special status fish species potentially occur. Approximately 55 percent of the unreclaimed surface in these subwatersheds would be related to coal mining activities. The higher level of surface disturbance could result in slightly higher sediment input to drainages. However, it is anticipated that impacts to special status fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

Under this scenario, construction of one additional linear facility would cross the Belle Fourche River. Related construction activities would result in temporary surface disturbance and potentially the loss of riparian vegetation on either side of the river. One special status fish species (plains minnow) occurs in the upper portion of this drainage. As habitat for the plains minnow is located upstream of the likely proposed crossing, no impacts to this species are expected.

CBNG-related groundwater discharge would be slightly higher under this scenario (approximately 2,791 additional mmgpy); however, increased flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

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**2.4.2.5 Year 2020 – Lower Production Scenario**

**Terrestrial Wildlife**

Potential impacts to wildlife habitat as a result of RFD activities would be similar to the 2010 - Lower Production Scenario, except approximately 163,173 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative effects study area are projected to result in the total cumulative disturbance of approximately 503,085 acres of habitat (or approximately 11.2 percent of the study area) by the year 2020. Of the 503,085 acres of total disturbance, it is projected that approximately 137,443 acres (27 percent) would be associated with coal mining activity.

Of the 503,085 acres of total habitat disturbance, approximately 367,999 acres (73 percent) would be reclaimed by 2020. The remaining 135,085 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 137,443 acres of habitat disturbance associated with coal mining activities, it is estimated that approximately 79,463 acres (58 percent) would be reclaimed by 2020. Of the remaining 57,979 acres of coal mining-related disturbance, it is estimated that approximately 28,797 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 29,182 acres of disturbance would proceed concurrently with mining operations.

**Game Species.** Impacts to game species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except there would be slightly higher impacts to some big game ranges. Potential impacts to big game ranges from coal mining activities in the cumulative effects study area are presented in **Table 2.4-5**. Impacts to small game species would be the same as described under the 2010 – Lower Production Scenario, except approximately 163,173 additional acres of potential habitat would be disturbed under this scenario.

**Table 2.4-5**  
**Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development**  
**under the Year 2020 – Lower Production Scenario**  
**(acres and percent affected)**

Species	Big Game Range <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,422 (3 percent)	33,637 (2 percent)	35,714 (1 percent)
White-tailed Deer	N/A	N/A	N/A	1,704 (0.7 percent)
Mule Deer	N/A	N/A	6,958 (0.4 percent)	27,004 (1 percent)
Elk	24 (0.4 percent)	N/A	351 (1 percent)	1,121 (0.7 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2020 (based on GIS mapping of coal reserves for the 2020 lower production scenario) and existing (2003) disturbance from coal mine development.

Potential impacts associated with RFD-related groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Approximately 914 fewer mmgpy of CBNG-produced water would be discharged, resulting in a slight reduction in water availability for area wildlife (e.g., waterfowl).

**Nongame Species.** Potential impacts to nongame species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except approximately 163,173 additional acres of potential habitat would be disturbed under this scenario.

**Fisheries.** Under this scenario, impacts to fisheries as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. RFD activities would result in an additional 286 acres of cumulative unreclaimed surface disturbance. The higher level of unreclaimed surface disturbance could result in higher sediment input to drainages. Most of the increased surface disturbance would occur in the Antelope Creek, Upper Belle Fourche River, and Upper Cheyenne River subwatersheds. The contribution of effects from coal mine development on fisheries would increase slightly to 43 percent when comparing unreclaimed surface disturbance from coal mining to total disturbance within the six subwatersheds. However, it is anticipated that impacts to fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

CBNG-related groundwater discharge would be slightly lower under this scenario (approximately 914 fewer mmgpy); however, there would be no effect to perennial streams as even the projected maximum discharge flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

#### **Special Status Species**

**Special Status Wildlife Species.** Potential impacts to special status species as a result of RFD activities would be the same as described under the 2010 – Lower production Scenario, except approximately 163,173 additional acres of potential habitat would be disturbed under this scenario.

Based on GIS mapping of future coal reserves and existing (2003) disturbance from coal mining activities, potential impacts to sage grouse habitat would be similar to those discussed under the 2010 – Lower Production Scenario, except 15 leks would be directly disturbed by coal mine development and 50 lek sites would occur within 2 miles of coal mining activities in the cumulative effects study area by 2020. However, an unquantifiable number of these lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development.

**Special Status Fish Species.** Under this scenario, impacts to special status fish species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. As a result of ongoing reclamation, approximately 4,230 fewer acres of unreclaimed surface disturbance would exist in the three subwatersheds where special status fish species potentially occur. Approximately 54 percent of the unreclaimed surface in these subwatersheds would be related to coal mining activities. The lower level of surface disturbance could result in slightly lower sediment input to drainages. It is anticipated that associated impacts to special status fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

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CBNG-related groundwater discharge would be slightly lower under this scenario (approximately 914 fewer mmgpy); however, there would be no effect to perennial streams as even the projected maximum discharge flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

#### **2.4.2.6 Year 2020 – Upper Production Scenario**

##### **Terrestrial Wildlife**

Potential impacts to wildlife habitat as a result of RFD activities would be similar to the 2010 - Lower Production Scenario, except approximately 174,820 additional acres would be disturbed. Under this scenario, past and projected development activities in the cumulative effects study area would result in the total cumulative disturbance of approximately 514,732 acres of habitat (or approximately 11.5 percent of the study area) by the year 2020. Of the 514,732 acres of total disturbance, it is estimated that 149,089 acres (29 percent) would be associated with coal mining activities.

Of the 514,732 acres of total cumulative habitat disturbance, approximately 374,732 (73 percent) would be reclaimed by 2020. The remaining 139,998 acres of habitat disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 149,089 acres of habitat disturbance associated with coal mining activities, it is projected that approximately 86,196 acres (58 percent) would be reclaimed by 2020. Of the remaining 62,890 acres of coal mining-related disturbance, it is estimated that approximately 28,345 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 34,545 acres of disturbance would proceed concurrently with mining operations.

**Game Species.** Impacts to game species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except there would be slightly higher impacts to some big game ranges. Potential cumulative impacts to big game ranges from coal mining activities in the cumulative effects study area are presented in **Table 2.4-6**. Impacts to small game species would be the same as described under the 2010 – Lower Production Scenario, except approximately 174,820 additional acres of potential habitat would be disturbed under this scenario.

Potential impacts associated with RFD-related groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Coal mining and CBNG activities in the cumulative effects study area would result in the annual production of approximately 3,705 fewer mmgpy of water than under the 2010 – Lower Production Scenario. Most, if not all, of the coal mine-produced water would be consumed during operation. Approximately 914 fewer mmgpy of CBNG-produced water would be discharged, resulting in a slight reduction in water availability for area wildlife (e.g., waterfowl).

**Nongame Species.** Potential impacts to nongame species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except approximately 174,820 additional acres of potential habitat would be disturbed under this scenario.

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**Table 2.4-6**  
**Potential Cumulative Disturbance to Big Game Ranges from Coal Mine Development**  
**under the Year 2020 – Upper Production Scenario**  
**(acres and percent affected)**

Species	Big Game Range <sup>1</sup>			
	Crucial Winter	Severe Winter	Winter Yearlong	Yearlong
Pronghorn	N/A	1,422 (3 percent)	33,580 (2 percent)	37,437 (2 percent)
White-tailed Deer	N/A	N/A	N/A	1,707 (0.8 percent)
Mule Deer	N/A	N/A	7,413 (0.5 percent)	27,990 (1 percent)
Elk	24 (0.4 percent)	N/A	351 (1 percent)	1,168 (0.7 percent)

<sup>1</sup> Potential coal mine-related impacts to big game ranges were determined based on GIS information as follows: the total acres of a big game range (e.g., crucial winter, severe winter, winter yearlong, and yearlong) within the cumulative effects study area was divided by the sum of the potential disturbance acreage for 2020 (based on GIS mapping of coal reserves for the 2020 upper production scenario) and existing (2003) disturbance from coal mine development.

**Fisheries.** Under this scenario, impacts to fisheries as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. RFD activities would result in an additional 5,199 acres of cumulative unreclaimed surface disturbance. The higher level of surface disturbance could result in higher sediment input to drainages. Most of the increased surface disturbance would occur in the Antelope Creek, Upper Belle Fourche River, and Upper Cheyenne River subwatersheds. The contribution of effects from coal mine development on fisheries would increase slightly to 45 percent when comparing unreclaimed surface disturbance from coal to total disturbance within the six subwatersheds. However, it is anticipated that impacts to fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

CBNG-related groundwater discharge would be slightly lower under this scenario (approximately 914 fewer mmgpy); however, there would be no effect to perennial streams as even the projected maximum discharge flows are not expected to reach perennial stream segments due to relatively low discharge volumes.

**Special Status Species**

**Special Status Wildlife Species.** Potential impacts to special status species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, except approximately 174,820 additional acres of potential habitat would be disturbed under this scenario.

Based on GIS mapping of future coal reserves and existing (2003) disturbance from coal mine development, potential impacts to sage grouse habitat would be similar to those described under the 2010 – Lower Production Scenario, except 15 leks would be directly disturbed by coal mine development and 48 lek sites would occur within 2 miles of coal mining activities in the cumulative

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effects area by 2020. (Note: The difference in the number of lek sites that would occur within 2 miles of coal mining activities under the lower production scenario versus the upper production scenario is due to slight variations in the projected disturbance areas for these scenarios.) However, an unquantifiable number of these lek sites initially could be impacted by CBNG activity, which would occur in advance of coal mine development.

**Special Status Fish Species.** Under this scenario, impacts to special status fish species as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exceptions. As a result of ongoing reclamation, approximately 2,430 fewer acres of cumulative unreclaimed surface disturbance would exist in the three subwatersheds where special status fish species potentially occur. Approximately 57 percent of the unreclaimed surface in these subwatersheds would be related to coal mining activities. The lower level of surface disturbance could result in slightly lower sediment input to drainages. It is anticipated that associated impacts to special status fish species would be low, based on implementation of erosion control measures and NPDES permit requirements.

CBNG-related groundwater discharge would be slightly lower under this scenario (approximately 914 fewer mmgy); however, there would be no effect to perennial streams as even the projected maximum discharge flows are not expected to reach perennial stream segments due to relatively low discharge volumes.