

**APPENDIX F**

**BIOLOGICAL ASSESSMENT  
FOR THE WEST COAL CREEK LBA TRACT,  
SOUTH GILLETTE AREA EIS**

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## **F-1.0 INTRODUCTION**

Between 2004 and 2006, operators of four coal mines in Campbell County, Wyoming applied for four tracts of federal coal as maintenance leases under the Leasing on Application regulations at 43 CFR 3425. The environmental impacts of leasing these four Lease by Application (LBA) tracts are being evaluated in one environmental impact statement (EIS), the South Gillette Area Coal (SGAC) EIS. The four tracts, which are shown in Figure F-1, and applicant mines are:

- Belle Ayr North LBA Tract adjacent to and north of the Belle Ayr Mine;
- West Coal Creek LBA Tract adjacent to and west of the Coal Creek Mine;
- Caballo West LBA Tract adjacent to and southwest of the Caballo Mine;
- and
- Maysdorf II LBA Tract adjacent to and west of the Cordero Rojo Complex.

The purpose of this Biological Assessment is to provide information about the potential effects that leasing one of the tracts, the West Coal Creek LBA Tract, would have on federally listed threatened or endangered (T&E) species. T&E species are managed under the authority of the Endangered Species Act of 1973 (PL 93-205, as amended). The Endangered Species Act requires Federal agencies to ensure that all actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any federally listed species or result in the destruction or adverse modification of their critical habitat. BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered at the leasing stage because it is a logical consequence of issuing a lease.

This Biological Assessment was prepared to disclose the possible effects to T&E species (plant and animal) that are known to be present or that may be present within the area influenced by the Proposed Action and the alternative to the Proposed Action being evaluated by the BLM. It was prepared in accordance with Section 7 of the Endangered Species Act.

Biological Assessment objectives are:

1. To comply with the requirements of the Endangered Species Act that actions of federal agencies not jeopardize or adversely modify critical habitat of federally listed species.
2. To provide a process and standard by which to ensure that threatened or endangered species receive full consideration in the decision making process.

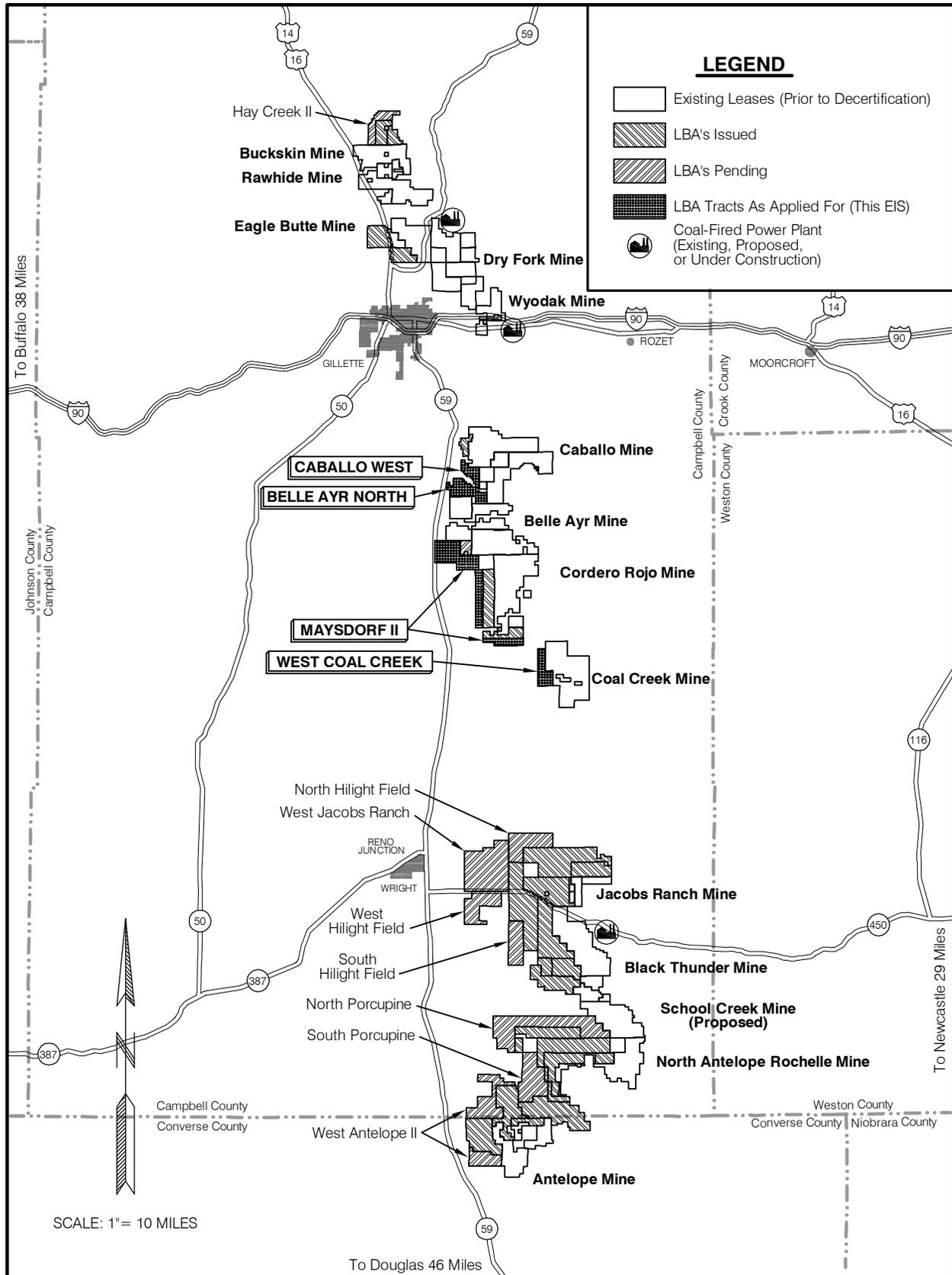


Figure F-1. General Location Map with Federal Coal Leases and LBA Tracts.

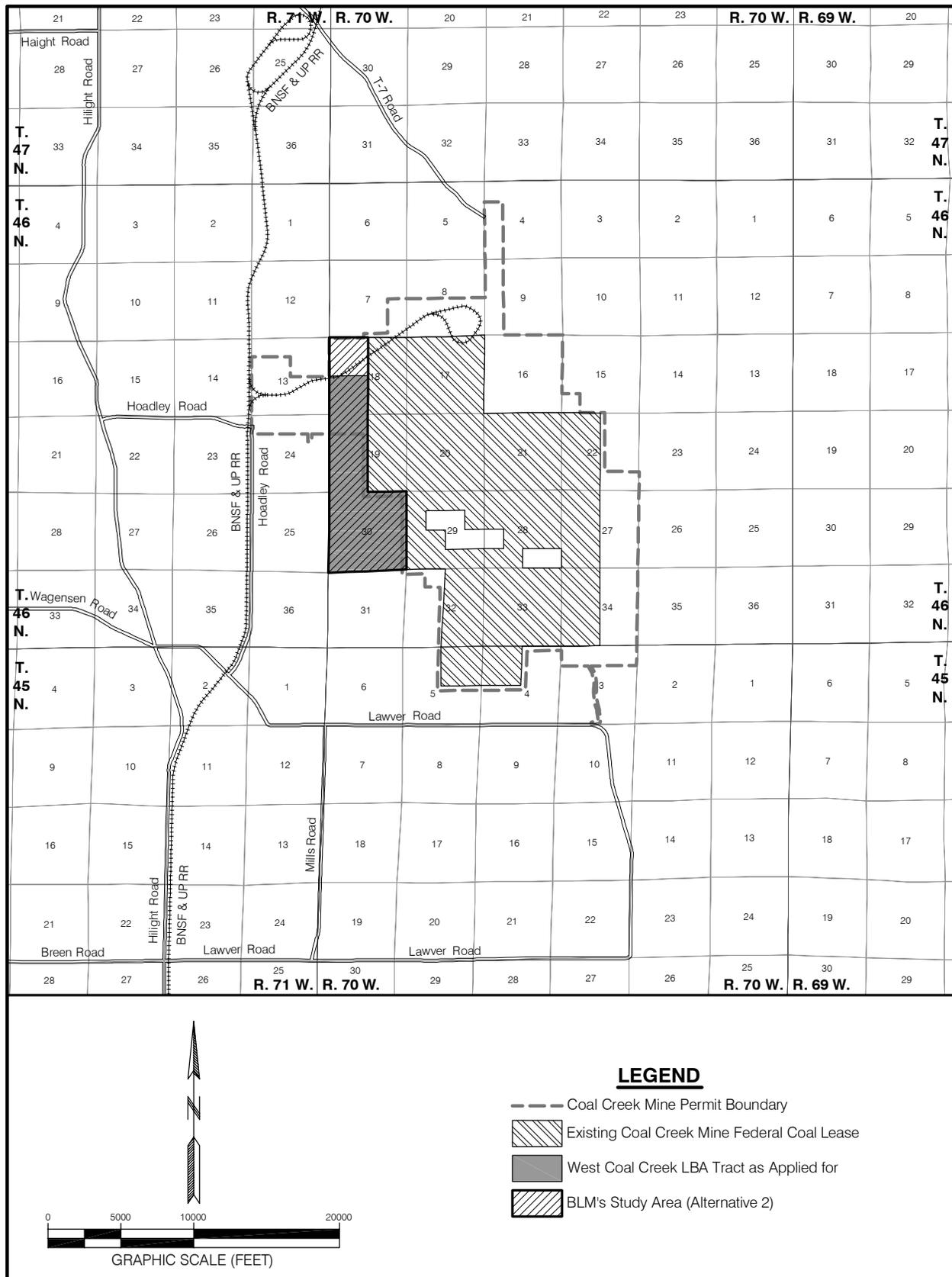


Figure F-2. West Coal Creek LBA Tract Alternatives.

## **F-2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**

### **F-2.1 The Proposed Action**

On February 10, 2006, Ark Land Company (ALC) filed an application with the BLM to lease federal coal reserves in a tract located west of and immediately adjacent to the Coal Creek Mine (Figure F-1). The Coal Creek Mine is operated by Thunder Basin Coal Company (TBCC), a subsidiary of Arch Western Resources, LLC. In this EIS, ALC is referred to as the applicant and TBCC is referred to in discussions of mine operations. The West Coal Creek LBA Tract was assigned case file number WYW172388. Under the Proposed Action the tract as applied for by ALC would be offered for lease at a sealed-bid, competitive lease sale. The boundaries of the tract would be consistent with the tract configuration proposed in the West Coal Creek LBA Tract lease application (Figure F-2). The Proposed Action assumes that ALC will be the successful bidder on the West Coal Creek LBA Tract if it is offered for sale.

The legal description of the proposed West Coal Creek LBA Tract coal lease lands as applied for by ALC under the Proposed Action is as follows:

T. 46 N., R. 70 W., 6<sup>th</sup> PM, Campbell County, Wyoming

Section 18: Lots 14 through 17;	161.95 acres
Section 19: Lots 7 through 10, 15 through 18;	323.60 acres
Section 30: Lots 5 through 20.	665.71 acres
Total:	<u>1,151.26 acres</u>

The coal estate underlying this tract described above is owned by the federal government and administered by the BLM. The surface estate of the tract is privately owned. Surface ownership is shown in Figure F-3.

The tract as applied for includes approximately 1,151.26 mineable acres. It is assumed that an area larger than the tract would have to be disturbed in order to recover all of the coal in the tract. The disturbances outside of the tract would be due to activities like overstripping, matching undisturbed topography, and construction of flood control and sediment control structures.

Under the Proposed Action for the West Coal Creek LBA Tract, if a decision is made to hold a competitive lease sale and if there is a successful bidder at that sale, a lease would be issued for the tract of federal coal as applied for. The tract offered for lease would be subject to standard and special lease stipulations developed for the Wyoming Powder River Basin (PRB). The stipulations that would be attached to a lease for the West Coal Creek LBA Tract are listed in Appendix D of the SGAC EIS document. The following

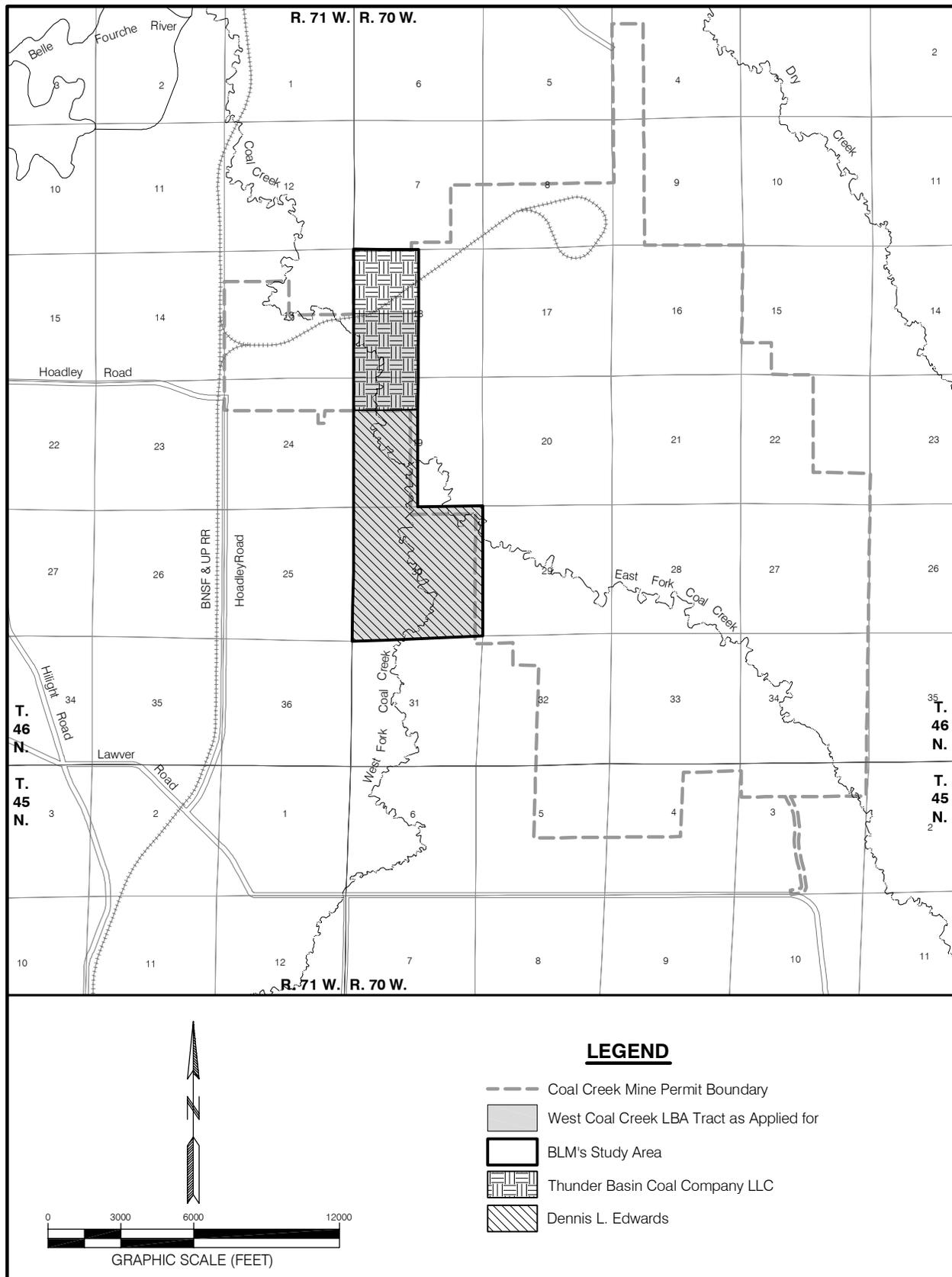


Figure F-3. Surface Ownership Within the West Coal Creek LBA Tract Alternatives.

stipulation relating to T&E species is one of the special stipulations developed for the Wyoming PRB:

***THREATENED, ENDANGERED, CANDIDATE, or OTHER SPECIAL STATUS PLANT and ANIMAL SPECIES*** - *The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened or endangered under the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq., or that have other special status. The Authorized Officer may recommend modifications to exploration and development proposals to further conservation and management objectives or to avoid activity that will contribute to a need to list such species or their habitat or to comply with any biological opinion issued by the Fish and Wildlife Service for the Proposed Action. The Authorized Officer will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act. The Authorized Officer may require modifications to, or disapprove a proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species, or result in the destruction or adverse modification of designated or proposed critical habitat.*

*The lessee shall comply with instructions from the Authorized Officer of the surface managing agency (BLM, if the surface is private) for ground disturbing activities associated with coal exploration on federal coal leases prior to approval of a mining and reclamation permit or outside an approved mining and reclamation permit area. The lessee shall comply with instructions from the Authorized Officer of the Office of Surface Mining Reclamation and Enforcement, or his designated representative, for all ground disturbing activities taking place within an approved mining and reclamation permit area or associated with such a permit.*

TBCC estimates that the West Coal Creek LBA Tract under the Proposed Action includes approximately 63.3 million tons of in-place and mineable coal. Using TBCC's projected recovery factor of 90 percent, the tract would contain about 57.0 million tons of recoverable coal.

Under the Proposed Action, it is assumed that the LBA tract would be developed as a maintenance lease to extend the life of the adjacent existing Coal Creek Mine. As a result, under the Proposed Action, the coal included in the tract would be mined by existing employees using existing facilities and roads.

## **F-2.2 Alternatives to the Proposed Action**

### **F-2.2.1 Alternative 1**

Under Alternative 1, the No Action Alternative, the application to lease the coal included in the West Coal Creek LBA Tract would be rejected, the tract would not be offered for competitive sale, and the coal included in the tract would not

be mined. This would not affect permitted mining activities and employment on the existing leases at Coal Creek Mine and would not preclude an application to lease the federal coal included in the West Coal Creek LBA Tract in the future. No additional surface of the West Coal Creek LBA Tract would be disturbed due to overstripping to allow coal to be removed from the adjacent existing leases.

#### F-2.2.2 Alternative 2

Under Alternative 2 for the West Coal Creek LBA Tract, BLM would reconfigure the tract, hold a competitive coal sale for the lands included in the reconfigured tract, and issue a lease to the successful bidder. In evaluating the West Coal Creek coal lease application, BLM identified a study area, which includes unleased federal coal adjacent to the northern edge of the tract as applied for (Figure E-2). BLM is evaluating the potential that some or all of these lands could be added to the tract to provide for more efficient recovery of the federal coal, increase competitive interest in the tract, and/or reduce the potential that some of the potentially mineable federal coal in this area would be bypassed in the future if it is not included in the West Coal Creek LBA Tract. The modified tract would be subject to standard and special lease stipulations developed for the PRB and this tract if it is offered for sale, as discussed above. Alternative 2 for the West Coal Creek LBA Tract assumes that ALC would be the successful bidder on the tract if a lease sale is held and that the tract would be developed as a maintenance lease to extend the life of the adjacent Coal Creek Mine. Other assumptions are the same as for the Proposed Action. The lands that BLM is considering adding to the tract are:

#### T.46N., R.70W., 6<sup>th</sup> P.M., Campbell County, Wyoming

Section 18: Lots 7 through 10;	<u>162.00 acres</u>
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Total:	162.00 acres
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The legal description of BLM's reconfiguration of the West Coal Creek LBA Tract under Alternative 2 is as follows:

#### T.46N., R.70W., 6<sup>th</sup> P.M., Campbell County, Wyoming

Section 18: Lots 7 through 10, 14 through 17;	323.95 acres
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Section 19: Lots 7 through 10, 15 through 18;	323.60 acres
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Section 30: Lots 5 through 20.	665.71 acres
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Total:	<u>1,313.26 acres</u>
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TBCC estimates that the reconfigured tract includes approximately 69.3 million tons of in-place coal and approximately 63.3 million tons of mineable

coal. Using TBCC's projected recovery factor of 90 percent, the reconfigured tract would contain about 57.0 million tons of recoverable coal.

### **F-3.0 CONSULTATION TO DATE**

The location of the existing Coal Creek Mine coal leases, the existing approved mine permit area, and the West Coal Creek LBA Tract are shown in Figure F-2.

The Coal Creek Mine and West Coal Creek LBA Tract are included in the area determined to be "acceptable for further consideration for leasing" as part of the coal screening process. The coal screening process is a four part process that includes application of the coal unsuitability criteria, which are defined in 43 CFR 3461.5. BLM has applied these coal screens to federal coal lands in Campbell County several times, starting in the early 1980s. Most recently, in 1993, BLM began the process of reapplying these screens to federal coal lands in Campbell, Converse, and Sheridan Counties. The results of this analysis were included as Appendix D of the 2001 *Approved Resource Management Plan for Public Lands Administered by the BLM Buffalo Field Office* (BLM 2001), which can be viewed on the Wyoming BLM website at <http://www.wy.blm.gov> in the NEPA documents section. Consultation with the U.S. Fish and Wildlife Service (USFWS) occurred in conjunction with the unsuitability findings under Criterion 9 (Critical Habitat for Threatened or Endangered Plant and Animal Species), Criterion 11 (Bald or Golden Eagle Nests), Criterion 12 (Bald and Golden Eagle Roost and Concentration Areas), Criterion 13 (Falcon Nesting Site(s) and Buffer Zone(s)), and Criterion 14 (Habitat for Migratory Bird Species).

Appendix B of the SGAC EIS document summarizes the unsuitability criteria, describes the general findings for the screening analyses discussed above, and presents a validation of these findings for the West Coal Creek LBA Tract based on the current information.

Consultation with USFWS has previously been completed for the area included within the Coal Creek Mine's existing approved mining permit area, shown in Figure F-2, as part of the mining and reclamation plan approval process. This process began when the mine was initially permitted in 1979.

A letter dated February 17, 2006, from Brian Kelly, USFWS, Cheyenne, Wyoming, to Monica Cummins (TBCC), Wright, Wyoming, documents approval of the current updated Raptor and Migratory Birds of High Federal Interest Monitoring and Mitigation Plan for the Coal Creek Mine (USFWS 2006a).

USFWS provided BLM a listing of the T&E species that may be present in the West Coal Creek coal lease project area in a memorandum letter from Brian T. Kelly, USFWS, Wyoming Field Office, Cheyenne, Wyoming, to Chris Hanson, BLM, Buffalo Field Office, Buffalo, Wyoming dated August 8, 2007 (USFWS 2007). The following list of species that was provided by USFWS represents the

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federally listed T&E species that may be present in Campbell County, Wyoming:

Black-footed ferret (*Mustela nigripes*): Endangered

Ute ladies'-tresses (*Spiranthes diluvialis*): Threatened

The August 8, 2007 memorandum provided recommendations for protective measures for T&E species in accordance with the Endangered Species Act. Protective measures for migratory birds in accordance with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act and recommendations for the protection of wetlands (under Executive Order 11990 and Section 404 of the Clean Water Act) and for other fish and wildlife resources (under the Fish and Wildlife Coordination Act and the Fish and Wildlife Act of 1956) were also included. The memorandum identified the greater sage-grouse as a species of specific interest and the importance of identifying grouse habitats within the lease area and appropriate mitigation measures to minimize potential impacts to this species. The memorandum also stated that the USFWS would work with the BLM to ensure that the species-specific protective measures and programs for the conservation and recovery of listed species as required by under Section 7 of the Endangered Species Act are satisfied and carried out.

The Wyoming Game and Fish Department (WGFD) provided BLM with scoping comments for the four tracts included in the SGAC EIS in a letter from John Emmerich, Deputy Director, WGFD, Cheyenne, Wyoming, to Teresa Johnson, BLM, Casper Field Office, Casper, Wyoming, dated April 10, 2007 (WGFD 2007). WGFD recommended consideration be given to possible impacts to big game, sage grouse, raptors, and nongame species and their habitat, and aquatic resources within the South Gillette Area Coal project area.

#### **F-4.0 SPECIES HABITAT AND OCCURRENCE AND EFFECTS OF THE PROPOSED PROJECT**

The Coal Creek Mine began producing coal in 1982. Wildlife monitoring has been conducted annually for the mine since 1983. This wildlife monitoring was designed to meet the Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD), Wyoming Game and Fish Department (WGFD), and federal requirements for annual monitoring and reporting of wildlife activity on coal mining areas. Detailed procedures and site-specific requirements have been carried out as approved by WGFD and USFWS. The monitoring program was conducted in accordance with Appendix B of WDEQ/LQD Coal Rules and Regulations. Because the areas covered in the wildlife surveys included the mine's permit area and a large perimeter around the permit boundary, the entire West Coal Creek LBA Tract has been included in baseline inventories and annual wildlife surveys conducted for the Coal Creek Mine since wildlife studies began.

The approved Coal Creek Mine Permit 483 Term T5 (TBCC 2005) includes monitoring and mitigation measures for the Coal Creek Mine that are required by Surface Mining Control and Reclamation Act and Wyoming State Law. If the West Coal Creek LBA Tract is acquired by FCW, these monitoring and mitigation measures would be extended to cover operations on the LBA tract when the Coal Creek Mine's mining permit is amended to include the tract. This amended permit would have to be approved before mining operations could take place on the tract. These monitoring and mitigation measures are considered to be part of the Proposed Action and Alternative 2 during the leasing process because they are regulatory requirements.

Background information on T&E species in the vicinity of the West Coal Creek LBA Tract was drawn from several sources, including: wildlife survey reports submitted by the Coal Creek Mine to the WDEQ/LQD from 1983 through 2006, the Final South Powder River Basin Coal EIS (BLM 2003), the Maysdorf Coal FEIS (BLM 2007), and from WGFD and USFWS records and contacts in 2006 and 2007. In addition, the entire West Coal Creek LBA Tract and all but the southwestern corner of its corresponding two-mile perimeter wildlife study area fall within the wildlife monitoring areas for the nearby Cordero Rojo Mine (Figure F-1).

Site-specific data for a substantial portion of the tract as applied for and the study area for Alternative 2 were obtained from several sources, including WDEQ/LQD permit applications and annual wildlife reports for the Coal Creek Mine and other nearby coal mines. Baseline wildlife studies were conducted by Thunderbird-Jones & Stokes, (TJS) expressly for the West Coal Creek LBA Tract during 2006 and 2007. Figure F-4 depicts TJS's T&E animal species survey areas for the West Coal Creek LBA Tract.

The West Coal Creek general analysis area is situated in an area of gently rolling terrain of moderate relief influenced by the East and West forks of Coal Creek. Elevations range from 4,555 to 4,710 ft within the LBA tract and from 4,580 to 4,725 ft within the area added under Alternative 2. Within the LBA tract and the area added under Alternative 2, slopes range from flat to over 33 percent, with the steeper slopes primarily occurring in the southern portion of the study area. The slopes of the gently rolling uplands, which comprise most (about 65 percent) of the BLM study area, seldom exceed 4.4 percent.

Predominant wildlife habitat types classified on the LBA tract and adjacent area correspond with the major plant communities defined during the vegetation baseline study and consist primarily of sagebrush/grassland and mixed grass prairie. Other habitats present in limited extent include streamside meadow and premine disturbance. Networks of road, pipeline, tank battery, and well-pad disturbance areas associated with oil and gas development overlay much of the study area.

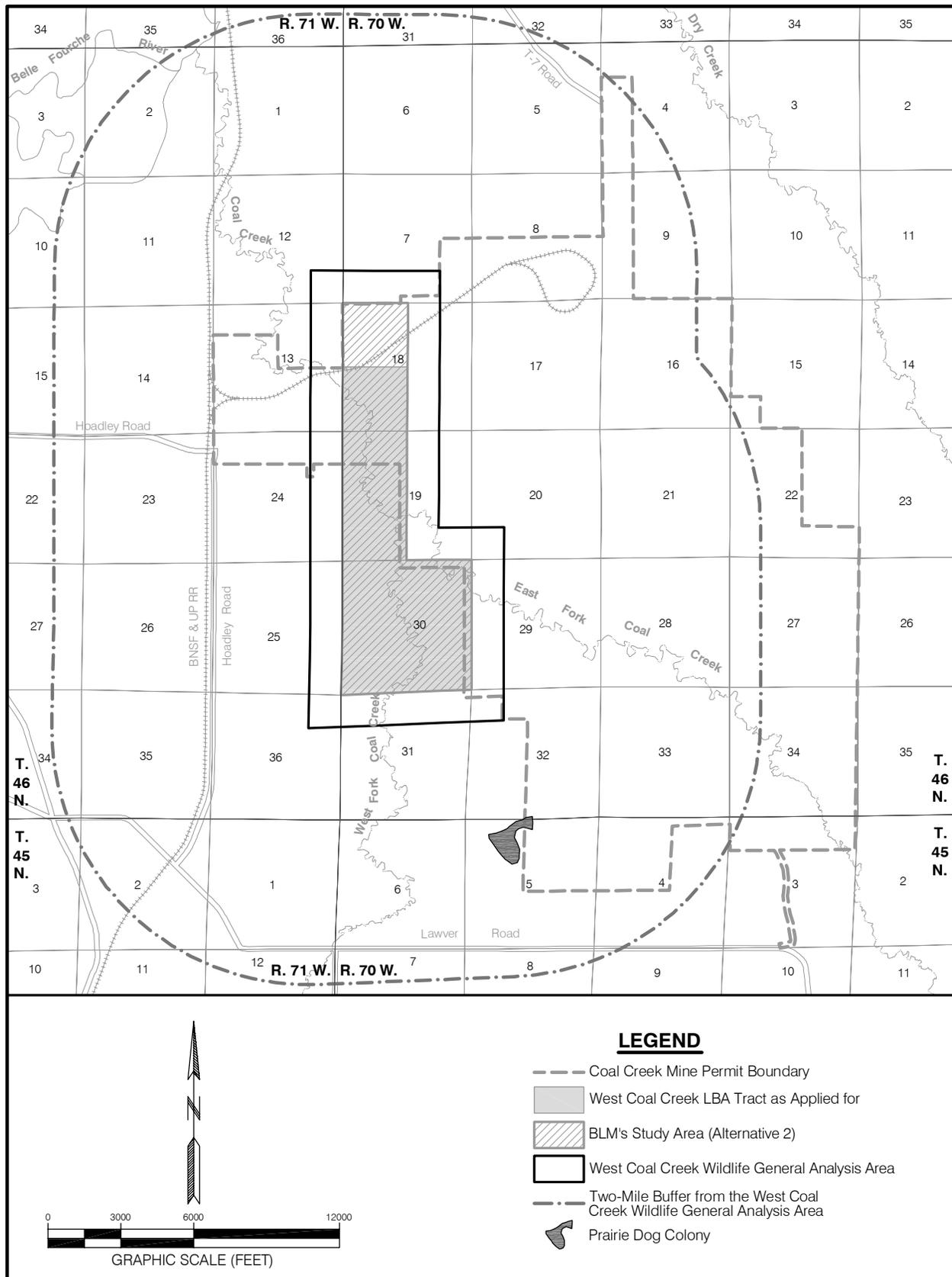


Figure F-4. T&E Species Survey Area for the Coal Creek Mine and the West Coal Creek LBA Tract.

All streams within and adjacent to the general analysis area are ephemeral. Storm runoff is typically of short duration and exhibits temporal patterns similar to the precipitation events. Streamflow is characteristically low to nonexistent from October through January. Streamflow frequently results from snowmelt during the late winter and early spring. Although peak discharges from such events are generally small, the duration and therefore the percentage of annual runoff volume can be considerable. During the spring, storms (both rain and snow) can result in both large runoff volumes and high peak discharges. Intense, short-duration summer thunderstorms also result in large runoff volumes and high peak discharges.

All streams draining the general analysis area are categorized as class 3B waters of the state by the WDEQ/Water Quality Division. No playas or topographic depressions have been identified within the general analysis area. Springs are uncommon in the general area and have not been identified in the general analysis area.

Four reservoirs used for livestock watering have been identified in the West Coal Creek general analysis area. None of these reservoirs have been permitted through the SEO. Most appear to have been in place for several decades. Three permitted sediment ponds (industrial and miscellaneous use) for the Coal Creek Mine are also located within the general analysis area. Each of these sediment ponds is associated with a WYPDES outfall.

A preliminary wetlands inventory, based on USFWS National Wetlands Inventory (NWI) mapping and vegetation mapping in the field, was conducted in 2004. The wetland analysis area includes the West Coal Creek LBA Tract as applied for, the lands added under Alternative 2, and a ¼-mile disturbance buffer around the tract sufficient to mine and reclaim the tract as a part of the existing Coal Creek Mine operation. A formal wetland delineation has been confirmed by the U.S. Army Corps of Engineers (COE) for the portion of the LBA tract wetlands analysis area that is within the adjacent existing Coal Creek Mine permit area (TBCC 2006).

Coal Creek Mine conducted a preliminary wetlands inventory in 2007, based on U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping and vegetation mapping in the field (BKS 2007), for the non-delineated portions of the wetlands analysis area. Some wetland areas previously mapped by the USFWS NWI project have been recently altered somewhat due to CBNG-related water production within and upstream of the West Coal Creek wetlands analysis area. The boundaries of the existing potential wetlands may vary to a greater or lesser extent from the boundaries shown on the NWI maps, and current field conditions may not be representative of the field conditions in the future. A formal wetland delineation survey of the lands proposed for mining disturbance would be conducted and submitted to the COE for verification as part of the mining and reclamation permit process, if the West Coal Creek LBA Tract is leased and proposed for mining.

Based on the existing USFWS NWI mapping data (which may be somewhat outdated), the wetlands confirmed to be present within the adjacent Coal Creek Mine's permit area, and the vegetation mapping that was conducted in 2007, a total of approximately 16.92 acres of wetlands and other Waters of the U.S. occur within the West Coal Creek wetlands analysis area. The earlier wetland delineation confirmed by the COE identified a total of approximately 3.48 acres of wetlands, which are associated with the stream channels (both riverine- and palustrine marsh-types), within the wetlands analysis area. The 2007 preliminary wetlands survey identified approximately 13.44 acres of other Waters of the U.S., which were areas of open water held within the stream channels, or in-channel impoundments identified by NWI mapping that were found to be dry at the time. These areas that occur within and adjacent to the West Coal Creek LBA Tract are shown on Figure S2-5 in the Supplementary Information document.

Within the proposed lease area and adjacent study area there is no "critical" habitat designated by USFWS for T&E species. The following discussion describes species' habitat requirements and their occurrence in the area of the West Coal Creek LBA Tract and evaluates the potential environmental effects of the Proposed Action and Alternative 1 on federal T&E species.

#### **F-4.1 Threatened Species**

##### **F-4.1.1 Ute ladies'-tresses (*Spiranthes diluvialis*)**

Ute ladies'-tresses, a member of the orchid family, was listed as threatened on January 17, 1992 due to a variety of factors, including habitat loss and modification, hydrological modifications of existing and potential habitat areas, and invasion of exotic plant species. At the time of listing, Ute ladies'-tresses was only known from north-central Colorado, northern and south-central Utah, and southeastern Nevada. As of September 2005, it had also been found in western Nebraska, southeastern Wyoming, southwestern Montana, and north-central Washington, while new populations had been documented in northwestern Colorado and northern Utah (Fertig, et al. 2005). USFWS has determined that a petition to remove the Ute ladies'-tresses orchid from federal protection under the Endangered Species Act provides substantial biological information to indicate that removal may be warranted. The petition was received from the Central Utah Water Conservancy District (USFWS 2004).

**Biology and Habitat Requirements:** Ute ladies'-tresses is a perennial, terrestrial orchid with erect, glandular-pubescent stems 8 to 20 inches tall arising from tuberous-thickened roots. This species typically flowers from late July through August. The flowers are white or ivory and clustered into a spike at the top of the stem; however, depending on location and climatic conditions, it may bloom in early July or still be in flower as late as early October (USFWS 2005b). Plants probably do not flower every year and may remain dormant below ground during drought years. The total known population of this species

is currently estimated to be 60,000 individuals (USFWS 2004). Occurrences range in size from one plant to a few hundred individuals.

Ute ladies'-tresses occurs primarily on moist, subirrigated or seasonally flooded soils bordering wetland meadows, springs, lakes, or perennial streams. The elevation range of known occurrences is 4,200 to 7,000 feet in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where the orchid has been found typically range from fine silt/sand to gravels and cobbles, as well as to highly organic and peaty soil types. The Ute ladies'-tresses orchid is not found in heavy or tight clay soils or in extremely saline or alkaline soils. The orchid seems intolerant of shade and small scattered groups are found primarily in areas where vegetation is relatively open (USFWS 2005). Ute ladies'-tresses orchid is commonly associated with horsetail, milkweed, verbena, blue-eyed grass, reedgrass, goldenrod, bentgrass and arrowgrass.

Populations are often dynamic and "move" within a watershed as disturbances create new habitat or succession eliminates old habitat (Fertig and Beauvais 1999). The orchid is well adapted to disturbances from stream movement and is tolerant of other disturbances, such as grazing, that are common to grassland riparian habitats (USFWS 1995). Ute ladies'-tresses colonize early successional riparian habitats such as point bars, sand bars, and low-lying gravelly, sandy, or cobbly edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The orchid establishes in heavily disturbed sites, such as revegetated gravel pits, heavily grazed riparian edges, and along well-traveled foot trails on old berms (USFWS 1995).

Prior to 2005, four orchid populations had been documented within Wyoming, all discovered between 1993 and 1997 (Fertig and Beauvais 1999). Four additional sites were located in 2005 and one additional site was found in 2006 (Heidel, 2007). The new locations were in the same drainages or tributaries as the original four populations. Drainages with documented orchid populations include Antelope Creek and tributaries in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County. No occurrences have been recorded in Campbell County or in the West Coal Creek wildlife general analysis area in Converse County.

Existing Environment: Areas of potential habitat within the West Coal Creek LBA Tract and adjacent study area were surveyed by BKS Environmental Associates, Inc during vegetation and wetland sampling in July 2007. The Coal Creek channel and its tributaries primarily had water present but for the most part lacked hydrophytic wetland vegetation or in some areas no vegetation was present along the steeply incised creek banks, with soils that primarily had clay textures.

Potential habitat was traversed on foot during the time of typical flowering of the known population, and it involved walking entire lengths of the drainages documenting locations of potential habitat and searching for this species.

No individuals of the Ute ladies'-tresses orchid were located during the 2007 survey. The land within the West Coal Creek LBA Tract and adjacent study area is not potential suitable Ute ladies'-tresses habitat. This includes highly disturbed or modified sites, upland habitat types, and sites inundated by standing water. Poor habitat (3.48 acres of Riverine and palustrine wetland channel) within the study area is very limited and is mostly found along the CBNG-impacted bottomlands of the Middle and West Forks of Coal Creek. Poor habitat factors included areas within and immediately adjacent to stream channels and floodplains, less steep stream banks, light soil texture having close lateral or vertical distance (within approximately 18 inches) to perennial water source during the flowering period, lack of plant competition, lack of general soil alkalinity/salinity, and current or historical management practices that did not promote overgrazing and extensive use of riparian areas.

As discussed above, a total of approximately 16.92 acres of wetlands and other Waters of the U.S. occur within the West Coal Creek wetlands analysis area.

**Effects of the Proposed Project: Mining the federal coal included in the West Coal Creek LBA Tract, if the tract is leased under the Proposed Action or Alternative 1, may affect, but is not likely to adversely affect Ute ladies'-tresses.** Potential habitat for this species on the tract is very limited and found along the CBNG-impacted bottomlands of West Fork, Middle Fork, and East Fork Coal Creek. However, the quality of potential habitat is extremely poor. Outside of the narrow riparian strips located along these impacted watercourses, potential habitat is rare or non-existent in the study area. Multiple surveys of the existing habitat at the Coal Creek Mine and other mines in this area have not found any Ute ladies'-tresses. Because of the ability of this species to persist below ground or above ground without flowering, single season surveys that meet the current USFWS survey guidelines may not detect populations. If undetected populations are present, they could be lost to surface disturbing activities.

Jurisdictional wetlands located in the West Coal Creek LBA Tract that are destroyed by mining operations would be replaced in accordance with the requirements of Section 404 of the Clean Water Act, as determined by COE. The replaced wetlands may not duplicate the exact function and landscape features of the pre-mine wetlands. COE considers the type and function of each jurisdictional wetland that will be impacted and may require restoration of additional acres if the type and function of the restored wetlands will not completely replace the type and function of the original wetland. Replacement of non-jurisdictional and functional wetlands may be required by the surface land owner and/or WDEQ/LQD. WDEQ/LQD allows and sometimes requires mitigation of non-jurisdictional wetlands affected by mining, depending on the values associated with the wetland features.

**Cumulative Effects:** Alterations of stream morphology and hydrology are believed to have extirpated Ute ladies'-tresses from most of its historical range (USFWS 2002). Disturbance and reclamation of streams by surface coal mining may alter stream morphology and hydrology. The large quantities of water produced with CBNG development and discharged on the surface may also alter stream morphology and hydrology.

## **F-4.2 Endangered Species**

### **F-4.2.1 Black-footed ferret (*Mustela nigripes*)**

The black-footed ferret is a nocturnal mammal and an obligate associate of prairie dogs (*Cynomys* spp.). Ferrets were listed as endangered in March 1967. This species is thought to have historically inhabited prairie dog colonies in the short-grass prairies of the eastern and southern Rockies, and across the Great Plains of North America. However, since the early 1900s, numerous factors have led to a decrease in potential habitat to less than 2% of its former acreage. Conversion of grasslands to agricultural landscapes, eradication of prairie dogs, and diseases such as the plague and canine distemper have resulted in severe reductions in prairie dog colonies across the west; colonies which provided both food and shelter for black-footed ferrets. This species of ferret is currently one of the most endangered mammals in North America, and was thought to be extinct until a small population was discovered in Meeteetse, Wyoming in September 1981. Since then, successful captive breeding and reintroduction programs have released black-footed ferrets in several western and Great Plains states, including Wyoming, Montana, South Dakota, Colorado, Utah, and Arizona.

**Biology and Habitat Requirements:** Ferrets rely on prairie dogs to provide both shelter and food (Hillman and Clark 1980). Ferrets produce one litter per year, typically giving birth to four or five kits. The decline in ferret populations has been largely attributed to the reduction in the vast prairie dog colonies that historically existed in the western United States. Despite extensive ferret surveys over the past 20 plus years throughout Wyoming, the last known wild black-footed ferret population was discovered near Meeteetse in 1981 (Miller et al. 1996). Those surveys included numerous USFWS-approved clearances for coal mining and other developments in the Powder River Basin of Wyoming, as well as USFS surveys for ferrets on the TBNG. Reintroduction efforts involving captive bred individuals have successfully established one black-footed ferret population in the Shirley Basin area in south-central Wyoming. Currently, this is the only known black-footed ferret population within the state, though other populations are present elsewhere in the United States and Mexico.

**Existing Environment:** Few ferrets have historically been recorded in locations away from prairie dog colonies. The Coal Creek Mine and LBA study area are beyond the focus area for ferret reintroduction efforts on the nearby Thunder Basin National Grassland and elsewhere in the general region (USFS 2002, Grenier 2003). One small (approximately 34 acres) prairie dog colony is

present just south of the BLM study area and its one-mile perimeter (Figure F-4). As indicated, that colony does not meet the 80-acre minimum, nor does it fall within a larger complex of colonies, to be considered as potential black-footed ferret habitat by the USFWS (1989). Likewise, the colony does not provide sufficient habitat to persistently support individuals or breeding females, whose needs are estimated to be at least 30 and 123.5 acres, respectively (Forrest et al. 1985). Ferrets have never been documented at Coal Creek Mine or in the surrounding region during surveys conducted over the last 20 plus years by a variety of private, state, and federal entities. The lack of black-footed ferret observations and scat in the BLM study area leads to the conclusion that ferrets are not present in the area. On 2 February 2004, the USFWS declared that surveys for black-footed ferrets are no longer required in black-tailed prairie dog colonies throughout Wyoming (file letter ES-61411/BFF/WY7746).

**Effects of the Proposed Project: Mining the federal coal included in the WCC LBA Tract, should the tract be leased under the Proposed Action Alternative, will have no effect on black-footed ferrets.** Given the documented absence of this species in the region, including the LBA study area, during specific surveys for this species, the isolated nature and small size of the lone colony within the LBA survey area, the block clearance issued by the USFWS for black-tailed prairie dog colonies throughout the entire state, and the location of the LBA area beyond future reintroduction sites, mining the LBA area will not result in any direct or indirect effects on black-footed ferrets.

**Cumulative Effects:** As indicated, coal mining and natural gas development have occurred in the general project area for more than 20 years, with energy extraction activities expected to increase in the immediate future. Leasing and mining the West Coal Creek LBA Tract would not contribute to cumulative adverse effects to black-footed ferrets within either the study area or region. No black-footed ferret populations exist within northeastern Wyoming. The USFWS issued a block clearance for this species in black-tailed prairie dog colonies throughout the state. The LBA study area and surrounding perimeter are beyond the focus area for future ferret reintroduction efforts in the general region (USFS 2002, Grenier 2003). Furthermore, the Proposed Action Alternative would not conflict with any future objectives to manage the area for, or reintroduce black-footed ferrets into, northeast Wyoming.

## **F-5.0 SUMMARY OF DETERMINATIONS**

Table F-1 summarizes the determinations for federally listed T&E species in the area of the West Coal Creek LBA Tract that may result from implementing the Proposed Action or Alternative 1.

## **F-6.0 REGULATORY REQUIREMENTS AND MITIGATION**

The issuance of a Federal coal lease grants the lessee the exclusive rights to mine the coal, subject to the terms and conditions of the lease. Lease

Table F-1. Effects Evaluation of Federal T&E Species in the Area of the West Coal Creek LBA Tract.

<b>Status</b>	<b>Species Common Name</b>	<b>Potential Effects</b>
Threatened:	Ute ladies'-tresses	May affect <sup>1</sup>
Endangered:	Black-footed ferret	No effect

<sup>1</sup> Not likely to adversely affect individuals or populations.

ownership is necessary for mining federal coal, but lease ownership does not authorize mining operations. Surface coal mining operations are regulated in accordance with the requirements of the Surface Mining Control and Reclamation Act of 1977 and Wyoming State regulations. The Surface Mining Control and Reclamation Act gives the Office of Surface Mining Reclamation and Enforcement (OSM) primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations. Pursuant to Section 503 of the Surface Mining Control and Reclamation Act, the WDEQ developed, and in November 1980 the Secretary of the Interior approved a permanent program authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on nonfederal lands within the State of Wyoming. In January 1987, pursuant to Section 523(c) of the Surface Mining Control and Reclamation Act, WDEQ entered into a cooperative agreement with the Secretary of the Interior authorizing WDEQ to regulate surface coal mining operations and surface effects of underground mining on federal lands within the state. In order to get approval of this cooperative agreement, the state had to demonstrate that the state laws and regulations are no less stringent than, meet the minimum requirements of, and include all applicable provisions of the Surface Mining Control and Reclamation Act.

If the West Coal Creek LBA Tract is leased, it would be a maintenance lease for the existing Coal Creek Mine, which currently has both an approved Mineral Leasing Act of 1920 (MLA) mining plan and an approved State mining and reclamation permit. In the case of maintenance leases, such as the West Coal Creek LBA Tract, the existing MLA mining plan and State mining and reclamation plan must be amended to include any newly leased area before that area can be mined. In order to amend the existing MLA mining plan and State mining and reclamation permit, the company would be required to submit a detailed permit application package to WDEQ before starting surface coal mining operations on any newly acquired lease. WDEQ/LQD would review the permit application package to insure the permit application complies with the permitting requirements and the coal mining operation will meet the performance standards of the approved Wyoming program. If the permit application package does comply, WDEQ would issue the applicant an amended permit that would allow the permittee to extend coal mining operations onto the newly acquired lease.

Protection of fish, wildlife, and related environmental values is required under the Surface Mining Control and Reclamation Act regulations at 30 CFR 816.97, which state:

“No surface mining activity shall be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the Secretary of which is likely to result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act of 1973, as amended.”

In addition to requiring the operator to minimize disturbances and adverse impacts on fish, wildlife, and related environmental values, the regulations at 30 CFR 816.97 disallow any surface mining activity which is likely to jeopardize the continued existence of endangered or threatened species and require that the operator use the best technology currently available to minimize electrocution hazards to raptors; locate and operate haul and access roads to avoid or minimize impacts on important fish and wildlife species; and design fences, conveyors, and other potential barriers to permit passage of large mammals. Section 7 consultation would be required prior to approval of the mining and reclamation plan modification. Additional measures to ensure compliance with the Endangered Species Act and the Surface Mining Control and Reclamation Act can be developed when the detailed mining plan, which identifies the actual location of the disturbance areas, how and when they would be disturbed, and how they would be reclaimed, is developed and reviewed for approval. At the leasing stage, a detailed mining and reclamation plan is not available for evaluation or development of appropriate mitigation measures specific to an actual proposal to mine.

The following is a partial list of measures related to federally-protected species that are required as part of the mining and reclamation permits:

- avoiding bald and golden eagle disturbance per the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act;
- restoring bald eagle foraging areas disturbed by mining;
- using raptor safe power lines; and
- surveying for Ute ladies'-tresses if habitat is present.

## **F-7.0 CUMULATIVE IMPACTS**

Existing habitat-disturbing activities in the PRB include surface coal mining; conventional oil and gas and CBNG development; uranium mining; sand and gravel, and scoria mining; ranching; agriculture; road, railroad, and power plant construction and operation; recreational activities; and rural and urban housing development. Mining, construction and agricultural activities, and urban development tend to have more intense impacts on fairly localized areas, while ranching, recreational activities, and oil and gas development tend to be less intensive but spread over larger areas. Oil and gas development and mining activities have requirements for reclamation of disturbed areas as

resources are depleted. The net area of energy disturbance in the Wyoming PRB has been increasing. In the short term, this means a reduction in the available habitat for T&E plant and wildlife species. In the long term, habitat is being and will continue to be restored as reclamation proceeds.

BLM is in the process of completing a regional technical study of current and proposed or potential development activity in the PRB to help the agency evaluate the impacts of coal development in the PRB. The *Powder River Basin Coal Review* consists of three tasks: Task 1 updates the BLM's 1996 status check for coal development in the PRB, Task 2 develops a forecast of reasonably foreseeable development in the PRB through the year 2020, and Task 3 predicts cumulative impacts that would be expected to occur as a result of the projected development. The information about existing development in the following paragraphs is taken from the *Powder River Basin Coal Review* Task 2 report (BLM 2005) and BLM lease records. The completed PRB Coal Review reports can be accessed at the BLM Wyoming website at <http://www.wy.blm.gov/minerals/coal/prb/prbdocs.htm>. The project area for Tasks 1 and 2 of the PRB Coal Review encompasses over eight million acres and includes all of Campbell, Sheridan, and Johnson Counties and the northern portion of Converse County in northeastern Wyoming.

Oil and gas exploration and production have been ongoing in the PRB for more than 100 years. Conventional (non CBNG) oil and gas fields are, for the most part, concentrated in the central and southern parts of the structural basin. Development of the CBNG resources from the coal beds is a more recent occurrence, with CBNG production in the Wyoming PRB starting in the late 1980s. As of 2003, an estimated 187,761 acres had been disturbed in the coal review project area as a result of oil and gas development activities, but approximately 115,045 acres of that disturbance has been reclaimed. This includes conventional oil and gas and CBNG wells and associated facilities and major transportation pipelines.

BLM estimates that the existing federal coal leases in the Wyoming PRB include approximately 121,185 acres. The currently pending federal coal LBA tracts (including the West Coal Creek LBA Tract) include approximately 25,585 additional acres. The majority of the coal in the areas permitted for surface coal mining is federal, but some state and private leases are included within some of the existing mine permit areas. All of the current and proposed federal coal leases are concentrated near the outcrop of the Wyodak coal bed, which is located in eastern Campbell County and the extreme northeastern edge of Converse County.

As of 2003, the base year for the PRB Coal Review, the surface coal mining operations along the Wyodak outcrop had disturbed approximately 68,794 acres. Approximately 24,097 of those acres of disturbance are occupied by "permanent" mine facilities, such as roads, buildings, coal handling facilities, etc., which are not available for reclamation until after coal mining operations

end. Of the remaining 44,697 acres of disturbance available for reclamation, approximately 21,238 acres had been reclaimed.

The *Powder River Basin Coal Review* identified an estimated 4,891 additional acres of coal-related development disturbance (i.e., coal-fired power plants, railroads, and coal technology projects) as of 2003.

The estimated total development-related disturbance in the Wyoming PRB in 2003 was 264,704 acres. In addition to the coal and oil and gas development discussed above, this total includes other types of development disturbance, such as reservoirs and industrial fabrication firms, as well as public and private infrastructure, such as highways and roads, government buildings, and residential and commercial real estate development. It should be noted that some of these disturbances overlap one another. In such cases, the disturbance acreage is counted separately under each category, but is not counted twice in determining the total area of disturbance.

Cumulative effects would also occur to T&E plant and wildlife resources as a result of indirect impacts. One factor is the potential import and spread of noxious weeds around roads and facilities. Noxious weeds have the ability to displace native vegetation and hinder reclamation efforts. Control of noxious weeds is addressed in surface coal mining and reclamation plans. If weed mitigation and preventative procedures are applied to all construction and reclamation practices, the impact of noxious weeds on T&E plants and wildlife would be minimized.

In reclaimed areas, vegetation cover often differs from undisturbed areas. In the case of surface coal mines, re-established vegetation would be dominated by species mandated in the reclamation seed mixtures (to be approved by WDEQ). The majority of the species in the approved reclamation seed mixtures are native to the area; however, reclaimed areas may not serve ecosystem functions presently served by undisturbed vegetation communities and habitats. In the short-term in particular, species composition, shrub cover, and other environmental factors are likely to differ from pre-disturbance vegetation communities and habitats. Establishment of noxious weeds and alteration of vegetation in reclaimed areas has the potential to alter T&E plant and wildlife habitat composition and distribution.

Potential adverse effects to listed and proposed species that have occurred and would continue to occur as a result of existing and potential future activities in the PRB would include direct loss of habitat, indirect loss of habitat due to human and equipment disturbance, and habitat fragmentation. The existing mines have developed mitigation procedures, as required by the Surface Mining Control and Reclamation Act (at 30 CFR 816.97) and Wyoming State regulations, to protect T&E species. These procedural requirements would be extended to include mining operations on the West Coal Creek LBA Tract, if it is leased as proposed and after required detailed plans to mine the coal and reclaim the mined-out areas are developed and approved.

**F-8.0 CREDENTIALS OF SURVEY PERSONNEL**

**Thunderbird-Jones & Stokes of Gillette, Wyoming**

Gwyn McKee

Ms. McKee obtained a Master of Science degree in Wildlife Ecology/Management from the University of Missouri-Columbia. She has accumulated nearly 20 years of professional experience, with the last 14 spent working with the energy industry in Wyoming, Montana, and South Dakota. Ms. McKee has conducted the wildlife surveys and impact analyses for most of the surface coal mines in the Powder River Basin during her tenure in Wyoming, including two of the three properties analyzed in the South Gillette Area Coal EIS. She has also provided and/or reviewed the pertinent text related to impact assessments for vertebrate species of concern for most of the coal EISs that have been prepared in the Powder River Basin since 2000.

Jennifer Ottinger

Ms. Ottinger received a B.S. in Zoology from Colorado State University in 1993, with a minor in Microbiology. She has 12 years of professional experience with a variety of vertebrate species, including surveys for sage-grouse and mountain plovers, though her work has focused on raptors during that period. Ms. Ottinger has worked throughout the U.S. and abroad. She joined Jones & Stokes as a Wildlife Biologist in 2004. She has strong raptor identification and handling skills, research experience, proven abilities in data analysis and technical writing, and has presented and/or published several articles in a variety of professional meetings and publications, respectively.

**BKS Environmental Associates, Inc of Gillette, Wyoming**

Dr. Brenda K. Schladweiler

Dr. Brenda K. Schladweiler obtained her Ph.D. in Soil Science from the University of Wyoming, 2003. M.S. in Soil Science from University of Wyoming 1995, and B.S. Range Management (Land Rehabilitation) from Colorado State University, Fort Collins, Colorado 1980.

Dr. Schladweiler has extensive experience over the last 26 years in conducting rare plant surveys. The following is a list of recent threatened and endangered plant studies she has conducted:

<b>Location</b>	<b>Date</b>	<b>Plants Surveyed</b>
Wharf Mine, Lawrence Co., SD	1992	Various, State of SD Heritage Plants
Ferris Haggerty Mine, Carbon Co., WY	1998	Various, State of WY
Crow AML, Big Horn Co., MT	1999	Various, State of MT
Caballo Mine	1999	<i>Spiranthes diluvialis</i>
Wright Clinic AML, Campbell Co., WY	1999	<i>Spiranthes diluvialis</i>
Kane Environmental, Campbell Co., WY	1999	<i>Spiranthes diluvialis</i>
Atlantic City Mine, Knight Piesold, Fremont Co., WY	2000	<i>Spiranthes diluvialis</i>

Eagle Butte Mine, Campbell Co., WY		<i>Spiranthes diluvialis</i>
West Antelope Mine, Converse Co., WY	2001	<i>Spiranthes diluvialis</i>
BRS, Bighorn Basin Water Project, Washakie Co., WY	2001	Various, State of Wyoming Plant
URS, Transmission Line, Campbell Co., WY	2001	<i>Spiranthes diluvialis</i>
Wright, (bike path) Campbell Co., WY	2001	<i>Spiranthes diluvialis</i>
Gillette, PCA sewer line, Campbell Co., WY	2002-2004	<i>Spiranthes diluvialis</i>
Gillette, PCA trunk line, Campbell Co., WY	2002-2004	<i>Spiranthes diluvialis</i>
Pinehaven (Wester-Wetstein), Crook Co., WY	2003	<i>Spiranthes diluvialis</i>
Spotted Horse, (CBMA CH4), Campbell Co., WY	2003	<i>Spiranthes diluvialis</i>
Bowers Oil (Antelope Creek)Campbell/Converse Co., WY	2003	<i>Spiranthes diluvialis</i>
Gillette, PCA Swanson Rd., Campbell Co., WY	2003	<i>Spiranthes diluvialis</i>
North Rochelle Mine USFS Survey, Campbell Co., WY	2004	Various USFS Sensitive Species for TBNG
Westport Oil & Gas, Nicholson POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Devon Energy, Mustang POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
NARM, Beckwith Rd., Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Yates Petroleum, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i> ; various USFS Sensitive Species for TBNG
PRCC, Ridgeroad USFS, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Lance, Black Thunder POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Devon Energy, Mulie POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Devon Energy Whitetail POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>
Devon Energy, Bighorn POD, Campbell Co., WY	2004	<i>Spiranthes diluvialis</i>

Numerous actions have been taken by Dr. Schladweiler to become acquainted with the known locations and the appearance of *Spiranthes diluvialis*. Research has been conducted through the Wyoming Natural Diversity Database and the Internet for sensitive plants. In addition, she has actually visited the population on the Unnamed Tributary to Antelope Creek numerous times over the last approximate 10 years. This known population verification was completed as part of a field survey conducted for Yates Petroleum Company in the Rochelle Hills POD, Campbell County, Wyoming on August 29, 2004. She has also visited the known population near Chugwater, Wyoming.

Dr. Schladweiler on numerous occasions has been in contact with Mr. Ernie Nelson, University of Wyoming, Rocky Mountain Herbarium, and George Jones, Wyoming Natural Diversity Database. In addition, she has consulted with Mr. Walt Fertig, previously from the University of Wyoming.

Katie Halvorson

Katie Halvorson holds a B.S. in Environmental Studies with a minor in Biology from Bemidji State University, Bemidji, Minnesota (2005). Ms. Halvorson has been employed by BKS Environmental since the spring of 2005. She has been conducting mineland reclamation monitoring for various coal mines in Campbell and Converse County, Wyoming since her employment. She has also performed vegetation sampling for numerous CBM projects and baseline vegetation surveys in the Powder River Basin. In addition, she has conducted rare plant species surveys, wetland delineations, and environmental compliance assessments. Threatened, endangered, proposed and sensitive plant survey experience includes:

- Visited a tributary of Antelope Creek and observed a *Spiranthes diluvialis* (Ute Ladies' Tresses orchid) population. 2005.
- Powder River Coal LLC – North Antelope Rochelle Mine Umbrella Botany Evaluation, in Campbell County, Wyoming. 2005.
- Powder River Coal LLC – Gold Mine Draw AVF Exchange – Ute Ladies' Tresses orchid survey, in Campbell County, Wyoming. 2005.
- West Roundup Resources, Inc. – School Creek Mine – Ute Ladies' Tresses orchid survey in Campbell County, Wyoming. 2005 and 2006.
- Devon Energy Corporation – Juniper Draw Unit – Ute Ladies' Tresses orchid survey in Johnson County, Wyoming. 2005.
- Devon Energy Corporation – Crossroads Unit – Ute Ladies' Tresses orchid survey in Johnson County, Wyoming. 2005.
- Marathon Oil Company – Knudson 9 Unit – Ute Ladies' Tresses orchid survey in Campbell County, Wyoming. 2006.
- Marathon Oil Company – Twenty Mile Butte Unit – Ute Ladies' Tresses orchid survey in Campbell County, Wyoming. 2006.
- Marathon Oil Company – West Innes 27 Unit – Ute Ladies' Tresses orchid survey in Campbell County, Wyoming. 2006
- Rio Tinto Energy America – Antelope Mine – Ute Ladies' Tresses orchid habitat survey in Converse County, Wyoming. 2007

Cindy Robinson

Cindy Robinson holds a Masters of Business Administration (MBA) and a B.S. in Environmental Science from the University of Denver, Denver, Colorado (2005). Ms. Robinson has been employed by BKS Environmental since April of 2006. She has been conducting mineland reclamation monitoring for various coal mines in Campbell County, Wyoming during the last year. In addition, she has conducted rare plant species surveys, wetland delineations, and environmental compliance assessments. Ms. Robinson has also visited an *Astragalus barrii* site, on USFS lands at the proposed School Creek Mine area when the species was blooming. Threatened and endangered and sensitive plant survey experience includes:

- West Roundup Resources, Inc., – School Creek Mine – Barr's Milkvetch survey in Campbell County, Wyoming, 2006.

- West Roundup Resources, Inc., - School Creek Mine - Ute Ladies' Tresses orchid survey in Campbell County, Wyoming, 2006.
- Thunder Basin Coal Company, Black Thunder Mine - West Hilight - Barr's Milkvetch survey, August 2006.
- Wellstar Corporation (Jones and Stokes), Ute Ladies Tresses orchid survey, 2007.

Jamie Eberly

Jamie Eberly holds a B.S. in Range Management, Rangeland Livestock Option with a Business Administrations minor from Chadron State College, Chadron, Nebraska (2005). Ms. Eberly has been employed by BKS Environmental since the fall of 2006. She has been conducting mineland reclamation monitoring for various coal mines in Campbell and Converse County, Wyoming since her employment. She has also performed vegetation sampling for numerous CBM projects and baseline vegetation surveys in the Powder River Basin. In addition, she has conducted rare plant species surveys, wetland delineations, and environmental compliance assessments. Threatened, endangered, proposed and sensitive plant survey experience includes:

- Williams Production Company, West Cripple Creek POD, Biological Evaluation/Biological Assessment in Campbell County, Wyoming. 2007.

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