FINDING OF NO SIGNIFICANT IMPACT

DOI-BLM-NM-P010-2011-80-EA

FINDING OF NO SIGNIFICANT IMPACT

After studying the potential impacts of the proposed action and alternatives as described in the Lesser Prairie-Chicken Expansion Corridor Environmental Assessment I do not anticipate any significant impacts on the quality of the human environment. I base my finding of no significant impacts on the factors related to context and intensity of impacts as defined by the Council on Environmental Quality (CEQ) at 40 CFR, parts 1500-1508. I have determined that this action is not a major Federal action that would significantly affect the quality of the human environment within the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969. I conclude that the implementation of the proposed action would not result in any undue or unnecessary environmental degradation and an Environmental Impact Statement is not required.

_____ _____

Douglas J. Burger Date
Pecos District Manager

ENVIRONMENTAL ASSESSMENT

Lesser prairie-chicken Expansion Corridor

Southeastern Chaves County and
Northeastern Eddy County, New Mexico

DOI-BLM-NM-P010-2010-80-EA

November 2010

U.S. Department of the Interior
Bureau of Land Management
Pecos District Office
Roswell, New Mexico

I. Background

Introduction

The Special Status Species Resource Management Plan Amendment and Record of Decision (2008 RMPA) addressed the management of all uses of public land on about 850,000 acres in the Pecos District where both surface and subsurface estates are in federal ownership. The RMPA also addressed management for an additional 300,000 acres of federal mineral estate where the surface is managed by other surface management agencies of the federal government or New Mexico State agencies or is privately owned. In these cases, the leasing of fluid mineral (i.e., oil and gas) is administered by BLM.

The 2008 RMPA amended the Carlsbad RMP and Roswell RMP within the Planning Area within portions of Chaves, Eddy, Lea and Roosevelt Counties, New Mexico. The RMPA was prepared in accordance with the requirements of the Federal Land Policy and Management Act (FLPMA) of 1976 and the National Environmental Policy Act (NEPA) of 1969.

The 2008 RMPA proposed specific management prescriptions to ensure the continued habitat protection of two special status species, the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and the sand dune lizard (*Sceloporus arenicolus*), while allowing other resource uses and activities to continue within the Planning Area.

The 2008 RMPA established five management areas, the Core Management Area, the Primary Population Area, the Sparse and Scattered Population Area, and the Isolated Population Area. Within the Isolated Population Area are 17 Habitat Evaluation Areas (HEAs). The HEAs were to be evaluated for habitat for the lesser prairie-chicken. Those HEAs meeting the criteria listed in Appendix 3 of the 2008 RMPA would be managed to maintain or enhance that habitat.

The corridor discussed in this EA would be located in a portion of the Sparse and Scattered Population Area (SSPA) and a portion of the Isolated Population Area (IPA). An HEA is also located within the corridor. The corridor abuts the southern boundary of the Core Management Area. See Map 1.

This environmental assessment discusses management decisions regarding existing oil and gas leases of federal minerals within the corridor. Decisions regarding new federal mineral leasing would be unchanged. Existing management decisions and mitigation measures for the SSPA, IPA, and HEAs are described in Appendix 1 of this document. This environmental assessment will analyze the impacts of using one or more of these mitigation measures within the corridor and document the cumulative effects of decisions with similar impacts.

Purpose and Need

The purpose of this document is to propose specific management prescriptions within the Lesser Prairie-Chicken Expansion Corridor (LPC Corridor), shown on Map 1, in order to maintain unfragmented suitable but unoccupied lesser prairie-chicken (*Tympanuchus pallidicinctis*) habitat while allowing other resource uses and activities to continue. Establishing this corridor of unfragmented suitable habitat will help maintain population viability and habitat connectivity for the lesser prairie-chicken (LPC).

Two factors are driving the need to modify the management prescriptions of the 2008 RMPA. The BLM reviewed the voluntary participation in the mitigation measures designed to protect LPC habitat and concluded the level of participation would lead to continued fragmentation of suitable LPC habitat. The second factor is the amount of effort expended to restore LPC habitat to an unfragmented state with the SSPA and the IPA.

The 2008 Special Status Species Resource Management Plan Amendment and Record of Decision (2008 RMPA) recognized the occurrence of federal oil and gas leases within the Sparse and Scattered Population Area (SSPA) as well as the development rights of the lease holders. The BLM must provide reasonable opportunity for lessees to develop their lease. Management prescriptions are needed to minimize conflict between oil and gas development and the need to maintain suitable LPC habitat within the LPC Corridor.

Federal law, regulations, and policies require the BLM to manage public lands and resources under the principle of multiple-use accompanied with adaptive management. It is BLM policy to conserve special status species and their habitats, and ensure that actions authorized by the BLM do not contribute to the need for the species to become listed as threatened or endangered. (For additional information, refer to the BLM Special Status Species Management Manual 6840). In 1998, the US Fish and Wildlife Service (USFWS) determined the LPC was warranted for listing as a threatened or endangered species, but precluded it from listing due to other priorities. The USFWS first determined the sand dune lizard was warranted for listing as Threatened or Endangered in 1982, but it was precluded from listing due to other priorities. On December 14, 2010, the USFWS published a proposed rule for listing the dunes sagebrush lizard (sand dune lizard) as an endangered species.

The corridor contains suitable LPC habitat connecting the Core Management Area with the Sparse and Scattered Population Area (SSPA) as well as the Isolated Population Area (IPA). Biologists have focused their studies on LPC mating and brood rearing habitats (March through June of each year). A lesser amount of data has been collected regarding the habitat needs of the species during the remainder of the year. Observations by local wildlife biologists, however, indicate LPCs over winter within the corridor, dispersing to other areas later in the year to mate and rear their young.

The BLM and other partners have invested considerable effort in projects designed to restore lesser prairie-chicken habitat by reclaiming abandoned well pads, access road, and removing idle overhead power lines. These actions enhance the possibility that it would not be necessary to list that species as threatened or endangered under the Endangered Species Act. Since the approval of the 2008 RMPA the desirability to maintain suitable habitat between chicken populations has become elevated.

Decision to be made: The BLM will decide what management prescriptions to use when authorizing actions within the LPC Corridor area.

Conformance with Land Use Planning

The proposed activity is consistent with the management actions and prescriptions identified in the 1988 Carlsbad Resource Management Plan (RMP), as amended; the 1997 Roswell RMP; and the 2008 Special Status Species RMP Amendment. This EA is tiered to the 2008 Special Status Species RMP Amendment and incorporates by reference the 2008 Special Status Species RMP Amendment.

Scoping

Internal scoping began in March 2010 among the BLM staff on the interdisciplinary team. Possible alternatives and possible solutions to the problem of habitat fragmentation as well as the size and configuration of the corridor were discussed. As proposed internally, the corridor was as wide as the SSPA. During these internal scoping sessions, the interdisciplinary team decided to limit the corridor to those areas containing suitable LPC habitat. Therefore, the size of the proposed corridor was reduced from 149,050 acres to 76,782 acres described in the proposed action.

The BLM generated a list of interested parties and notification of the scoping period was mailed to 123 parties on this list. A public scoping meeting was held on June 2, 2010, in Artesia, NM and 23 members of the public attended. The scoping period originally was to close on July 1, 2010, however, the scoping period was extended to July 30, 2010, at the request of interested parties. The BLM received four scoping comment letters.

Issues

An "issue" is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. The following issues have been identified and will be addressed in this Environmental Assessment:

- How would the alternatives impact the wildlife in the project area, including the habitats of special status species of the lesser prairie chicken and the sand dune lizard?
- How would the costs and safety aspects of implementing differ among alternatives?
- Is there a need to protect suitable but unoccupied LPC habitat?

Relationships to Statutes, Regulations, or Other Plans

The proposed action and alternatives are consistent with the Federal Land Policy and Management Act of 1976; the Clean Water Act, as amended; and the Endangered Species Act, as amended. The leasing of federal oil and gas is authorized by the Mineral Leasing Act of 1920, as amended, and supplemented by other Acts. The proposed action and alternatives are consistent with the laws and regulations in 43 CFR 3100. There are no known inconsistencies between the proposed action and alternatives described in this document and officially approved and adopted resource related plans of other federal agencies, State and local governments, and Indian tribes.

II. Proposed Action and Alternatives

Management Common to All Alternatives

The intent of the 2008 RMPA is to limit surface disturbing activities to areas outside sand dune complexes in order to avoid occupied and suitable sand dune lizard habitat. The 2008 RMPA states:

> "For existing leases within the sand dune lizard boundary the lessee will be responsible for occupancy and habitat suitability surveys required prior to permitting surface disturbing activities. Surveys will be considered Conditions of Approval (COAs) and

conducted by BLM employees or BLM approved contractors and personnel. Depending on the results of the survey, proposed well sites may not be available to be developed and directional drilling may be necessary to develop all spacing units within a lease. Shinnery oak flats adjacent to dune complexes are the preferred location for proposed well sites."

Sand dune lizards occupy dune complexes within the corridor. Under all the alternatives described below, avoiding surface disturbance (roads, well pads, utility lines of all types, pipelines) would continue.

Perch deterrent would be placed on all poles supporting overhead utility lines to reduce the opportunities for raptors to prey on lesser prairie-chickens within the corridor unless otherwise approved by the Authorized Officer.

Low-profile tanks would be required for all oil and gas well development within the corridor unless otherwise approved by the Authorized Officer.

No Action Alternative

Under the No Action Alternative there will be no changes made to the current management prescriptions outlined for the Sparse and Scattered Population Area (SSPA), the Isolated Populations Area (IPA), and the Habitat Evaluation Areas (HEAs) in the 2008 RMPA. See Appendix 1. As prescribed in the RMPA, applicants for electric power line rights-of-way will be provided the opportunity to participate in the Power Line Removal Credit Program (PLRC). Under this program applicants could remove 1.5 miles of idle power lines (wire and poles) within prairie-chicken habitat management unit and habitat type (occupied or suitable/potentially suitable) before receiving authorization to construct 1.0 mile of new overhead power line in a similar or lower value habitat type. Details of this program can be found in Appendix 1 of this EA.

Should an applicant elect not to participate in the PLRC, the BLM would offer the applicant one of the mitigation measures found on page 7 of the 2008 RMPA:

"Other mitigation measures that will be considered include, but are not limited to, those shown below. These mitigation measures are ranked in order of effectiveness of reducing impacts from power lines:

- Burying new distribution power lines within 2 miles of occupied lesser prairie-chicken habitat (measured from the lek) and in suitable lesser prairie-chicken habitat within 2 miles of an active lek. See Table 2-4, Robel Impact Distances. (See Appendix 2, Monitoring and Implementation. [2008 RMPA])

- Using internal combustion engines to power equipment at the well. Such engines will be muffled to 75 db measured at 30 feet from the source.

- Constructing new power lines in locations which avoid occupied and suitable lesser prairie-chicken habitat.

- In cases where overhead power lines already exist in occupied or suitable lesser prairie-chicken habitat, new power lines could be constructed immediately adjacent to an existing line but only to the extent of the existing overhead power lines. Where

sections of the new power line cannot follow the existing line, it will have to be buried, or mitigated according to the PLRC program described above.

- Constructing all infrastructure supporting development of a well (including roads, power lines and pipelines) within the same corridor."

Proposed Action

The Proposed Action is to establish the Lesser Prairie-Chicken Expansion Corridor (LPC Corridor) in which all new electrical distribution power lines and all new utility lines would be buried when crossing public land. Related facilities such as electric junction boxes, ground transformers, electric panels, and pedestals, may be constructed on the surface. The Proposed Action would not require existing overhead lines to be removed. The requirement for burying power lines would apply only to those crossing public land. The BLM has no authority to require buried power line across State or private land.

To shorten the distance a line would be buried, existing overhead lines outside the corridor can be extended to the corridor boundary. Further extensions into the corridor would be buried. Rights-of-way for overhead utility lines would not be granted. See Map 1 for a location of the LPC Corridor. The LPC Corridor includes portions of Townships 13, 14, 15, and 16 South, west of New Mexico State Highway 172 in Chaves and Eddy Counties.

Alternative B

Within the corridor shown on Map 1, Alternative B would require the use of internal combustion engines to power equipment at the well. Such engines will be muffled to 75 db or less measured at 30 feet from the source. Rights-of-way for overhead utility lines would not be granted.

Alternative C

Within the corridor shown on Map 1, Alternative C would establish overhead electric distribution lines running north and south within the corridor on alternating sections lines. Prospective oil and gas wells would be drilled at locations no more than 330 feet from the distribution lines and overhead lines serving these locations would be allowed. Electric lines serving prospective wells located more than 330 feet from the distribution lines would be buried. See Map 2.

Alternative D

Within the corridor shown on Map 1, all new pipelines, and overhead power lines would be placed on either side of the road that provides access to the well. See Figure 1. This would apply to both new road construction and existing roads.

Alternatives Considered But Not Analyzed

- Burying utility lines in the access road or within the access road right-of-way: this alternative is similar to the Proposed Action and, therefore will not be analyzed in detail.

- Allowing overhead utility lines without restrictions: this alternative does not meet the purpose and need of this document, specifically, the need to ensure habitat protection for the lesser prairie-chicken. Therefore, this alternative will not be analyzed in detail.

- Mack Energy Corporation proposed an alternative that the BLM developed into Alternative C. Mack Energy's original proposal covered only their lease holdings, which is a small portion of the proposed corridor. Because this alternative did not cover the entire corridor and is essentially the same as Alternative C, this alternative will not be analyzed in detail.

III. Affected Environment and Environmental Impacts

Affected Resources

The following resources or values are not present or would not be affected by the designation of the LPC Expansion Corridor: Areas of Critical Environmental Concern, Floodplains, Prime or Unique Farmland, Minority/Low Income Populations, Hazardous or Solid Wastes, Riparian/Wetland Areas, Threatened and Endangered Species, Wild Horse and Burros, Wild and Scenic Rivers, and Wilderness or Wilderness Study Areas.

General Setting

The proposed corridor is located in southeast Chaves County and northeast Eddy County of New Mexico. Uses of the public land and resources are ranching, mineral (oil and gas) development with sparse rural housing on private land. Within the proposed corridor approximately 64,504 acres are managed by the BLM, approximately 8,045 acres are managed by New Mexico's State Land Office, and approximately 4,275 acres are in private ownership. Also within the proposed corridor The BLM manages approximately 65,776 acres of federal minerals. Of that total approximately 48,500 acres are under lease for oil and gas development and approximately 17,276 acres are unleased.

1. Vegetation, including Invasive and Non-native Species

Affected Environment

Using the Desired Plant Community (DPC) descriptions for the Roswell Field Office (RFO), the two major vegetative communities within the project area are the Grassland Community and the Shinnery Oak-Dune Community. The grassland community can be broken down into several subtypes, with the grass rolling uplands and mesquite grasslands subtypes being the most common. Also found are grass hills and grass flats areas. Descriptions of these communities may be found in the Roswell RMP, pages 33 to 37.

Within the project area, the field office has over 20 years of rangeland monitoring data collected at permanently established study plots. This data provides information about range condition, amount of annual vegetative production, composition and cover of vegetation, utilization amounts, and precipitation. In general terms, this data indicates that range condition is in the high fair to low good class and trend data is static to slightly upward. When the vegetative composition monitoring data for the project area is summarized in terms of DPC, the grass component falls within the objectives, the forb component is low, and the shrub component is high. The Desired Plant Community is expressed numerically as:

Grassland Community

DPC	Grasses 30-85%	Forbs 10-15%	Shrubs/Trees 1-10%

Shinnery Oak-Dune Community

DPC	Grasses 50-70%	Forbs 10-15%	Shrubs/Trees 25-40%

The grassland community occurs on rolling uplands is the predominant shortgrass habitat subtype in the resource area and is found in scattered locations throughout the proposal area. It is found on broad, nearly level or gently undulating plains to rolling hills at elevations between 3800 feet to 5000 feet. Slopes are 0 to 9 percent. Vegetation is dominated by blue grama, black grama, galleta, tobosa, sideoats grama, dropseeds, muhlys, threeawns, burrograss and fluffgrass.

Woody shrub species are scarce but include mesquite, fourwing saltbush, wolfberry, sumac, and cactus species such as yucca and cholla. Invasions of broom snakeweed, a halfshrub, are common in some areas. Forbs are a minor component of the subtype except following periods of rainfall. Ground cover may be too sparse in much of this subtype to provide the cover requirements of certain small mammals or ground-nesting birds.

Grass hills are found primarily on hills, low mountains, or lower foot slopes of higher mountains. Slopes are rolling to steep and average about 25 percent. Elevations range from 4500 feet to 6000 feet. Short- and mid-grasses dominate this subtype, including hairy grama, fluffgrass, three-awn, and red lovegrass. Shrubs, halfshrubs and cacti include little leaf sumac, beargrass, ocotillo, hedgehog cactus, cholla and broom snakeweed. The structured diversity of the vegetation in this subtype provides more diverse bird nesting habitat than adjacent grasslands. This is the preferred habitat for mule deer, which also use the brushy draws for browse and cover.

The grass flats subtype occurs on nearly level to gently sloping upland plains as broad swales between uplands, or as isolated pockets in shallow depressions, playas, along drainages or in sinks. These areas receive significant runoff from adjacent sites, which produces denser and taller vegetation. Vegetation is dominated by mid- and tall-grasses with occasional shrubs or half shrubs. The primary grasses are tobosa and galleta, which may occur on large expanses between upland sites, and alkali and giant sacaton, which usually are found along drainages or in depressions. Shrubs sparsely associated with the sacaton type are mesquite and fourwing saltbush. A few scattered yuccas or cholla may be interspersed in the tobosa swales. Forb diversity and abundance is low due to the density of the grass cover.

The mesquite grassland subtype could best be described as a disclimax stage in a desert shortgrass climax. The mesquite invasion results from disturbance of natural successional processes. The type is generally located between the grassy plains and the Pecos River, including the breaks adjacent to the floodplain. Terrain is level to gently undulating with slopes generally less than 5 percent, or hummocky with numerous sand dunes scattered throughout the area. The elevation varies from 3,000 feet to 6,000 feet.

Mesquite is found on most soil types, but the main invasion occurs on sandy soils. The predominant shrub is honey mesquite, which has invaded what at one time was a shortgrass dominated type. Few other shrub species are associated with mesquite, although some creosote, yucca and other cactus-type plants occur.

Vegetation in the mesquite grassland subtype is dominated by black grama, blue grama, dropseed, muhly, tobosa and galleta, fluffgrass, and alkali sacaton on undulating terrain, with higher percentages of dropseed, three-awn and muhly on sandy sites. Halfshrubs include sand sage and broom snakeweed. Forbs may be abundant following periods of rainfall.

The dominant and unique community type in the proposal area is found primarily below the Llano Estacado, or Staked Plains, in an area known as Mescalero Sands, called the Shinnery

Oak Dune Community. It lies in the southern desert plains ecosystem between the elevations of 4,100 feet and 4,300 feet. The topography is gently sloping and undulating sandy plains, with moderate to very steep hummocky dunes of up to ten feet and more in height scattered throughout the area. Some of the dunes are stabilized with vegetation, while a number of them are unstable and shifting. Dune blowouts with shinnery oak and bluestem, either isolated or in dune complexes, are characteristic of the sand country. Dune blowouts are the habitat of the sand dune lizard.

The aspect vegetation is shinnery oak and bluestem. The Shinnery Oak-Dune Community is a unique ecological area dominated by tall- and mid- grasses in a shortgrass ecosystem. The southern desert plains is characterized by such grasses as black grama, tobosa or galleta, and dropseed, but due to the sandy medium that occurs throughout the shinnery oak community, the dominant grasses are sand bluestem, little bluestem and three-awn. The Shinnery Oak-Dune Community is the habitat of the lesser prairie-chicken.

In many areas, the shinnery oak community has shifted away from a dominant sand bluestem/little bluestem/hairy grama grassland with varying amounts of shinnery oak, sand sage and yucca. Composition is now dominated by sand dropseed, red and purple three-awn and hairy grama, with increasing annual forbs, shinnery oak mesquite, sand sage and yucca.

Invasive, Non-native Species: The project area includes small populations of African rue (*Peganum* harmala), generally along roads and on scattered caliche well pads. The populations may have gotten their starts from seeds brought in on heavy equipment being moved from infested sites. Small inclusions of salt cedar (*Tamarix* spp.) also may be found along draws, dirt tanks and waterways.

Direct and Indirect Effects

The Proposed Action, burying all new utility lines, would directly impact all of the vegetation in the right-of-way where blading would be necessary. Utilizing the Desired Plant Community, an appropriate seed mix would be included with the terms and conditions of the approved project. The seed mix would require about 9.0 pounds of pure live seed (pls) per acre. Low profile tanks would produce a greater vegetation impact than normal tanks since they have a larger footprint.

Alternative B would have fewer impacts to vegetation. The only area impacted would be the well pad, where the engine would be located. The vegetation disturbance will remain as long as the engine is still there. Reseeding using the appropriate seed mix after the removal of the engine would be included in the terms and conditions. As in the Proposed Action, low profile tanks would produce a greater vegetative impact than normal tanks.

Under Alternative C, burying a portion of the utility line and allowing overhead construction of the north-south lines, the vegetation under the portion of the overhead utility lines would be initially crushed by the equipment placing the power poles, and removed totally where the blading occurs and poles are placed. The vegetation removed during the placement of the line requires approximately 9.0 lbs pls/acres of the appropriate seed mix to rehabilitate the disturbed site. Under all alternatives, the vegetation should recover within two growing seasons given adequate precipitation.

Under Alternative D, concentrating the power lines and the pipelines along the road right-of-way would be similar in impacts as the No Action Alternative. Pole placement would be the direct impact to the vegetation as would burial of the pipelines. As this would also concentrate use along the right-of-way, the potential for invasive species establishment may rise, as well as

increasing the amount of time it would take for the vegetation to recover.

Impacts to vegetation under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to vegetation would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to vegetation could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

Typical overhead distribution utility line construction practices do not require blading or clearing the right-of-way corridor. Therefore, under Alternatives C, D, and the No Action Alternative, removal of vegetation would be limited to the area of the drill hole, for the placement of the power poles. Other disturbance to vegetation would include compression of the vegetation caused by construction vehicles traveling along the right-of-way corridor. Vegetation should quickly return to the disturbed area without requiring the application of a seed mixture.

Impacts to vegetation will be reduced by following standard practices such as utilizing existing surface disturbance, minimizing blading, and quickly establishing vegetation on the disturbed areas.

Mitigation for each of the Actions: Under the Proposed Action and Alternatives C and D, utilizing the appropriate seed mix after the construction and burial of the utility lines will reduce the overall impact of the installation. As with the Non Native and Invasive Species requirements, all equipment must be cleaned prior to impacting the vegetation to prevent the establishment of unwanted vegetation.

Map 3 shows the completed and planned vegetation projects as well as completed reclamation projects. There have been approximately 24,675 acres of vegetation treatments within the proposed corridor within the past four years. The BLM and its partners spent approximately $494,000 for aerial applications of herbicide to reduce the amount of mesquite. Approximately 30,000 additional acres are planned for similar treatment. Within the same time period approximately 198 acres of abandoned roads and well pads were reclaimed. The cost of these projects was approximately $594,000.

2. Soils

Affected Environment

The Soil Conservation Service, now the Natural Resource Conservation Service (NRCS), has surveyed the soils in Chaves County. Complete soil information is available in the Soil Survey of Chaves County, New Mexico, Southern Part (USDA Soil Conservation Service 1980). The soil map units represented in the project area are:

Berino-Cacique association, 0 to 3 percent slopes (BE) Runoff of the Berino soil is very slow and the hazard of water erosion is slight and the hazard of soil blowing is moderate. Runoff of the Cacique soil is slow and the hazard of water erosion is slight and the hazard of soil blowing is moderate.

Faskin fine sand, 0 to 1 percent slopes (Fa) Runoff is slow and the hazard of water erosion is slight and soil blowing is severe.

Faskin – Malstrom association, 0 to 3 percent slopes (Fm) Runoff is slow or very slow and the hazard of water erosion is slight and soil blowing is severe.

Faskin – Roswell complex, 0 to 15 percent slopes (Fr) Runoff is medium and the hazard of water erosion is slight and soil blowing is moderate.

Ima fine sandy loam, 1 to 5 percent slopes (Im) Permeability is moderately rapid. Runoff is medium or slow. The hazard or water erosion is severe.

Jal fine sandy loam, 0 to 3 percent slopes (Ja) Permeability is moderate. Runoff is medium to slow. The hazard or water erosion is slight and the hazord of soil blowing is moderate.

Roswell-Jalmar complex, 0 to 15 percent slopes (Rn) Runoff of the unit soil is very slow and the hazard of water erosion is slight and the hazard of soil blowing is severe.

Simona fine sandy loam, 0 to 5 percent slopes (Sm) Runoff of the Berino soil is very slow and the hazard of water erosion is slight and the hazard of soil blowing is severe.

Sotim fine sandy loam, 0 to 3 percent slopes (So) Runoff of the soil is medium and the hazard of water erosion and the hazard of soil blowing is moderate.

Tencee-Sotim association, 0 to 9 percent slopes (TS) For Tencee soil the hazard of water erosion is moderate and the hazard of soil blowing is slight. For Sotim soil the hazards of water erosion and soil blowing are moderate. Runoff is medium.

The Soil Conservation Service, now the Natural Resource Conservation Service (NRCS), has also surveyed the soils in Eddy County. Complete soil information is available in the Soil Survey of Eddy County, (USDA Soil Conservation Service 1971). The soil map units represented in the project area are:

Active Dune Land, (AD) Blowouts are common and active dunes form from the shifting sand.

Berino comples, 0 to 3 percent slopes (BB) Permeability is rapid. The hazard to wind erosion is severe.

Berino-Dune land complex, 0 to 3 percent slopes (BD) Permeability is rapid. The soil is highly susceptible to wind erosion.

Kermit-Berino fine sands, 0 to 3 percent slopes (KM) Permeability is very rapid. The soil is highly susceptible to wind erosion.

Largo loam, 1 to 5 percent slopes (LA) Permeability is moderate, and the water holding capacity is high. Runoff is medium.

Likes loamy foine sand, 1 to 5 percent slopes (LS) Permeability is rapid. The soil is highly susceptible to wind and water erosion. Runoff from adjoining uplands is rapid.

Mobeetie fine sandy loam, 1 to 5 percent slopes (MO) Permeability is moderately rapid, and the water holding capacity is moderately high.

Pajarito loamy fine sand, 0 to 3 percent slopes (PA) Permeability is moderately rapid, and the water holding capacity is moderate.

Tonuco loamy fine sand, 0 to 3 percent slopes (TN) Permeability is rapid. The water holding capacity is very low, and the soils are droughty.

Direct and Indirect Effects

Under the Proposed Action, Alternative B, Alternative C, Alternative D, and the No Action Alternative direct impacts to soils resulting from the construction of the projects include removal of vegetation, exposure of the soil, mixing of horizons, compaction, loss of top soil productivity and susceptibility to wind and water erosion. Wind erosion would be expected to be a minor contributor to soil erosion with the possible exception of dust from vehicle traffic. These impacts could result in increased indirect impacts such as runoff, erosion and off-site sedimentation.

The Proposed Action would cause more short-term impacts to soils than Alternatives B, C, and D. Alternative B would cause fewer short-term impacts to soils than the Proposed Action, and Alternatives C and D. Alternative C would cause fewer short-term impacts to soils than the Proposed Action, Alternative D, but would cause more impacts to soils than Alternative B.

Impacts to soils under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to soils would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to soils could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

Under all alternatives, reseeding all surface disturbed by construction activities using the appropriate seed mix after construction would be required in the stipulations of the approved projects. Upon relinquishment of the projects the Authorized Officer shall issue instructions and/or orders for surface reclamation/restoration of the disturbed areas.

3. Water Quality

Affected Environment Surface and Ground

1. Surface Water:

Surface water within the area is affected by geology, precipitation, and water erosion. Factors that currently affect surface water resources include livestock grazing management, oil and gas development, recreational use and brush control treatments. No perennial surface water is found on public land in the area. Ephemeral surface water within the area may be located in tributaries, playas, alkali lakes and stock tanks.

2. Ground Water:

Groundwater within the area is affected by geology and precipitation. Factors that can affect groundwater resources in the area include livestock grazing management, oil and gas

development, groundwater pumping, and possible impacts from brush control treatments. Most of the groundwater in the area is used for industrial, rural, domestic and livestock purposes.

The approximate depth to fresh water in the shallow unconfined alluvial aquifer ranges from 80 to 200 feet (East Chaves EIS Depth to Water Map).

Direct and Indirect Effects

Under all alternatives, direct impacts caused by surface disturbance from the construction of any projects can result in degradation of surface water quality and groundwater quality from non-point source pollution, increased soil losses, and increased gully erosion.

Potential direct impacts that would occur due to construction of the projects include increased surface water runoff and off-site sedimentation brought about by soil disturbance and increased salt loading and water quality impairment of surface waters. The magnitude of these impacts to water resources would depend on the proximity of the disturbance to the drainage channel, slope aspect and gradient, degree and area of soil disturbance, soil character, duration and time within which construction activity would occur, and the timely implementation and success or failure of mitigation measures.

Direct impacts would likely be greatest shortly after the start of construction activities and would likely decrease in time due to natural stabilization and reclamation efforts. Construction activities would occur over a relatively short period; therefore, the majority of the disturbance would be intense but short-lived. Direct impacts to surface water quality would be minor, short-term impacts which may occur during storm flow events. Indirect impacts to water-quality related resources, such as fisheries, would not occur.

The Proposed Action would cause more short-term impacts to water quality than Alternatives B, C, and D. Alternative B would cause fewer short-term impacts to water quality than the Proposed Action, and Alternatives C and D. Alternative C would cause fewer short-term impacts to water quality than the Proposed Action, Alternative D, but would cause more impacts than Alternative B.

Impacts to water quality under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to water quality would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to water quality could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

Authorization of the proposed projects would require full compliance with BLM directives and stipulations that relate to surface and groundwater protection. Reseeding all surface disturbed by construction activities using the appropriate seed mix after construction would be required in the stipulations of the approved projects. Upon relinquishment of the projects the Authorized Officer shall issue instructions and/or orders for surface reclamation/restoration of the disturbed areas.

4. Wildlife

Affected Environment

The project area provides habitat for a wide variety of wildlife. The diversity and abundance of wildlife species in the area is due to the presence of Grasslands, Shinnery Oak Dunes, a mixture of grassland habitat and mixed desert shrub vegetation.

Common bird species are mourning dove, mockingbird, white-crowned sparrow, black-throated sparrow, blue grosbeak, northern oriole, western meadowlark, Crissal thrasher, Scaled quail, western kingbird, northern flicker, common nighthawk, loggerhead shrike, and roadrunner. Raptors include northern harrier, Swainson's hawk, American kestrel, and occasionally golden eagle and ferruginous hawk.

Common mammal species using the area include mule deer, pronghorn, coyote, gray fox, bobcat, striped skunk, porcupine, raccoon, badger, jackrabbit, cottontail, white-footed mouse, deer mouse, grasshopper mouse, kangaroo rat, spotted ground squirrel, and woodrat.

A variety of herptiles also occur in the area such as yellow mud turtle, box turtle, eastern fence lizard, sand dune lizard, side-blotched lizard, horned lizard, whiptail, hognose snake, coachwhip, gopher snake, rattlesnake, and spadefoot toad.

Direct and Indirect Effects

Proposed Action

The disturbance from the Proposed Action, burying utility lines, would be short-term in nature and limited to the immediate area. Under the Proposed Action, 90 percent of the corridor area would be within 2 miles of an existing overhead power line. Impacts include temporary displacement of wildlife and vegetation used for food and cover due to construction activities. Wildlife in the area would be able to utilize existing habitat adjacent to the area of construction and would continue to persist. In open trench areas plugs or escape ramps would be installed to allow wildlife to escape.

Alternative B

This alternative would have less of an impact than overhead power lines. Muffled noise from internal combustion engines would have a negative impact on wildlife by masking wildlife calls and songs.

Alternative C

The impacts of Alternative C would be a combination of the impacts of the Proposed Action and Alternative D.

Alternative D

Short-term impacts from Alternative D include temporary displacement of wildlife due to construction and human presence. The long-term impacts from the presence of overhead utility lines include increased perching availability for birds as well as increased possibility of those birds being electrocuted from the power lines. The increased power line presence will have a negative effect on the Lesser Prairie Chicken and Sand dune lizard, both Special Status Species. See Section 5 below.

No Action

The impacts of the No Action Alternative were analyzed in the 2008 RFO Special Status Species RMPA. The following management decisions were analyzed in that document and are carried forward in this EA:

- Existing habitat management plans (HMPs) will be revised, as needed, to incorporate changes resulting from decisions made in this RMPA. Modifications in existing HMPs will include public participation and review through the NEPA process. Actions in existing HMPs will continue to be implemented.
- Surface disturbance will not be allowed on public land within known prairie dog towns or towns identified in the future. Exceptions to this requirement will be considered for maintaining existing structures or facilities. Prairie dog control will not be authorized on public land, except in emergency situations involving public health.
- Surface disturbance will not be allowed within up to 200 meters of active raptor nests on special, natural habitat features, such as trees, large brush, cliff faces and escarpments. Surface disturbance will not be allowed within up to 200 meters of playas and alkali lakes.
- The Master Memorandum of Understanding between the BLM and the Animal and Plant Health Inspection Service, Animal Damage Control (now Wildlife Services, WS) will guide predator damage management (PDM) activities on public land in the Planning Area. BLM will coordinate with WS to provide for the welfare and perpetuation of wildlife and to be responsive to the needs of individuals or groups who use public land. Constraints on PDM can be found in the 1997 Roswell RMP.

5. Special Status Species

Affected Environment

In accordance with BLM Manual 6840, BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered under the Endangered Species Act in the future. These include species considered candidate species. There are two of these species present on this site, the lesser prairie-chicken and the sand dune lizard. The 2007 Final Environmental Impact Statement for the Pecos District Special Status Species RMP Amendment states that:

> Special status species are defined as all state and federally-listed threatened and endangered species and other species given special attention by agencies. The latter includes candidate and species of concern identified by the USFWS. Both the lesser prairie-chicken and the sand dune lizard are candidate species for potential listing as either threatened or endangered.
>
> The USFWS first determined the sand dune lizard was warranted for listing as Threatened or Endangered in 1982, but it was precluded from listing due to other priorities. The status of the sand dune lizard is reviewed annually by USFWS in a candidate notice of review (CNOR). In 1995, the USFWS received a petition to list the Lesser prairie-chicken as a threatened or endangered species. The USFWS did not make a determination regarding the petition until 1998. At that time, the USFWS determined the lesser prairie-chicken was also warranted for listing as a Threatened or Endangered species, but also precluded it from listing. The status of the lesser prairie-chicken is also reviewed annually in a CNOR.

On December 14, 2010, the USFWS published a proposed rule for listing the dunes sagebrush lizard (sand dune lizard) as an endangered species. The lesser prairie-chicken was moved from a listing priority class 8 to a class 2 candidate species in December 2008.

Both species inhabit the corridor area, LPCs have a historic lek in the northeast corner of the corridor and another near the southern boundary. LPCs have been seen throughout the corridor by local ranchers, hunters and wildlife biologists. SDLs occur throughout the corridor, documented sites are primarily at the southern end due to BLM efforts focused there.

Lesser Prairie-Chicken

The lesser prairie-chicken (LPC) is a species of prairie grouse endemic to the southern high plains of the United States, commonly recognized for its feathered feet, stout build, ground-dwelling habit, and elaborate breeding behavior. The historic range of the LPC encompassed habitats with sandy soils supporting shinnery oak (*Quercus harvardii*) bluestem (*Andropogon* sp.) and sand sage (*Artemisia filifolia*) bluestem communities in the high plains of southeastern Colorado, southwestern Kansas, western Oklahoma, west Texas, the Texas panhandle, and eastern New Mexico. In New Mexico, Ligon (1961) reported the historic range as being the sandhill-bluestem plains, an approximately 120 km (75 mi) wide swath from the northeast border with Colorado to the southeast border with Texas and in northern De Baca County to 48 km (30 mi) west of Ft. Sumner.

In the 1920s and 1930s, the former range of the LPC in New Mexico was described as all of the sandhill rangeland of eastern New Mexico as far west as De Baca County. Ligon (1927) mapped the breeding range as encompassing portions of seven counties, a small subset of what he described as former range. In the 1950s and 1960s, occupied range was more extensive, indicating reoccupation of some areas. Presently, the NMDGF reports that LPCs are known from portions of seven counties and the occupied range of the LPC in New Mexico is estimated to encompass approximately 5,698 km^2 (2,200 mi^2) (Davis 2006) compared with its historic range of 22,390 km^2 (8,645 mi^2). Private and state land supports approximately 40 percent of the LPC population in New Mexico, with the remaining occurring on lands managed by BLM (Davis 2006). In the 1950s, the LPC population was estimated at 40,000 to 50,000 individuals, but by 1972 the population had declined to an estimated 6,000 to 10,000 individuals. NMDGF currently estimates the LPC statewide population to be about 9,443 individuals (Beauprez 2008).

In New Mexico, the most recent LPC population decline began in 1989. LPC counts on leks dropped dramatically in the BLM Caprock Wildlife Habitat Management Area and in west-central Lea County (Smith et al. 1998). Estimated hunter harvest also declined sharply (Cowley 1995), resulting in closure of hunting seasons in New Mexico in 1996. Although the decline may have been precipitated by drought conditions and reduced nest success, it is also likely that population recovery during the drought was hampered by habitat fragmentation and low recruitment. Since 2005, weather conditions have improved resulting in population increases, and Federal and State agencies have focused staff time and funding to address habitat concerns.

From 1998-2008 LPC populations within the core area of southern Roosevelt, northern Lea, and eastern Chaves counties have increased (Beauprez 2008). The LPC population south of U.S. Highway 380 in southeastern Chaves County has shown a significant decline over the same ten-year period, even though five leks were detected in 2008, the largest number of leks

detected since 1998 (Beauprez 2008). In 1995, conservation interests petitioned the USFWS to list the LPC as a threatened species under the Endangered Species Act. In 1998, the FWS ruled that such a listing was warranted, but precluded by the need to devote limited agency resources to other higher priority species. The species is currently considered a candidate species for listing. The 2008 Candidate Notice of Review elevated the species to a Listing Priority Number of 2, the highest priority ranking as a candidate species.

LPCs are not considered to be a migratory species. Hugh Dingle, professor emeritus at the University of California at Davis, has identified five characteristics that apply, in varying degrees and combinations to all migrations. First, migrations are prolonged movements that carry animals outside familiar habitats. Second, migrations tend to be linear. Third, migrations involve special behaviors of preparation and arrival. Fourth, migrations demand special allocations of energy from the migrating individuals. Fifth, migrating animals maintain a fervid attentiveness to the journey. To date, no studies would lead biologists to consider reclassifying LPC as a migratory species.

Sand Dune Lizard

The SDL is native to a small area of southeastern New Mexico and west Texas. A habitat specialist, the SDL only occurs in sand dune complexes associated with shinnery oak (Degenhardt et al. 1996), with areas often separated by large stretches of unsuitable habitat.

The SDL prefers active and semi-stabilized sand dunes associated with shinnery oak and scattered sandsage. The oaks provide dune structure, shelter, and habitat for the species' prey base. SDLs are found in large dunes with deep, wind hollowed depressions called blowouts, where they remain under vegetation or loose sand during the hot part of the day and at night. These large, deep dunal blowouts (greater than 3 m deep and 32.9 m long) provide superior habitat with more area for cover (for thermoregulation and predator avoidance) and steeper slopes needed as breeding habitat. SDLs avoid shallow blowouts.

SDLs feed on ants, small beetles, crickets, grasshoppers, and spiders. Most feeding takes place within or adjacent to patches of vegetation, usually shinnery oak habitat. Individuals are diurnal and wary, and will seek protection and shelter in burrows, under the sand, beneath leaf litter, and under the shinnery oak canopy (BLM 2006). Within a dune complex, the shinnery flats between dune blowouts are used for movement by females seeking nesting sites and for dispersal of recent hatchlings (Painter 2007). Therefore, it is imperative that connectivity be considered across interdunal areas.

Within the geographic range of the species, habitat is localized and fragmented where known populations are separated by vast areas of unoccupied habitat. Fitzgerald et al. (1997) observed isolated areas of apparently suitable habitat that did not contain SDLs. It is possible that these observations are the result of local extinction events in isolated areas where recolonization is either impossible or has not yet occurred (Snell et al. 1997). It is also possible that these areas have never been occupied and other factors such as competition with or predation by other species prevent SDL occupation in otherwise suitable habitat. Recent surveys by the BLM have reconfirmed the presence of SDLs within the known geographic range of the species. The BLM has also developed a habitat predictability model to help redefine the parameters of the known geographic range.

Conservation interests petitioned the USFWS to list the SDL as a threatened species under the Endangered Species Act. In 1982, the FWS ruled that such a listing was warranted, but

precluded by the need to devote limited agency resources to other higher priority species. As stated above, on December 14, 2010, the USFWS published a proposed rule for listing the dunes sagebrush lizard (sand dune lizard) as an endangered species.

Direct and Indirect Effects

Proposed Action

The disturbance from the Proposed Action, burying utility lines, would be short-term in nature and limited to the immediate area. Under the proposed action, 90 percent of the corridor would be within 2 miles of an existing overhead power line. Impacts include temporary displacement of wildlife and vegetation used for food and cover due to construction activities. Wildlife in the area would be able to utilize existing habitat adjacent to the area of construction and would continue to persist. In open trench areas plugs would be installed to allow wildlife to escape.

Lesser prairie chickens would greatly benefit from the proposed action, by burying utility lines the 0.25 mile Robel avoidance buffer (Table 3, 2008 RMPA) would not exist and allow LPC's to freely move into and out of the area. The proposed action would limit habitat fragmentation which could cause the isolation of LPC populations, create small population sizes and inbreeding depression, leading to a greater chance of LPC extinction. Also, sand dune lizards would benefit from the burial of power lines by eliminating perching advantages to predators.

The intent of the 2008 Special Status Species Resource Management Plan Amendment is for surface disturbing activities to take place outside of dune complexes. On page 13 the RMPA states:

> "For existing leases within the sand dune lizard boundary (see Map 1) the lessee will be responsible for occupancy and habitat suitability surveys required prior to permitting surface disturbing activities. Surveys will be considered Conditions of Approval (COAs) and conducted by BLM employees or BLM approved contractors and personnel. Depending on the results of the survey, proposed well sites may not be available to be developed and directional drilling may be necessary to develop all spacing units within a lease. Shinnery oak flats adjacent to dune complexes are the preferred location for proposed well sites."

In practice the BLM negotiates the location of right-of-ways and infrastructure associated with the development of an oil field, avoiding occupied and suitable SDL habitat. Soil types that are conducive for the sand dune lizard comprise a large portion of the LPC Expansion Corridor and there are recorded lizard sites within the boundary. By following the management prescriptions of the 2008 RMPA, impacts to the sand dune lizard would be minimized.

A study done on patterns of bird predation on reptiles observed species using manmade structures (e.g., power lines, fences) in their daily routine (Barrows et al. 2006). They observed birds perched on power lines and fences, scanning the area and when movement was detected they swooped to collect their prey. It was suggested that manmade structures provided these bird predators with an advantage (Sewell and Catterall 1998).

Studies of greater sage-grouse (GSG), a close relative to the lesser prairie–chicken (LPC), have shown that habitat fragmentation from construction of roads, well pads, power lines, and pipelines, as well as the associated increases in vehicle traffic and noise can negatively impact the grouse populations (Harju et al. 2010). These studies have shown a greater sage-grouse

population decline of 17 to 47 percent throughout much of their distribution. Loss of habitat to cropland, invasive plants, drought, overgrazing by livestock, and energy development are all factors that contribute to this decline (Harju et al. 2010). GSG and LPC behavior is closely related, therefore, after consulting with other specialists and BLM expertise it is believed that impacts to LPCs would be similar as to those demonstrated to GSG.

The noise and human activity generated from construction activity could impact the lesser prairie-chicken by disrupting or reducing the establishment of seasonal "booming grounds" or leks, thus possibly reducing reproductive success in the species. Noise generated by construction activity and human presence can mask or disrupt the booming of the male prairie-chicken and thus, the females cannot hear the booming. In turn, female lesser prairie-chicken would not arrive at the booming ground, and subsequently, there would be decreased courtship interaction and possibly decreased reproduction. Decreased reproduction and the loss of recruitment into the local population would result in an absence of younger male lesser prairie-chickens to replace mature male lesser prairie-chicken once they expire, eventually causing the lek to disband and become inactive. Additionally, habitat fragmentation caused by development could possibly decrease the habitat available for nesting, brooding and feeding activities. Approval of a permit for any type of construction inside the LPC Corridor will be subject to these conditions:

> Timing Limitation Stipulation/Condition of Approval for lesser prairie-chicken: Along with Oil and gas activities and other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, power line, and well pad construction, will be allowed except between 3:00 am and 9:00 am, March 1 through June 15. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. In light of these requirements and mitigation measures, minimal impacts to the lesser prairie-chicken are anticipated as a result of burying this power line.
>
> Exceptions to these requirements will be considered in emergency situations such as mechanical failures, however, these exceptions will not be granted if BLM determines, on the basis of biological data or other relevant facts or circumstances, that the grant of an exception would disrupt prairie-chicken booming activity during the breeding season. Requests for exceptions on a non-emergency basis may also be considered, but these exceptions will not be granted if BLM determines that there are prairie-chicken sightings, historic leks and or active leks within 1.5 miles of the proposed location, or any combination of the above mentioned criteria combined with suitable habitat.

The Proposed Action should have little negative impact on the lesser prairie-chicken. Disturbance to the area would be short-term and the usual mitigations would be applied for sand dune lizards (avoiding dunes and installing plugs or escape ramps in the open trench to provide escape routes for reptiles) therefore impacts to SDL's would be minimal. When Robel avoidance distance (0.25 miles either side) is applied to the existing overhead lines within the corridor the amount of habitat unfragmented by power lines is approximately 58,622 acres. See Map 6.

The photos in Figure 2 show a power line that was buried within the Lesser Prairie-Chicken Habitat Preservation Area of Critical Environmental Concern (ACEC). The second photo in Figure 2 shows the buried power line crossing a major pipeline.

Alternative B

A point source motor would have less of an impact on LPC/SDL than overhead utility lines. However, noise created from the point source motor and traffic could cause LPCs to avoid the area. With this alternative there would be no power lines with no impacts to SDL's due to decreased predator perching availability. Since no new overhead utility lines would constructed, the amount of habitat unfragmented by power lines would be approximately the same as the proposed action. See Map 6.

Alternative C

Alternative C establishes north-south overhead utility lines two miles apart that would span the length of the corridor. Overhead utility lines give perching predators an advantage, therefore having a negative effect on SDLs. The BLM acknowledges in this EA that peer reviewed scientific research is lacking on the effects of tall structures on LPC behavior, however applied science leads the BLM to conclude tall structures have a negative impact on LPC's.

Figure 2. Photos showing buried power line.

Figure 2. (continued) Photos showing buried power line.

Both the greater and lesser prairie-chickens avoid overhead power lines and this avoidance has created an unintentional buffer along power lines. They appear to place nests and leks away from overhead power lines (Pruett et al. 2009).

In another study on lesser prairie chickens, only 16 nests were found within 1.2 miles of a power line out of a total of 107 nests found in the entire study area. Of these 16 nests, only six nests produced offspring. This could be due to predation associated with the power line. The closest nest was 660 feet from the line, and the closest lek was 3,291 feet from the line. There were two leks within 1.2 miles of the power line out of a total 23 in the entire study area. Seventeen of the 81 (21%) birds that had locations within 1.2 miles of the power line crossed the power line at least once, while the remainder (79%) of the birds never crossed the line. No bird crossed the line more than four times in a year. In this study four of the 128 lesser prairie-chickens had mortalities caused by power line collisions (Pruett et al. 2009).

This isolation of populations due to habitat fragmentation creates a small population size and inbreeding depression, leading to a greater chance of extinction. It appears the power lines serve as obstructions that limit chicken movements, which further fragments the landscape (Pruett et al. 2009). The 2008 RMPA cites an impact radius of 0.25 miles for power lines (Robel et al. 1970).

Connelly et al. (2000) further recommended that power lines be buried or electric-utility structures be modified to discourage their use as raptor perch sites. (For a description of perch deterrents, see Appendix 10, Biological Assessment and US Fish & Wildlife Service Response, 2007 Special Status Species Proposed Resource Management Plan Amendment and Final Environmental Impact Statement.) However, Lammers and Collopy (2007) studied raptor and corvid responses to perch deterrents placed on a new high-voltage transmission line in north-central Nevada. They reported that although perch deterrents did not prevent perching, the perching duration of raptors on the deterrents was reduced compared to other perching sites.

Although the deterrents reduced the probability of avian predators perching on the towers, avian predators overcame the deterrents to take advantage of the height of the towers where no other perches of similar height existed. LPCs do not recognize perch deterrents on power poles, they see a tall structure and avoid it because of the chance something could be perched on it.

Braun et al. (2002) reported sage grouse leks within 0.25 miles from a new overhead power line had significantly slower growth rates compared to leks located further from the line. They hypothesized the slower growth rates were a result of increased raptor predation but did not provide any data to quantify the growth rates. This publication was not peer-reviewed.

Hall and Haney (1997) reported observing 82 disturbances at a sage grouse lek. Of those, 29 were caused by raptors (25 golden eagles, 5 others), which were observed to be perching on nearby power lines. Ungulates (pronghorn primarily) caused 18 disturbances.

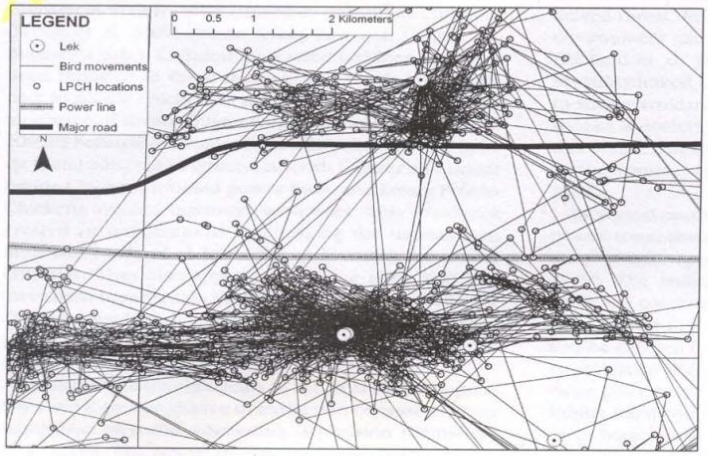
Pitman et al (2005) conducted a 6-year study in southwestern Kansas. They captured 233 female lesser prairie chickens, and fitted 226 of them with tracking devices. They located 209 nests by using these tracking devices. Of 209 nests, 118 were on Area 1 (19,027 acres of prairie habitat), 84 on Area 2 (13,837 acres of prairie habitat), and seven were on neither of the two areas. Nest location and landscape features i.e. transmission lines, oil and gas wellheads, buildings, improved roads, and center pivots all influenced nest location on Area 1 and 2. In Area 1, 111 nests had an average distance of 1,514 yards from all nests to a power line and the closest lek was 287 yards, second closest lek was 532 yards. In Area 2, 76 nests had an average distance of 1,371 yards from a power line and the closest lek was 157 yards, second closest lek 375 yards.

On November 16, 2010, BLM wildlife biologist Randy Howard conducted an interview with Jim Weaver, a landowner and rancher in Roosevelt County, New Mexico. Mr. Weaver has also been a wildlife biologist. He has been involved in raptor research for 40 years, and managed the peregrine falcon program at Cornell University. Mr. Weaver described that while he was out walking with a friend near Milnesand, New Mexico, they watched a flock of around 750 LPCs take flight. They happened to be flying at the exact height of a power line. As the flock passed through the power line, they counted eight LPCs that were killed from colliding with the power line. While eight may seem like a low number compared to 750, this was only one viewing. These birds most likely fly this path day after day and numbers of collisions would add up quickly.

Also, he noted that along a county road there was a power line and he noticed hawks perching along the power line in high numbers. He walked under the power line and found multiple remains of LPCs. Mr. Weaver theorized the hawks had become so accustomed to LPCs hitting the power line they would just wait and feed on the wounded or dead LPCs as they hit the power line throughout the day.

The Robel avoidance distance from overhead power lines is 0.25 miles on either side. When this avoidance distance is applied to the north-south power lines the amount of habitat unfragmented by power lines is approximately 45,629 acres. See Map 7.

Figure 3. This diagram of the tracking locations of lesser prairie-chickens, from the journal "Conservation Biology," shows avoidance of the power line. The power line is the light gray line.



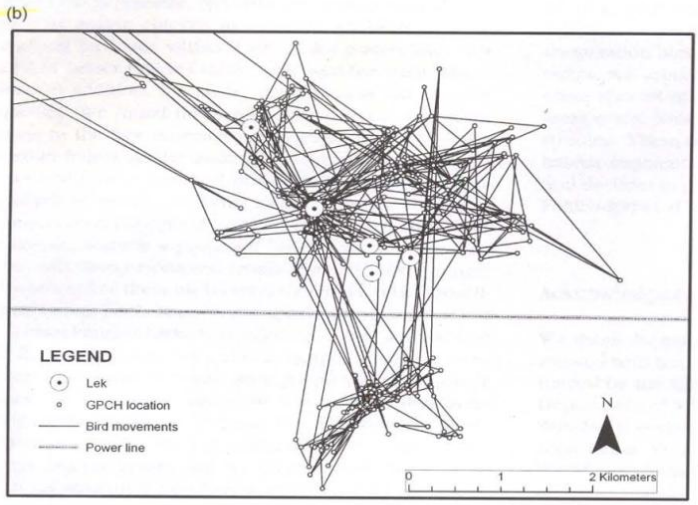


Figure 1. (a) Lesser Prairie-Chicken and (b) Greater Prairie-Chicken movements and lek locations in relation to a power line and a highway in shortgrass prairie of Harper County, Oklahoma (U.S.A.) and in the tallgrass prairie of Osage County, Oklahoma (U.S.A.), respectively.

Table 2. Movements of Lesser and Greater Prairie-Chickens in relation to structural features.*

Species	*Feature*	n	*Movements*	*Crossings*	p
Lesser Prairie-Chicken	power line	17	760	41	<0.023
	Highway 412	21	1009	75	>0.206
	Highway 283	48	2290	159	>0.057
Greater Prairie-Chicken	power line	8	402	20	<0.045

**Key:* n, *number of birds that crossed the structure; movements, total number of movements by these birds; crossings, number of crossings; p, whether or not these values differed from a signal of random movement based on simulations.*

Figure 4. These photos show an area of suitable lesser prairie-chicken habitat within the corridor. There is minimal disturbance in the surrounding area.

Facing North

Facing South

Facing East

Facing West

Alternative D

This alternative allows overhead power lines in the same corridor or footprint with the road to the well and pipelines. The impacts of this alternative are similar to Alternative C. Since all electric power would be supplied by overhead lines within the corridor the amount of habitat unfragmented by power lines would be less than the 45,629 acres of Alternative C. See Map 7.

No Action Alternative

Under the No Action Alternative the prescriptions outlined for the Sparse and Scattered Population Area in the 2008 Special Status Species RMPA would continue. Applicants for electric power line rights-of-way will be provided the opportunity to participate in the Power Line Removal Credit Program (PLRC). Should an applicant elect not to participate in the PLRC, the BLM would offer the applicant one of the mitigation measures found in the 2008 RMPA. See page 7 of the 2008 RMPA.

Impacts to habitat for special status species under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to habitat would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to habitat could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

6. Visual Resources Management

Affected Environment

The area is considered to contain both Class III and IV Visual Resource Management Areas (VRM). In a Class III VRM, contrasts to the basic elements caused by a management activity may be evident and begin to attract attention in the landscape. The changes should remain subordinate to the existing landscape. In a Class IV VRM, contrasts may attract attention and be a dominant feature in the landscape in terms of scale; however, the changes should repeat the basic elements of the landscape.

Direct and Indirect Effects

While the management action of above ground power lines are allowed in certain cases in Class III and IV VRM zones overhead lines, unless screened, constitute visual pollution on the landscape. Overhead power lines would have a negative impact on the landscape. Power lines should be buried in all cases where possible.

7. Recreation

Affected Environment

Recreation within this area consists of hiking, hunting and driving for pleasure. Off-highway vehicle use designation for public land within this area is designated as "Limited," meaning that vehicles must stay on existing roads and trails.

Direct and Indirect Effects

Hunting and hiking as well as off-highway vehicle activity and other actions would still occur within the corridor area. There should not be any adverse actions by the proposed action or alternatives.

8. Air Resources

Affected Environment

The BLM must consider and analyze the potential effects of BLM-authorized activities on air resources as part of the planning and decision making process.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Greenhouse gasses (GHG) and the potential effects of GHG emissions on climate are not regulated by the EPA, however climate has the potential to influence renewable and non-renewable resource management.

1. Air Quality

The area of the Proposed Action is considered a Class II air quality area. A Class II area allows moderate amounts air quality degradation. The primary sources of air pollution are dust from blowing wind on disturbed or exposed soil and exhaust emissions from motorized equipment.

The Clean Air Act requires that air pollutant emissions be controlled from all significant sources in areas that do not meet the National Ambient Air Quality Standards. The New Mexico Air Quality Bureau (NMAQB) is responsible for enforcing the state and national ambient air quality standards in New Mexico. Any emission source must comply with the NMAQB regulations. At the present time, the Chaves and Eddy Counties are classified as in attainment of all state and national ambient air quality standards as defined in the Clean Air Act of 1972, as amended.

The Environmental Protection Agency (EPA), on October 17, 2006, issued a final ruling on the lowering of the National Ambient Air Quality Standard (NAAQS) for particulate matter ranging from 2.5 micron or smaller particle size. This ruling became effective on December 18, 2006, stating that the 24-hour standard for PM2.5, was lowered to 35 ug/m^3 from the previous standard of 65 ug/m^3. This revised PM2.5 daily NAAQS was promulgated to better protect the public from short-term particle exposure.

Air quality in the corridor area is generally good and is not located in an areass designated by the Environmental Protection Agency as “non-attainment areas” for any listed pollutants regulated by the Clean Air Act.

2. Climate

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years.

Greenhouse gases (GHGs), including carbon dioxide (CO2) and methane (CH4), and the potential effects of GHG emissions on climate, are not regulated by the EPA under the Clean Air Act. However, climate has the potential to influence renewable and non-renewable resource management. The EPA's Inventory of US Greenhouse Gas Emissions and Sinks found that in 2006, total US GHG emissions were over six billion metric tons and that total US GHG emissions have increased by 14.1% from 1990 to 2006. The report also noted that GHG emissions fell by 1.5% from 2005 to 2006. This decrease was, in part, attributed to the increased use of natural gas and other alternatives to burning coal in electric power generation.

The levels of these GHGs are expected to continue increasing. The rate of increase is expected to slow as greater awareness of the potential environmental and economic costs associated with increased levels of GHGs result in behavioral and industrial adaptations.

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the Intergovernmental Panel on Climate Change (IPCC) predicted that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2006) supports these predictions, but has acknowledged that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures.

A 2007 US Government Accountability Office (GAO) Report on Climate Change found that, "federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others: 1) physical effects such as droughts, floods, glacial melting, and sea level rise; 2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and 3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses."

In New Mexico, a recent study indicated that the mean annual temperatures have exceeded the global averages by nearly 50% since the 1970's (Enquist and Gori). Similar to trends in national data, increases in mean winter temperatures in the southwest have contributed to this rise. When compared to baseline information, periods between 1991 and 2005 show temperature increases in over 95% of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state.

Direct and Indirect Effects

1. Air Quality

Air quality would temporarily be directly impacted with pollution from exhaust emissions, chemical odors, and dust that would be caused by the motorized equipment used to bury utilities. Dust dissemination and air pollution from the motorized equipment would discontinue upon completion of the construction phase. The winds that frequent the southeastern part of New Mexico generally disperse the odors and emissions. The impacts to air quality would be greatly reduced as the construction and drilling phases are completed. Other factors that currently affect air quality in the area include dust from livestock herding activities, dust from recreational use, and dust from use of roads for vehicular traffic.

The significant threshold of 35 ug/m^3 daily PM2.5 NAAQS is not expected to be exceeded under the proposed action.

The Proposed Action would cause more short-term impacts to air quality than Alternatives B, C, and D. Alternative B would cause fewer short-term impacts to air quality than the Proposed Action, and Alternatives C and D. Alternative C would cause fewer short-term impacts to air quality than the Proposed Action, Alternative D, but would cause more impacts than Alternative B.

Impacts to air quality under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to air quality would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to air quality could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

2. Climate

Climate change analyses are comprised of several factors, including greenhouse gases (GHGs), land use management practices, the albedo effect, etc. The tools necessary to quantify climatic impacts from the Proposed or No Action Alternatives are presently unavailable. As a consequence, impact assessment of specific effects of anthropogenic activities cannot be determined. Additionally, specific levels of significance have not yet been established. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of factors that may contribute to climate change.

9. Cultural Resources

Affected Environment

The LPC Corridor and projects within the corridor fall within the Southeastern New Mexico Archaeological Region. This region contains the following cultural/temporal periods: Paleoindian (ca. 12,000-8,000 B.C.), Archaic (ca. 8000 B.C.-A.D. 950), Ceramic (ca. A.D. 600-1540) Protohistoric and Spanish Colonial (ca. A.D. 1400-1821), and Mexican and American Historical (ca. A.D. 1822 to early 20th century). Sites representing any or all of these periods are known to occur within the region. A more complete discussion can be found in *Living on the Land:*

11,000 Years of Human Adaptation in Southeastern New Mexico An Overview of Cultural Resources in the Roswell District, Bureau of Land Management published in 1989 by the U.S. Department of the Interior, Bureau of Land Management.

Portions of the LPC Corridor and projects within the corridor fall within the area covered by the Permian Basin Memorandum of Agreement (MOA). The Permian Basin MOA is an optional method of compliance with Section 106 of the National Historic Preservation Act for energy related projects in a 28 quadrangle area of the Pecos District. The MOA is a form of off-site mitigation which allows industry to design projects to avoid known NRHP eligible cultural resources and to contribute to a mitigation fund in lieu of paying for additional archaeological inventory in this area that has received adequate previous survey. Funds received from the Permian Basin MOA will be utilized to conduct archaeological research and outreach in Southeastern New Mexico. Research will include archaeological excavation of significant sites, predictive modeling, targeted research activities, as well as professional and public presentations on the results of the investigations.

Direct and Indirect Effects

The Proposed Action, Alternative B, Alternative C, and the No Action Alternative that engage in ground disturbing activities all have the same potential impact and will require a Class III Archaeological Survey. For those projects that fall within the Permian Basin MOA 28 quadrangle area the proponent may choose to participate in the Permian Basin MOA offsite mitigation program.

Alternative D, right-of-way established for pipelines, access roads and utilities will need a Class III Archaeological Survey. A Class III Archaeological Survey which is linear requires clearance of 50 foot either side of the staked center line. If another project is planned for the same corridor and the Area of Potential Effect (APE) is entirely within the previously archaeologically surveyed area then no additional survey is required. For those projects that cannot be placed entirely within the previously archaeologically surveyed area then additional survey will be required.

If the proponent chooses to participate in the Permian Basin MOA, the proponent will develop the project by planning to avoid all known NRHP eligible and potentially eligible cultural resources. The proponent will contribute funds commensurate to the undertaking into an account for offsite mitigation. Participation in the MOA serves as mitigation for the effects of projects on cultural resources. If any skeletal remains that might be human or funerary objects are discovered by any activities, the project proponent will cease activities in the area of discovery and notify the BLM within 24 hours as required by the Permian Basin MOA.

9. Watershed – Hydrology

Affected Environment

The watershed and hydrology in the area is affected by land and water use practices. The degree to which hydrologic processes are affected by land and water use depends on the location, extent, timing and the type of activity. Factors that currently cause short-lived alterations to the hydrologic regime in the area include livestock grazing management, recreational use activities, groundwater pumping and also oil and gas developments such as well pads, permanent roads, temporary roads, pipelines and power lines.

Direct and Indirect Effects

Under the Proposed Action, Alternative B, Alternative C, Alternative D, and the No Action Alternative impacts caused by construction and surface disturbance activities from the construction of the projects can result in long-term and short-term alterations to the hydrologic regime. Peak flow and low flow of perennial streams, ephemeral, and intermittent rivers and streams would be directly affected by an increase in impervious surfaces resulting from any construction. The potential hydrologic effects to peak flow is reduced infiltration where surface flows can move more quickly to perennial or ephemeral rivers and streams, causing peak flow to occur earlier and to be larger. Increased magnitude and volume of peak flow can cause bank erosion, channel widening, downward incision, and disconnection from the floodplain. The potential hydrologic effects to low flow is reduced surface storage and groundwater recharge, resulting in reduced base flow to perennial, ephemeral, and intermittent rivers and streams. The direct impact would be that hydrologic processes may be altered where the perennial, ephemeral, and intermittent river and stream system responds by changing physical parameters, such as channel configuration. These changes may in turn impact chemical parameters and ultimately the aquatic ecosystem.

Long-term direct and indirect impacts to the watershed and hydrology would continue for the life of the project and would decrease once reclamation of the project has taken place. .

The Proposed Action would cause more short-term impacts to the watershed than Alternatives B, C, and D. Alternative B would cause fewer short-term impacts to the watershed than the Proposed Action, and Alternatives C and D. Alternative C would cause fewer short-term impacts to watershed than the Proposed Action, Alternative D, but would cause more impacts than Alternative B.

Impacts to the watershed under the No Action alternative would vary, depending on the mitigation measure used. If an applicant of a utility right-of-way participates in the Power Line Removal Credit Program (PLRC), then the impacts to the watershed would be similar to Alternatives C and D because the applicant could be removing idle power lines in locations other than the corridor and constructing overhead lines within the corridor. If an applicant does not participate in the PLRC, then the impacts to watershed could be similar to the proposed action (burying utility lines, or Alternative B (point source motors).

Reseeding all surface disturbed by construction activities using the appropriate seed mix after construction would be required in the conditions of approval for approved projects. Upon completion of the projects the Authorized Officer shall issue instructions and/or orders for surface reclamation/restoration of the disturbed areas.

10. Health and Human Safety

Affected Environment

The corridor contains overhead electric power lines, buried communications lines, and, where there is oil and gas development, buried pipelines carrying to tank batteries and other gathering facilities. During the scoping period, oil field worker safety was an issue regarding buried electric lines.

Direct and Indirect Effects

The Bureau of Labor Statistics tracks on-the-job fatalities annually and uses the North American Industry Classification System (NAICS) to track these fatalities by Industry. The Mining category includes the oil and gas industry. In the fatality statistics compiled by the Bureau of Labor Statistics, Mining and natural resources are combined. The following table summarizes the fatalities from 2006 to 2009. The "struck by lightning" category has been added simply for comparison.

Table 1. Fatal occupational injuries by events and major private industry sector

Event or Exposure	2006		2007		2008		2009	
	Total	Mining	Total	Mining	Total	Mining	Total	Mining
Contact with overhead power lines	109	13	94	10	102	4	63	4
Contact with underground, buried power lines	-	-	-	-	3	-	-	-
Struck by lightning	9	-	10	3	8	3	4	-
Bureau of Labor Statistics								

The Bureau of Labor Statistics data makes no correlation between the amount of overhead lines compared to the amount of buried lines. To learn more about the safety issues regarding buried power lines, during September 2010, the BLM contacted the Little Missouri National Grasslands (LMNG) in North Dakota. LMNG manages an active oil and gas field containing approximately 730 well serviced by approximately 435 miles of buried electric power lines. During the past 20 years there have been no accidents or injuries related to buried power lines in this field.

Fatalities caused by contact with underground power lines occur but are uncommon. Within the corridor, buried utility lines would not be allowed in the dune areas to avoid impacts to SDL habitat. Therefore, loose, sandy soil with the potential for blowouts would not be used. Additionally the applicant would be responsible for maintaining any buried utility line or pipeline. Ensuring buried lines remain buried is part of the maintenance responsibility. Buried utility lines would be marked and buried in accordance with regulations formulated by the State of New Mexico. See Figure 2. Finally, the "one call" system is to be used before any excavation, which should reduce the hazards of buried utility lines.

IV. Cumulative Impacts

A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

Within the proposed corridor there are approximately 131 active oil and gas leases with approximately 117 active wells. See Map 4. The average surface disturbance for each well (road and pad) is about four acres which would indicate a total surface disturbance from oil and gas development is approximately 468 acres. Under the reasonable and foreseeable development scenario, up to 56 new wells could be drilled over the next 10 years within the corridor with up to 224 acres of new surface disturbance.

Constructing buried utility lines is more expensive than overhead lines. The construction costs of 3 phase overhead lines are between $18,000 and $24,000 per mile. Construction costs of 3 phase underground lines are between $45,000 and $75,000 per mile. (Construction cost estimates were obtained from utility and construction companies in New Mexico and North Dakota.) Regardless of the type of power line used to energize the oilfield, the lines expected to be present for the next 40 to 70 years as the field is developed and produces.

The LPC Corridor contains all or portions of livestock grazing allotments Nos. 65075, 65078, 65079, 65085, 65185, and 65090. Rangeland health assessments (RHAs) have been conducted on these allotments and all meet the standards of rangeland health as described in the 2001 New Mexico Standards for Rangeland Health and Guidelines for Livestock Grazing. One of the components of an RHA is presence and health of habitat for special status species. While active livestock grazing occurs within the LPC Corridor, suitable habitat exists for both LPCs and SDLs.

The corridor contains pasture fences associated with the allotments listed above. LPC loss from fence strikes occurs and has been noted near active leks. At this time the corridor contains no active leks. Neither the proposed action nor the other alternatives proposes new fences within the corridor. Should active leks become established in the corridor, the BLM would take steps to mark fences to reduce the amount of LPC loss associated with fences. In the future, any proposals to construct fences within the corridor would be subject analysis in a NEPA document and public participation.

While global and national inventories of GHG are established, regional and state-specific inventories are in varying levels of development. Quantification techniques are in development – for example, there is a good understanding of climate change emissions related to fuel usage; however measuring and understanding the effects are less comprehensive. Analytical tools necessary to quantify climatic impacts are presently unavailable. As a consequence, impact assessment of specific effects of anthropogenic activities cannot be determined.

Due to the absence of regulatory requirements to measure GHG emissions it is not possible to accurately quantify potential GHG emissions in the affected areas as a result of the Proposed Action. A general assumption can be made, however, that operating vehicles to support both the Proposed Action and the No Action Alternatives will contribute to GHG emissions. The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern United States. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated.

Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations would likely impact the timing and quantity of snowmelt, which, in turn, could impact water resources and species dependant on historic water conditions. Forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a ten year period. Should the trend continue, the habitats and identified drought sensitive species in these forested areas and higher elevations may also be more affected by climate change.

V. BLM Team Members

Randy Howard, Wildlife Biologist
Kyle Arnold, Invasive Weed Coordinator
Helen Miller, Range Management Specialist
Bill Murry, Outdoor Recreation Planner
Michael McGee, Hydrologist
Rebecca Hill, Archeologist
Tate Salas, Realty Specialist
Jared Reese, Natural Resource Specialist
John Simitz, Geologist
Jerry Dutchover, Geologist
Monica Ketcham, Writer/Editor
Howard Parman, Assistant Field Manager Resources
Angel Mayes, Assistant Field Manager Lands and Minerals

VI. Literature Cited

Anderson, Lyn and Burgin, Shelley. 2008. Patterns of bird predation on reptiles in small woodland remnant edges in peri-urban north-western Sydney, Australia. Landscape Ecology 23:1039-1047.

Barrows, C.W., M.F. Allen, J.T. Rotenberry. 2006. Boundary processes between a desert sand Dune community and an encroaching suburban landscape. Biological Conservation 131: 486-494.

Bureau of Land Management. 1997. Roswell Approved Resource Management Plan and Record of Decision. BLM-NM-PT-98-003-1610.

Bureau of Land Management. 2007. Special Status Species Proposed Resource Management Plan Amendment/Final Environmental Impact Statement. BLM-NM-PL-07-06-1610.

Bureau of Land Management. 2008. Special Status Species Resource Management Plan Amendment. BLM-NM-PL-08-05-1610.

Braun, C. E., O. O. Oedekoven, and C. L. Aldridge. 2002. Oil and gas development in western North America: effects on sagebrush steppe avifauna with particular emphasis on sage grouse. Transactions of the North American Wildlife and Natural Resources Conference 67:337-349.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitat. Wildlife Society Bulletin 28:967-985.

Enquist, Carolyn and Gori, Dave. 2008. Implications of Recent Climate Change on Conservation Priorities in New Mexico. April 2008.

Frankham,R., J.D. Ballou, and D.A. Briscoe. 2002. Introduction to conservation genetics. Cambridge University Press, Cambridge, United Kingdom

Goddard Institute for Space Studies. 2007. Annual Mean Temperature Change for Three Latitude Bands Datasets and Images.

Hall, F., and E. Haney. 1997. Distribution and trend of sage grouse (*Centrocercus urophasianus*) in relation to overhead transmission lines in Northeastern California. California Department of Fish and Game. Unpublished Report.

Harju, Seth M., Matthew R. Dzialak, Renee C. Taylor, Larry D. Hayden-Wing, and Jeffrey B. Winstead. 2010. Thresholds and Time Lags in Effects of Energy Development on Greater Sage-Grouse Populations. Journal of Wildlife Management 74(3):437-448.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Basis (Summary for Policymakers). Cambridge University Press. Cambridge, England and New York, New York. (Available on the Internet: http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf)

_____. Climate Change 2007, Synthesis Report. A Report of the Intergovernmental Panel on Climate Change.

Lammers, W.M., and M.W. Collopy. 2007. Effectiveness of Avian Predator Perch Deterrents on Electric Transmission Lines. Journal of Wildlife Management 71(8):2752-2758.

National Academy of Sciences. 2006. Understanding and Responding to Climate Change: Highlights of National Academies Reports. Division on Earth and Life Studies. National Academy of Sciences. Washington, D.C. (Available on the Internet: http://dels.nas.edu/basc/Climate-HIGH.pdf.)

New Mexico Office of the State Engineer Groundwater Data, (Available at the Roswell District 2 Office and at http://nmwrrs.ose.state.nm.us/WRDispatcher).

Pitman, J. C., C. A. Hagen, R. J. Robel, T. M. Loughin, and R. D. Applegate. 2005. Location and success of lesser prairie-chicken nests in relation to vegetation and human disturbance. Journal of Wildlife Management 69:159-1269.

Pruett, Christin L., Patten, Micheal A., and Donald H. Wolfe. “Avoidance Behavior by Prairie Grouse: Implications for Development of Wind Energy.” Conservation Biology 10.1111 (2009): 1523-1739.

Quammen, David. Great Migrations. National Geographic, November 2010, 30-51.

Robel, R.J., J.N. Briggs, A.D. Dayton, and L.C. Hulbert. 1970. Relationships between Visual obstruction measurements and weight of grassland vegetation. Journal of Range Management 23:295-297.

Sewell, Sven R. and Catterall, Carla P. (1998). Bushland modification and styles of urban development: their \effects on birds in south-east Queensland. *Wildlife Research* **25**, 41–63.

Schrag, Duane. 16 Mar 2009. “Prairie chickens face new threats.” Salina Journal.

USDA Soil Conservation Service. 1971. Soil survey of Eddy County, New Mexico, northern part
.

USDA Soil Conservation Service. 1980. Soil survey of Chaves County, New Mexico, southern part.

United States Environmental Protection Agency. 2008. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006. April 2008. USEPA #430-R-08-005.

United States Government Accountability Office Report "Climate Change, Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources" GAO-07-863, August 2007 (1st paragraph, 1st page, GAO Highlights) at: http://www.gao.gov/news.items/d07863.pdf

United States Fish and Wildlife Service. 1998. Endangered and threatened wildlife and plants; 12-month finding for a petition to list the Lesser prairie-chicken as threatened and designate critical habitat.

Utah Wildlife in Need. 2010. In cooperation with Rocky Mountain Power and Utah Division of Wildlife Resources. Unpublished Report.