

FINDING OF NO SIGNIFICANT IMPACT/ DECISION RECORD

FINDING OF NO SIGNIFICANT IMPACT

After studying the potential impacts of the proposed action as described in the Pecos River Grassland Restoration Environmental Assessment and after careful consideration of public comments received, 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 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.

DECISION

It is my decision to approve the Pecos River Grassland Restoration Project as described in the Proposed Action in the attached environmental assessment (EA No. NM-510-2006-181). The mitigation measures identified in the attached EA (section IV, E. Mitigation Measures) along with specific project design features relative to vegetative treatments on public lands have been formulated into stipulations. This decision incorporates, by reference, those stipulations identified in the attached Environmental Assessment.

RATIONALE FOR DECISION

Approval of the Proposed Action is the most economical and environmentally acceptable method of restoring the desired desert grassland communities, reducing dead and decadent fuel loadings, and reducing desert brush encroachment in the Pecos River Grassland Restoration Project area. Consequently, watershed functions, soil stabilization, wildlife habitat and livestock management will be improved. This action will authorize treatment of up to 88,000 public land acres by the use of prescribed fire, mechanical, manual extraction and/or herbicides in the project area for the purpose of meeting specific desired plant community objectives and improving vegetative composition for rangeland health considerations. The proposed action is limited to the upland sites where targeted brush species have exceeded the threshold of desired density and composition. Floodplains, as well as wetlands and riparian zones would not be treated and would be buffered out of treatment areas. The North Pecos River and Overflow Wetlands Area of Critical Environmental Concern (ACEC's) have been eliminated from aerial application of herbicides to comply with the 1997 Roswell RMP.

The Proposed Action is in conformance with the Roswell Resource Management Plan and the Fire and Fuels Management Plan Amendment for Public Lands in New Mexico and Texas. The treatments will be conducted when the windows are appropriate to safely meet treatment objectives. These types of treatments are expected to benefit many wildlife species, as well as restore and promote watershed functionality.

If you wish to protest this proposed decision in accordance with 43 CFR 4160.2, you are allowed 15 days from receipt of this notice within which to file a protest with the Field Manager, Bureau of Land Management, 2909 West 2nd, Roswell, NM 88201. This

protest should specify, clearly and concisely, why you think the proposed action is in error.

If a protest is filed within the time allowed, the protest statement of reasons and other pertinent information will be considered and a final decision will be issued with the right to appeal (43 CFR 4160.3 (b) and 4160.4).

In the absence of a protest within the time allowed, the above decision shall constitute my final decision. Should this notice become the final decision, you are allowed an additional 30 days within which to file an appeal for the purpose of a hearing before an Administrative Law Judge, and to petition for stay of the decision pending final determination on the appeal (43 CFR 4.21, 4.470 and 4160.3 (c)). If a petition for stay is not requested and granted, the decision will be put into effect following the 30-day appeal period. The appeal and petition for stay should be filed with the Field Manager at the above address. The appeal should specify, clearly and concisely, why you think the decision is in error. The petition for stay should specify how you will be harmed if the stay is not granted.

/s/Eddie Bateson

12/14/06

Eddie Bateson, Roswell Field Manager

Date

**Bureau of Land Management, Roswell Field Office
Environmental Assessment Checklist, EA# NM-510-2006-181**

Resources	Not Present on Site	No Impacts	May Be Impacts *	Mitigation Included	BLM Reviewer	Date
CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT						
Air Quality			X		Hydrologist	
Floodplains	X				/s/ Michael McGee	10/5/06
Water Quality - Surface/Ground			X X	X	Geologist /s/ John S. Simitz Hydrologist /s/ Michael McGee	10/5/06
Cultural Resources			X		Archaeologist	
Native American Religious Concerns		X			Pat Flanary	9/26/06
Environmental Justice		X			/s/ J H Parman	
Areas of Critical Environmental Concern			X	X	Plan & Env. Coord.	8/25/06
Farmlands, Prime or Unique		x			Realty Irene M. Gonzales	9-13-06
Invasive, Non-native Species			X	x	Range Mgmt. Spec. /s/ HCJMiller	9/27/2006
Wastes, Hazardous or Solid	X				/s/J H Parman Haz. Mat Spec	10/17/06
Threatened or Endangered Species	X	X			Biologist /s/ D Baggao	10/6/06
Wetlands/Riparian Zones			X	X		
Wild and Scenic Rivers	x				Outdoor Rec. Plnr.	
Wilderness	x				Paul Happel	9/5/06
NON-CRITICAL ELEMENTS						
General Topography/Surface Geology		X			Sur .Prot. Spec. Richard G. Hill	10/18/06
Solid Mineral Resources		√			Geo/SPS /s/ Jerry Dutchover	10/18/06
Fluid Mineral Resources			X		Pet Engr/Geo /s/ John S. Simitz	10/18/06
Paleontology		X			Archaeology Pat Flanary	9/26/06
Soil			X	X	Hydrologist	
Watershed/Hydrology			X	X	/s/ Michael McGee	10/5/06
Vegetation			X		John Spain, Range Mgmt . Spec.	9/27/06
Livestock Grazing			X			
Special Status Species					Biologist	
Wildlife			X	X	/s/ D Baggao	10/6/06
Recreation			X		Outdoor Rec. Plnr.	
Visual Resources			x		Paul Happel	9/5/06
Cave/Karst			x		Paul Happel	9/5/06
Fire and Fuels					Fire Mgmt. Officer Allan J Wyngaert Act	10/4/06

Environmental Analysis

Pecos Uplands Grassland Restoration

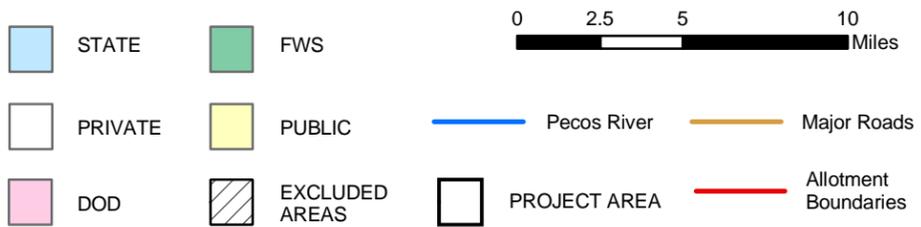
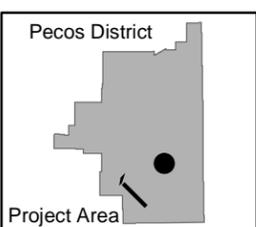
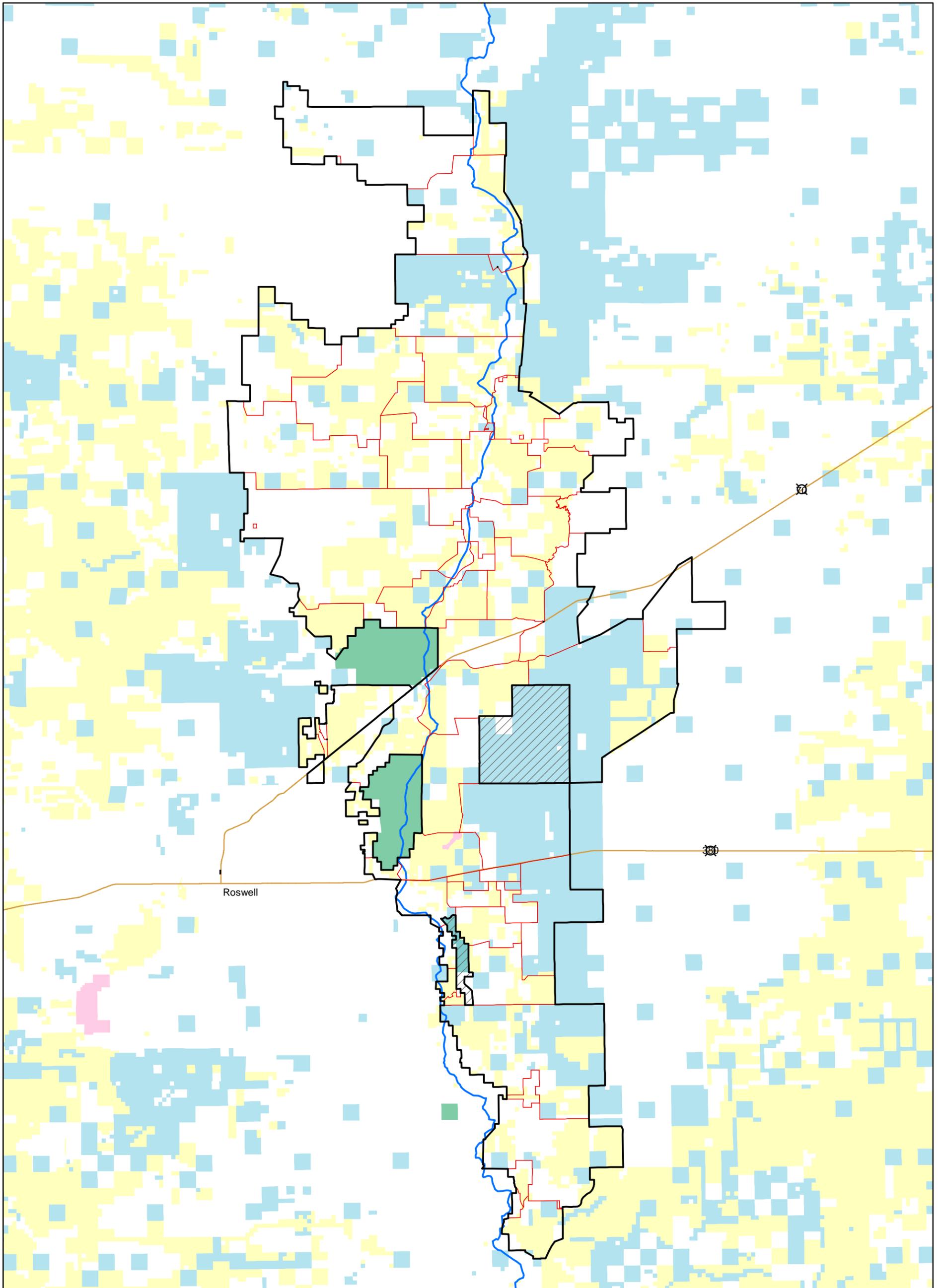
NM-510-2006-181

Bureau of Land Management
Roswell Field Office
Roswell, New Mexico

Date
December 12, 2006



PECOS GRASSLAND RESTORATION



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data. Original data was compiled from various sources. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

Produced by the RFO GIS Specialist on Dec. 5, 2006.

Environmental Analysis
Pecos Uplands Grassland Restoration

NM-510-2006-181

Bureau of Land Management
Roswell Field Office
Roswell, New Mexico

I. INTRODUCTION

Purpose and Need for the Proposed Action

The purpose of the Pecos Uplands Grassland Restoration Project is to meet the goals and objectives of the desired plant community as described in the 1997 Roswell Resource Management Plan. The desired plant community would provide for the stabilization of both the biotic and hydrologic components of the watershed, restore and support habitat requirements for flora and fauna within the area and serve to reduce hazardous fuel loads that could eventually contribute to an uncontrollable catastrophic wild land fire event.

Within portions of the Pecos Uplands Grassland Project area, the vegetative composition has shifted from a desert grassland dominated community, with scattered shrubs, to a shrub dominated landscape characterized by a lack of herbaceous ground cover and an increase in bare ground. The increase in shrubs has resulted in an increase in dead and down fuel loadings, as well as a decrease in the values of an under-story component. This vegetative modification has a negative affect on the watersheds ability to withstand periodic drought events, accelerated erosion impacts, sustain a healthy biodiversity and ability to provide for quality habitat.

This environmental assessment would analyze impacts associated with various methods and techniques available for meeting the intended objectives of this action within the project area (see map). This EA also identifies mitigation measures to minimize or eliminate impacts to affected resources and evaluate cumulative impacts in relation to threshold levels identified for the watershed as a whole.

Conformance with Land Use Plans: The proposed activity is addressed as part of the Roswell Resource Management Plan (October, 1997).

Relationship to Statutes, Regulations or Other Plans: The proposal to implement a vegetation treatments on mesquite is consistent with and tiered to the New Mexico Record of Decision dated July, 1991, for the Vegetation Treatment on BLM Lands in Thirteen States Final EIS (FEIS) of May 1991; the Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1700 et seq.); the Taylor Grazing Act of 1934 (TGA) (43 U.S.C. 315 et seq.); the Public Rangelands Improvement Act of 1978 (PRIA) (43 U.S.C. 1901 et seq.); the Federal Noxious Weed Act of 1974 (7 U.S.C. 2801-2813), as amended by Section 15, Management of undesirable Plants on Federal Lands, 1990; and the Carson-Foley Act of 1968 (P.L. 90-583).

II. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

The proposed project area is located on either side of the Pecos River in Chaves County, New Mexico (see attached map). Acres proposed for treatment in the Pecos Uplands Grassland Restoration Project can be found in Table 1.

The goal of the proposed action is to restore overall rangeland health and watershed functionality through the use of chemical, prescribed fire, and mechanical extractor treatments in those areas where the vegetative composition and production levels are no longer meeting desired plant community objectives. To accomplish this goal, the proposed action would concentrate treatments on areas that possess one or more of the following characteristics:

1. the vegetative community is at a level of 60 percent or greater departure from potential for the site,
2. the mesquite (*Prosopis glandulosa* and *P. jugans*) component of shrubs meets or exceed one-third of the total percent of shrub cover,
3. the specific upland community is not currently meeting one or more rangeland health standards and,
4. the treatment would have no negative impact on non-target plant or animal components of the community.

Table 1. Ownership Acres Within the Pecos Uplands

Acres Within Pecos Uplands (all owners)	Acres of Public Land Within Pecos Uplands	Upper Limit of Acres of Public Land to be Treated	Percent of Pecos Uplands to be Treated	Percent of Field Office Public Land to be Treated
471,000	187,000	88,000	19%	6%

Herbicide treatments would consist of the application of triclopyr and clopyralid or an approved alternate herbicide by aerial application on public land. The liquid herbicides triclopyr (Reclaim) and clopyralid (Remedy) would be applied at a rate of about 0.25 pound of active ingredient each per acre to the areas that are dominated by mesquite and meet the criteria listed above. See Appendix A for the label information and appropriate application requirements for triclopyr and clopyralid. The herbicides would be aerially applied in the spring and early summer (April through July). Small blocks in inclusions or mesquite may also be considered for treatment by backpack or truck

mounted application equipment.

The following measures would be applied to all aerial herbicide applications within the project area:

- a. Irregular boundaries for maximizing edge effect would be incorporated into all methods of treatment. Undisturbed islands of natural vegetation would be left, where appropriate, to minimize negative impacts to wildlife. Additional islands of untreated vegetation would be left as needed to create or maintain the mosaic pattern that provides suitable habitat for such species as scaled quail and loggerhead shrikes. The leave out areas would be equal to or greater than 15% of the total proposed treatment area.
- b. All livestock would be removed from treated pastures prior to aerial spraying or ground applications involving foliar spray. Livestock should be removed after the first 1/2 inch of moisture following pellet treatment. Herbicide label requirements would be met when grazing domestic animals after application. Livestock grazing would be removed prior to treatment and then deferred for a minimum of two consecutive growing seasons after treatment. The growing season usually begins at the onset of the summer rains (July 1) and continues until first frost (October 31). Livestock numbers would not increase as a result of treatment.
- c. Livestock grazing management, using the best management practices associated with the New Mexico Guidelines, would follow all treatments to ensure that the objectives for Healthy Public Lands are not compromised.
- d. Floodplains as well as wetlands and riparian zones would not be treated and would be buffered out of treatment areas. (See Appendix 9, Treating Vegetation with Herbicides, of the 1997 Roswell RMP, for a description of buffers around rivers, floodplains and riparian areas.)
- e. Monitoring studies would be conducted to determine those areas that meet or exceed the treatment threshold. Post-treatment monitoring would be conducted to evaluate the effectiveness of treatments.

Management treatments and project design features relating to vegetation treatment for mesquite reduction activities are presented in the Vegetation Treatment on BLM Lands in Thirteen States FEIS pages [1-33](#) to [1-35](#). All mitigation measures adopted in the ROD are incorporated as additional project design features.

The requirement that no new treatments completed adjacent to an existing treatment until five years have passed (see page 33, 1997 Roswell RMP) would be dropped in order to offer more management flexibility on a landscape and watershed basis. See Appendix B, Best Management Practices for Vegetation Treatments.

Prescribed fire may be used as a primary treatment or as a secondary method of treatment after chemical application to meet the goals of the Desired Plant Community as described above within the project area. The use of prescribed fire would be considered when:

- a. Fuel loading in a prospective treatment area is such that fire would effectively reduce the amount of mesquite to one-third or less of the total percent of shrub cover.

- b. Existing herbaceous vegetation in a prospective treatment area is adequate to effectively carry and support ignition attempts.
- c. A reasonable treatment window would result from the prescribed fire parameters for effective mesquite treatment.
- d. The risk of an escaped prescribed fire is minimal.

All prescribed fires would be conducted under a site specific Prescribed Fire Burn Plan as per BLM Manual 9214. The Prescribed Fire Burn Plan would specify the weather and fuel conditions, fire behavior, holding resources, and prep work (i.e. sites to be protected, line construction) needed to safely and efficiently meet the objectives for the project. The Prescribed Fire Burn Plan would identify any persons and agencies to be notified concerning the prescribed fire project. The Prescribed Fire Burn Plan would also identify any potential receptor sites and smoke management mitigation measures necessary to minimize impacts to the airshed and receptor sites.

Prescribed fire control lines would utilize natural barriers (i.e. rock outcrops, bare ground), bladed roads and two-tracks when possible to avoid creating new surface disturbance. There would possibly be areas where control lines would have to be constructed using heavy equipment. Before implementing this phase of the proposed action, the appropriate level of cultural resources inventory would be determined by following the procedures described in the "Protocol Agreement between the New Mexico Bureau of Land Management and New Mexico State Historic Preservation Officer" (June 2004) or successor documents (the Protocol Agreement).

The following measures would apply to all prescribed burn treatments within the project area:

- a. Range improvement projects (pipelines, fences) would be excluded from fire when possible. Oil and gas related infrastructure would also be protected from fire. Power lines and communication lines would be excluded as well.
- b. Grazing deferment would be necessary prior to prescribed treatment, each project area would be evaluated and the proper deferment would be applied.
- c. Treatment areas would be deferred from livestock grazing for at least two consecutive growing seasons following treatment. The growing season usually begins at the onset of the summer rains (July 1) and continues until first frost (October 31). Livestock numbers would not increase as a result of treatment.

Mechanical extractors grasp the plant by the stem and pull the plant out of the ground with the bulk of the roots still attached. This treatment method would be used in those areas where chemical or prescribed fire treatments would be inappropriate due to other resource concerns such as wildlife habitat. The following protection measures would apply to all extractor treatments within the project area:

- a. Treatment areas would be no larger than 350 acres in size.
- b. Treatment would be scheduled when conditions are favorable and minimal damage would occur to none target plant communities within the treatment area.
- c. Vegetative debris would be piled or left in windrows for reduction by burning when conditions are favorable to meet resource objectives.

B. Alternative A – Manual Treatment

Under this alternative hand-operated power tools and hand tools would be used to cut and clear the treatment area of mesquite. Workers would cut plants at ground level and pull, grub or dig out root systems to prevent sprouting and regrowth. Tools to be used would include hand saws, axes, grub hoes, hand pruners and chain saws. All materials removed would require hand piling and burning at a later date.

C. Alternative B – Large Scale Mechanical Treatment

Under this alternative wheeled or crawler-type tractors would be the only treatment used to grub out mesquite in the project area. Tractors would be confined to working on slopes of less than 30 percent. Vegetative debris would be piled or left in windrows for reduction by burning. Rest periods from livestock grazing would also apply to these types of treatments.

D. No Action Alternative

No treatment would be conducted to reduce the amount of mesquite in the treatment area.

E. Alternatives Considered But Not Analyzed

Biological Treatment – Currently BLM is not aware of any specific effective biological control for mesquite. Therefore, biological treatments as a primary control for mesquite will not be analyzed.

Treatment with other chemical –There are other chemicals on BLM's list of approved herbicides that could be used to control mesquite. A partial list of these chemicals include tebuthurion, 2,4-D, dicamba, glyphosate, hexazinone, and triclopyr. BLM rejected their use due to impacts to non-target vegetation and/or increased impacts to soil or water resources. Therefore, the use of these chemicals as a primary control for mesquite will not be analyzed.

No livestock grazing – This alternative was previously analyzed in the 1994 Range Reform EIS. The 1997 Roswell RMP determined the public land within the project area as suitable for livestock grazing. Therefore, a no-livestock grazing alternative will not be analyzed.

III. AFFECTED ENVIRONMENT

A. General Setting

Physiography and Topography

The project area consists of the uplands either side of the Pecos River in Chaves County. The project area runs about 72 miles north and south in length, generally from the north Chaves County line to the south line. It varies in width between 13 to 25 miles.

U.S. Highway 70 bisects the area about midpoint lengthwise. It is a portion of the eastern plains area of New Mexico with the general aspect of gently rolling hills to the west of the Pecos River valley and terraces to the east as it rises to the Llano Estacado. It is centrally situated along the Pecos River with uplands east and west of the Pecos River valley. The uplands are dissected by numerous drainages leading to the river. The larger draws or arroyos on both sides of the valley are significant features of the landscape. Although none of these draws or arroyos have perennial flows, many do run during significant rainfall periods.

Elevation at the north end of the project area is about 4,420' on the uplands and grading down to about 3,755' at the Pecos River. The "valley" delineation on the west side of the project area generally begins at the 4,500-foot elevation and is more or less a gradual slope beginning from the foothills of the Capitan and White Mountains further to the west. The valley delineation on the east side of the river is at about the 4,000-foot elevation line, with a drop of about 450' to the river and is more of an escarpment separating the valley from the expansive plains area to the east. There is a drop of about 375 feet in elevation over the 72 miles from the upper reach of the Pecos River as it flows to the lower end of the project area. The Pecos River floodplain varies in width from about ½ mile to 2 miles.

Climate

The climate in project area is an arid to semiarid continental climate with mild winters and hot summers. Average annual precipitation ranges from 10 to 16 inches. Over half the yearly precipitation falls during July, August, and September, when moist air masses move into the region from the Gulf of California. Fall, winter, and spring are relatively dry seasons.

The average annual temperature is 62°F. Maximum temperatures average 92°F in July, although temperatures more than 100°F are frequent. Minimum temperatures average 28°F in January, although temperatures do occasionally dip below 0°F. The average growing season is 220 days in the eastern plains.

Wind speeds average about 12 mph with the spring months of March through May being the windy season. Dry, gusty winds, predominately from the west, may exceed 50 mph. These winds, blowing across dry soil, occasionally cause severe afternoon dust storms.

Both the surface and mineral estates are in public ownership. An inspection of the Master Title Plats revealed the following title information:

Oil and Gas Leases: There are approximately 655 oil & gas leases filed with BLM in the area proposed for this project, as of October 2, 2006.

There are no existing mining claims filed with BLM in the area proposed for this project, as of October 2, 2006.

The regional uses are ranching, along with seasonal hunting and recreation.

The proposed project area is in Fire Regime Condition Class 1. The fire management unit is the Pecos Plains which falls into Category D, meaning this is an area where wildland fire is desirable with few or no constraints to the use of fire to achieve desired objectives such as to improve vegetation, wildlife habitat or watershed conditions.

The exceptions to this are the North Pecos ACEC, the Overflow Wetlands ACEC and the public land the lies between the units of the Bitter Lake Nation Wildlife Refuge. These areas fall in to Category C, meaning these are areas where wildland fire is desired but there are significant constraints to its use.

The critical elements of Prime or Unique Farmlands, Native American Religious Concerns, Hazardous or Solid Wastes, Wild and Scenic Rivers, and Wilderness are not present within the treatment area and would not be affected. Although there are Floodplains as well as Wetlands and Riparian Zones associated with the Pecos River, these areas would not be treated and, therefore, would not be affected. (See Appendix 9, Treating Vegetation with Herbicides, of the 1997 Roswell RMP, for a description of buffers around rivers, floodplains and riparian areas.)

B. Affected Resources:

Air Quality: Air quality is rated as a Class II area, which allows for moderate development within the standards of the State of New Mexico and the Federal Air Standards.

Soil: Redona-Ratliff-Blakeney: Shallow and deep, well drained, nearly level to gently sloping soils, on high terraces.

Sotim-Simona-Pajarito: Shallow and deep, well drained, nearly level to gently sloping soils, on high terraces and on alluvial side slopes below landscape breaks.

Glendale-Ustifluents-Hardey: Deep, somewhat poorly drained and well drained, nearly level soils.

Hollomex-Reeves-Milner: Deep, well drained, nearly level to undulating soils, on terraces.

Poquita-Alamo-Hodgins: Deep, well drained, nearly level to sloping soils, on alluvial side slopes.

Reakor-Alama-Bascal: Deep, well drained, nearly level to sloping soils, on alluvial side slopes, alluvial fans, and terraces.

Reakor-Reeves association: Deep, level to nearly level loams.

Reakor-Tencee association: Deep, level to nearly level lams and nearly level to hilly gravelly loams that are very shallow and shallow over indurated caliche.

Holloman-Gypsum land-Reeves association: Level to gently sloping loams that are very shallow and shallow over gypsum. Gypsum land and deep level to nearly level loams.

Glendale-Pecos-Vinton association: Rarely or occasionally flooded, level fine sandy loams, silty clay loams and loamy fine sands.

Berino-Pintura-Pajarito association: Deep, level to rolling, moderately permeable to rapidly permeable fine sandy loams and loamy fine sands.

Tencee-Simona-Sotim association: Level to gently rolling moderately permeable and moderately rapidly permeable gravelly fine sandy loams and fine sandy loams.

Detailed information on soil in the Roswell Field Office is available in the Soil Survey of Chaves County, N.M. Northern Part; Soil Survey of Chaves County, N.M. Southern Part (SCS 1980).

Water Quality:

Surface Water: The proposed treatment area is located in the Pecos River Basin of New Mexico. There are no perennial streams, rivers or riparian areas in the area proposed for treatment.

Ground Water: The depth to shallow unconfined groundwater varies from 1 foot to depths of 100 feet throughout the Planning Area (New Mexico Office of the State Engineer data).

North Pecos River Area of Critical Environmental Concern (ACEC): This ACEC is located at the northern end of the project area along the Pecos River. The management goal of the ACEC is to protect the biological and scenic values of the area, which provides habitat for endangered fish species and supports a significant riparian/wetlands plant community. The ACEC consists of approximately 3,400 acres of public land in scattered parcels.

The 1997 Roswell RMP states herbicides would not be applied from the air, that is, sprayed from aircraft. The purpose of this application restriction is to mitigate the effects of aerial application to target specific plants and to protect the riparian/wetlands habitat within the ACEC. Therefore, this ACEC would not be included in any aerial application project.

Overflow Wetlands Area of Critical Environmental Concern (ACEC): This ACEC is located approximately 16 miles southeast of Roswell, NM, adjacent to Bottomless Lakes State Park. The management goal of the ACEC is to protect the biological and scenic values of the area, which provides habitat for endangered fish species and supports a significant riparian/wetlands plant community. The ACEC consists of approximately 3,000 acres of public land.

The 1997 Roswell RMP states herbicides would not be applied from the air, that is, sprayed from aircraft. The 2003 Overflow Wetlands Activity Plan further restricts herbicide application to hand methods from the ground. The implication of these two

documents is that chemical treatment within the ACEC would be a secondary application, after other treatment methods had been used.

The purpose of this application restriction is to mitigate the effects of aerial application, to target specific plants and to protect the riparian/wetlands habitat within the ACEC. Therefore, this ACEC would not be included in any aerial application project.

Recreation: The majority of the recreation within this area is hunting, walking for pleasure, fishing where access is permitted, bird watching and caving. The proposed action should not affect the recreation aspects of this area.

Cave/Karst: The area is located in an area of high, medium and low cave/karst potential. Several individual significant caves and karst features are found within the proposed treatment area. There is one significant cave named "Bat Hole" that should be avoided from November through April because of a hibernating bat colony.

Visual Resource: The area is considered to contain both Class II, III, and IV Visual Resource Management Areas (VRM); Approximately one mile and sometimes more around the Salt Creek Wilderness and National Wildlife Area and the Over Flow Wetlands and a considerable area around it is a Class II VRM management area. All of the Pecos River valley is a class III VRM area, The remainder of the area is a Class IV management area.

The classes are explained as follows:

The Class II objective is to retain existing landscape character. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract a casual observer's attention. Any changes must repeat the basic elements of line, form, color and texture found in the predominant natural features of the characteristic landscape.

The VRM Class III objective is to: Partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The VRM Class IV objective is to: "Provide for management activities which require major modification of the existing landscape character. Every attempt, however, should be made to reduce or eliminate activity impacts through careful location, minimal disturbance, and repeating the basic landscape elements."

Vegetation: Using the DPC descriptions for RFO, the two major vegetative communities within the project area are the grassland and mixed desert shrub

community. The grassland community makes up the largest portion of the project area. The grassland community can be broken down into several subtypes, with the grass rolling upland and mesquite grassland types being the most common.

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 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 these objectives, the forb component is low, and the shrub component is high. This is expressed numerically as:

Grassland Community

DPC	Grasses 30-85%	Forbs 10-15%	Shrubs/Trees 1-10%
Monitoring	Grasses 66%	Forbs 7.7%	Shrubs/Trees 26.9%

Mixed Desert Shrub Community

DPC	Grasses 55-75%	Forbs 10-20%	Shrubs/Trees 15-20%
Monitoring	Grasses 49.3%	Forbs 9.6%	Shrubs/Trees 39.4%

Shinnery Oak-Dune Community

DPC	Grasses 50-70%	Forbs 10-15%	Shrubs/Trees 25-40%
Monitoring	Grasses 45%	Forbs 4%	Shrubs/Trees 47%

Drainages, Draws and Canyons Community

DPC	Grasses 50-80%	Forbs 10-20%	Shrubs/Trees 10-40%
Monitoring	Grasses 79%	Forbs 7.7%	Shrubs/Trees 16.5%

In these Desired Plant Communities, mesquite should not exceed 3% of the production.

Invasive, Non-Native Species: The project area includes populations of African rue (*Peganum harmala*), Russian knapweed (*Centaurea repens*) and salt cedar (*Tamarix* spp.). The African rue and Russian knapweed are generally found along roads and on scattered caliche pads. The populations may have gotten their starts from seeds brought in on heavy equipment being moved from infested sites. Salt cedar is usually found along draws, bottomlands, dirt tanks, riparian areas, sub-irrigated areas and anywhere that water may collect.

Wildlife: The entire area provides a myriad of habitat types for terrestrial and aquatic wildlife species. The diversity and abundance of wildlife species in the area is due to the presence of water, the numerous drainages interconnecting upland habitats to the Pecos floodplain, a mixture of grassland habitat and mixed desert shrub vegetation, and the steep and rocky escarpment which divides the uplands from the Pecos River valley.

Common bird species are mourning dove, mockingbird, white-crowned sparrow, black-throated sparrow, blue grosbeak, northern oriole, western meadowlark, Crissal thrasher, 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 antelope, coyote, gray fox, bobcat, striped skunk, porcupine, racoon, 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, side-blotched lizard, horned lizard, whiptail, hognose snake, coachwhip, gopher snake, rattlesnake, and spadefoot toad.

Special Status Species: Special status species found within the project area, including those determined to be threatened or endangered by the U.S. Fish and Wildlife Service include:

Roswell springsnail (*Pyrgulopsis roswellensis*)
Koster's springsnail (*Juturnia kosteri*)
Noel's amphipod (*Gammarus desperatus*)
Pecos assiminea (*Assimineia pecos*)
Pecos sunflower (*Helianthus paradoxus*)
Pecos gambusia (*Gambusia nobilis*)
Pecos bluntnose shiner (*Notropis pecosensis*)
Interior least tern (*Sterna antillarum athalassos*)

All four invertebrate species have only recently been described to science. Noel's amphipod was described as a new species in 1981 (Cole, 1981), whereas Roswell springsnail, Koster's springsnail, and Pecos assiminea were all described as new species in 1987 (Taylor, 1987).

These three snails and one amphipod are found in the same locations and share the same threats and management needs. All four species are restricted to small, isolated, spring-fed aquatic and wetland habitats in the Pecos River drainage.

Pecos assiminea is in the family Assimineidae, and is unique in that it is the most inland species of the primarily marine genus *Assimineia*. Taylor (1987: 8-9) reported extirpation of two populations in Chaves County: one at North Spring on the Roswell Country Club and the other at the type locality on Bitter Lake National Wildlife Refuge. Populations on Bitter Lake National Wildlife Refuge currently are found in the upper reaches of Bitter Creek near Dragonfly Spring, the lower end of Bitter Creek near Bitter Lake, the lower reaches of the Sago Spring wetland complex near Sinkhole No. 32, very localized on the western perimeter of Unit 7, and at a spring in the extreme southwestern corner of Unit 15 (Lang, 2002: A5).

Roswell springsnail is in the family Hydrobiidae. The species persists at Bitter Lake National Wildlife Refuge. Current distribution of Roswell springsnail appears to be restricted to Bitter Lake National Wildlife Refuge. A survey of the Roswell Country Club conducted in 2004 indicated that Roswell springsnail is no longer present there (M. Myers, Service, pers. comm., 18 April 2005). Roswell springsnail persists in Bitter

Creek, Sago Spring, Sinkhole No. 32, and along the western boundary of Unit 6 (Melhop, 1992; Melhop, 1993; Lang, 2002: A16). The type locality on the western boundary of Unit 7 was reported as being dry in 1992 (Melhop, 1992: 5), and Lang (1998:B69) confirmed that the species was no longer found there.

The current distribution of Koster's springsnail appears to be restricted to Bitter Lake National Wildlife Refuge. A survey conducted in 2004 indicated that Koster's springsnail no longer occurs at the Roswell Country Club site (M. Myers, Service, pers. comm., 18 April 2005). Therefore, the status of the population there is unknown. Koster's springsnail persists in Lake St. Francis, Dragonfly Spring, Bitter Creek, Sago Spring, Sinkhole No. 32, the southwestern corner of Unit 15, the northwestern border of Hunter Marsh, and in isolated locations along the western boundaries of Units 5, 6, and 7 (Melhop, 1992; Lang, 2002: A16). Koster's springsnail has not been found in recent times along the western boundary of Unit 3 (Lang, 2002: A16).

Noel's amphipod is a small freshwater crustacean. Noel's amphipod is in the family Gammaridae. Noel's amphipod currently persists on Bitter Lake National Wildlife Refuge at the Sago Spring wetland complex (including Sinkhole No. 32), Bitter Creek, and along the western boundary of Unit 6 (Lang, 1999: A1; Lang, 2002: A2). Noel's amphipod appears to be declining at Dragonfly Spring at the headwaters of Bitter Creek following the Sandhill Fire that burned through the area in March 2000 (Lang, 2002: A2).

There is no potential habitat for the Pecos assiminea, Roswell springsnail, Koster's springsnail and Noel's amphipod within the proposed project area. No surveys have been conducted for these species due to the absence of habitat for these species outside of the Bitter Lake NWR.

Pecos Sunflower (*Helianthus paradoxus*)

The Pecos sunflower is found along alkaline seeps and cienegas of semi-desert grasslands and the short-grass plains (4,000-7,500 feet elevation). Plant populations are found both in water and immediately adjacent to water sources where the water table is near the surface. The largest and most secure population is found on BLNWR.

The New Mexico Energy, Minerals and Natural Resources Division and BLM staff have conducted surveys along the Pecos River through riparian studies and during routine field reconnaissance over the years. The only known locations on public lands are Lloyd's Draw on the Leer (65137) BLM allotment, a small wetland area on Lynch (64059) & an un-named draw on the Hagelstein (65037) allotments, and a small wetland area at the Overflow Wetlands Area of Critical Environmental Concern.

No other occupied habitat currently is known within the project area. Potential habitat may now occur on the Melena Allotment (64056), situated between the Salt Creek Wilderness Area and the BLNWR Middle Unit, resulting from a large scale saltcedar control project conducted along the Pecos River in 2005.

Pecos Gambusia (*Gambusia nobilis*)

The Pecos gambusia (*Gambusia nobilis*) was listed as endangered under the Endangered Species Conservation Act of 1969, and became an endangered species under the Endangered Species Act of 1973 when that legislation was enacted. No critical habitat has been designated. It is endemic to the Pecos River basin in southeastern New Mexico and western Texas. Natural populations within the Roswell Field Office area occur in several springs and isolated gypsum sinkholes at BLNWR. Introduced populations occur in other sinkholes at BLNWR, and at the Salt Creek Wilderness Area in Ink Pot sinkhole.

The Pecos gambusia is a small fish 25-40 millimeters long and is endemic to the Pecos River Basin in southeastern New Mexico and western Texas. Historically, Pecos gambusia occurred as far north as the Pecos River near Fort Sumner, New Mexico, and south to Fort Stockton, Texas. However, recent records indicate that its native range is restricted to sinkholes or springs and their outflows, on the west side of the Pecos River in Chaves County, New Mexico. In spite of population declines, the species remains locally common in a few areas of suitable habitat.

In New Mexico, populations are present on the BLNWR and the Salt Creek Wilderness Area (both Chaves County). These areas constitute the key habitat of the species in the RFO area. Populations of Pecos gambusia occur in several springs and isolated gypsum sinkholes at the BLNWR Middle Unit (Lake St. Francis Research Natural Area) and the Ink Spot sinkhole in the Salt Creek Wilderness.

No other occupied habitat currently is known within the project area.

Pecos Bluntnose Shiner (*Notropis simus pecosensis*)

Historically, the Pecos bluntnose shiner inhabited the Pecos River from Santa Rosa to near Carlsbad, New Mexico. Currently, the subspecies is restricted to the river from the Fort Sumner area southward locally to the vicinity of Artesia, and seasonally in Brantley Reservoir (NMDGF 1988; USFWS 1992). Routine fish community monitoring conducted by the USFWS in the Pecos River between Sumner Dam and Brantley Reservoir show the fish remains generally abundant, especially in light of cooperative efforts between the Bureau of Reclamation and the USFWS to more closely mimic natural flows in the Pecos River.

There are two designated critical habitat areas on the Pecos River within the RFO area. The first is a 64-mile reach beginning about ten miles south of Fort Sumner, downstream to a point about twelve miles south of the DeBaca/Chaves county line. The second reach is from Highway 31 east of Hagerman, south to Highway 82 east of Artesia.

Loss of habitat (periodic dewatering), and introduction of non-native fish species of the Pecos River (Arkansas River shiner) are the key threats to the Pecos bluntnose shiner. The primary threat to the Pecos bluntnose shiner appears to be artificial manipulation of flows in the Pecos River to meet irrigation needs and subsequent drying of the river channel (NMDGF 1996). High flows in the late winter-early spring before natural spring runoff appear to displace fish into marginal downstream habitats (including Brantley Reservoir). Cessation of reservoir releases after spring runoff, before the advent of

summer rains, desiccates long stretches of the Pecos River. Maintenance of water levels within the Pecos River and its tributaries is beyond the management authority of the BLM.

In addition to the manipulation of flows is the threat posed by non-native fish. The introduction and establishment of species such as the Arkansas River shiner offers direct competition with the Pecos bluntnose shiner.

Fish communities between Sumner Dam and Brantley Reservoir are monitored by the FWS in coordination with the BLM and Bureau of Reclamation. Monitoring indicates a serious decline in Pecos bluntnose shiner density since 2002. Extensive river drying occurred in 2002 and 2003, and the river dried again for a short period in 2004. River drying is detrimental to the Pecos bluntnose shiner. In 2005, the species density was the lowest recorded since 1992 (FWS 2006).

The North Pecos River ACEC is designated critical habitat for the species on the Pecos River. The proposed project does not directly affect aquatic habitat for the species.

Interior Least Tern (*Sterna antillarum athalassos*)

The interior least tern nests on shorelines and sandbars of streams, rivers, lakes, and man-made water impoundments. There are only three known nesting habitats in the Roswell Field Office (RFO) area. The primary areas are on the alkali flats on the east side of Unit 16 and around Bitter Lake on BLNWR. A secondary area is an alkali flat due north of the refuge on public lands on Allotment 64056. The third area is located on City of Roswell property at the old desalinization plant where terns once nested on the evaporation ponds behind the plant and have since abandoned. No other nesting terns have been found to date. BLNWR is considered essential to tern breeding habitat in the state.

Sporadic observations of least terns have been recorded elsewhere in the Pecos River valley and they nested successfully at Brantley Reservoir in 2004. The tern may occur on public lands in Chaves County along the river because suitable nesting habitat is found on sites that are sandy and relatively free of vegetation (i.e., alkali flats). Other potential habitat sites are saline, alkaline, or gypsiferous playas that occasionally hold water. However, ephemeral playas do not support fish, the main staple for terns.

Specific surveys for nesting least terns have been conducted in potential habitat along the Pecos River and playas by the New Mexico Natural Heritage Program under a challenge cost share agreement with the BLM. Surveys were conducted at eight designated survey sites in the RFO area during the June/July 1997 season. A flyover was noted at the Overflow Wetlands ACEC, and two nesting pairs were observed on the Melena Allotment 64056 north of the BLNWR (NMNHP 1997). No other nesting terns have been found to date.

Channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of the tern nesting habitat. Unpredictable flow patterns below

reservoirs can pose problems for nesting terns. Increased human activity on river sandbars threaten nesting terns, including the use of recreational vehicles on previously unreachable habitat during periods of drought.

No other occupied habitat currently is known within the project area. The proposed project does not directly affect nesting or aquatic habitat for the species.

Livestock: Allotments affected by the Proposed Action are listed in the following table:

Table 2. Grazing Allotments

Allotment Number	Allotment Name	Public Land Acres	Permitted AUMs
62067	Ward Canyon	1960	624
62069	Pursely Mill 15	1280	336
64038/4538	Pecos North Flat	5,915	1236
64039	Pecos Pump Flat	4140	912
64040	Red Spring Draw	7,303	1373
64041	Hobbs Canyon	10,640	2434
64042	Huggins Draw	6,780	1478
64044	5 Mile	6,061	1239
64045	Blue Water	3,331	555
64046	Cottonwood	5,611	957
64047	Kranz Place	358	53
64048	Sleepy Valley Farm	530	108
64049	Red Bluff	14,629	2616
64050	Milner Lake	4,775	644
64051	Garcia Flat	4,856	1083
64052	Capitan Road South	160	24
64053	Dunahoo Hills	4,485	1014
64054	Little Sinkhole	360	111
64055	Sinkhole Flats	1,450	451
64056	North Melena	3,605	526
64057	South Melena	1,000	24
64058	Salt Grass Flat	200	48
64059	Pecos 380	4000	108
64095	Wonder Lane	80	20
64155	West NMMI	80	24
65007	Henery Tanks	2,876	517
65008	Haystack Butte	2,342	420
65019	Bosque Spring	3,597	638
65020	Bosque Grande	6,290	1260
65021	Haystack Mtn.	4,379	922
65022	NE Sand Creek Ranch	296	48
65023	West White Ranch	440	124
65024	8-Mile	3,585	804
65025	Railroad Mtn	4,798	900

65026	Acme	965	216
65035	White Lake Ranch	960	168
65036	Bob Crosby Draw	3,111	503
65037	Comanche Hill	6,228	1140
65038	Palma Mesa	78,965	1122
65040/65540	N. Comanche Draw	447	84
65054	Pronghorn Mesa	390	84
65056	Annaya Well	200	32
65057	Comanche Spring	1,224	352
65059	Comanche Hill South	1,041	204
65060	Bottomless Ranch	221	36
65062	Slash G	3,587	605
65069	Calumet Ranch	11,110	1785
65070	Red Gypsum	400	56
65072	Wiggins Place	9,666	1536
65082	Quail Road	843	62
65083	King Place East	3,443	366
65093	Buffalo Valley Junc.	96	12
65094	Comanche 3	5,254	936
65095	Comanche 15	195	36
65137	Lloyd's Canyon	7,556	1536
65158	Comanche Sacaton	3,145	576
Total		186,639	35,078

*Total acres do not equal the area of the project area because these allotments overlap the boundaries of the project area.

IV. ENVIRONMENTAL IMPACTS

The actions described in Section II of this assessment which would cause environmental impacts are presented in Chapter 3 and summarized in Table 1-9 (Alternative 1) of the FEIS. Analysis discussions in that EIS have no impact of importance upon the following resources; climate, topography, minerals, utilities, communication sites and energy use.

A. Impacts of the Proposed Action

No impacts have been identified which exceed those addressed in the FEIS and the decision referenced in Section I of this assessment. The following are impacts of importance based upon site specific analysis of the proposal.

Air: The most significant impacts on air quality would be moderate noise and the potential for minimal chemical drift from aerial application of the herbicide. Impacts would be temporary, small in scale, and quickly dispersed throughout the area. These factors, combined with standard management practices (stipulations), minimize the significance of potential impacts. Federal, State, and local air quality regulations would not be violated. Standard management practices for aerial application of herbicides would limit the amount of drift into non-target areas.

The use of aircraft to apply the herbicides could temporarily cause noise levels to reach 90 dbA; however, no long-term effects are anticipated. The chemical nature of the herbicide is such that no residue would be left in the soil or atmosphere after approximately 3 years.

This analysis area is within the Pecos River airshed and is classified as a Class II Air Quality Area. The class II rating allows for moderate development or slight degradation of air quality. The Pecos River airshed is classified as an attainment area which means federal air quality standards are being met. Air quality is generally considered good to excellent. Intermittent dust storms that generate airborne particulate materials are the primary source of air pollution in the area, but are not of adequate frequency or duration to detract from the overall condition of the airshed.

Treatment with prescribed fire would have an immediate, but short term impact on air quality in the immediate area. Burn out time for grasses is usually less than 60 minutes. Using smoke emission models, total suspended particulate would be approximately 0.41 tons.

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield it from erosion or alter the presence and abundance of microorganisms or larger organisms that contribute to overall soil quality.

Granular formulations of herbicide release the herbicide into the soil plant root zone with subsequent chemical uptake and absorption by those targeted plants. Triclopyr and clopyralid are liquid formulations that are applied onto the foliage of the mesquite. Whether the herbicide is aerially applied or by truck-mounted and backpack units, some of the herbicide is deposited on the soil. Removal of solid stands of vegetation by chemical treatment may result in short-term, insignificant increases in surface erosion that would diminish as vegetation reoccupies the treated site. The speed of site revegetation and plant composition of new vegetation depends on climate and herbicide persistence and selectivity. Table 3-3 of the FEIS (page 3-23) gives a general description of vegetation susceptibility of herbicides. Clopyralid is considered to be "Selective". Many broadleaf annual and perennial weeds and woody plants are susceptible to clopyralid. Triclopyr is also considered to be "Selective". Woody plants, broadleaf weeds, and root –sprouting species are susceptible to triclopyr.

Although herbicides would not alter a soil's physical properties, there may be indirect effects on microorganisms. Depending on application rates and soil environment, herbicides can either stimulate or inhibit soil organisms. When herbicide-treated vegetation decomposes, the resulting addition of organic matter to the soil can support increased populations of microorganisms. Soil microorganisms can metabolize herbicides and often are reported to be responsible for herbicide decomposition (Norris and Moore, 1981). However, certain herbicides may inhibit microorganism growth or may produce more toxic effects and increase mortality rates.

The effects of the proposed action on the soil would be substantial. Increased organic matter caused initially by mesquite leaves, stems and roots and secondarily by increased production of grasses and forbs would improve fertility of fine sandy loam soil.

Prescribed burning may increase erosion potential until perennial vegetation re-establishes. Extremely intense fires would cause a higher than desired mortality on all plant species, resulting in the exposure of excess amounts of bare ground over a longer period of time and, consequently, greater soil loss. However, extremely intense burning would be avoided by burning within favorable prescriptions. Because fibrous rooted perennial grass species increase soil stability, erosion would be reduced below present levels when grasses become re-established.

Burning increases nutrient cycling by releasing nutrients that had been tied up in litter and plant material back into the soil. Soil temperatures of burned areas are usually higher than those of adjoining unburned areas. This is part of the reason that burned areas typically green-up earlier than unburned adjoining areas.

Competition for water and nutrients would be decreased as the treatment takes effect. Grasses and herbaceous plants may be affected by the treatment during the first year. An increase in ground cover (grasses and forbs) is expected by the second growing season. This ground cover would help minimize erosion and increase infiltration of surface water. Some soil microorganisms may be negatively impacted for the short-term treatment duration. Microbial activity is expected to resume at present levels once chemical dispersion is complete.

Water: Herbicides applied to the land may enter surface or ground water. Herbicide use also may produce minor increases in stream nutrients, stormflows, and sediment yields.

Surface Water Impacts: Entry of herbicides into surface water is discussed in the risk assessment (Appendix E of the 1991 Vegetation Treatment FEIS). Herbicides may enter surface water during treatment through accidental direct application or drift, or after treatment through surface or subsurface runoff. To pollute the water, herbicides must be present in the water at concentrations high enough to impair water quality at point of use.

Buffer zones reduce drift impacts on sensitive areas, while wind increases drift impacts. Mitigation requires buffer of 100 feet (aerial). After treatment, herbicides may enter streams by subsurface flow or by movement in ephemeral channels. Key factors that would affect peak concentration include presence of buffers, storm size, herbicide and soil properties and downstream mixing and dilution.

Large storms rarely produce high concentrations because herbicides are diluted by large water volumes, while small storms may not produce enough flow to move herbicides into streams. Intermediate storms often produce higher concentrations of pesticides in streams relative to the other two situations because of the resulting streamflow is sufficient to mobilize the herbicides but not large enough to substantially dilute the material.

Amounts of herbicide available for movement from the site of application with surface or infiltrating water would be determined, in part by the herbicide's persistence. Herbicide persistence is usually expressed in terms of "half-life". This is the typical length of time needed for one-half of the total amount applied to break down to substances that are no longer of toxicological concern. While a herbicide's soil half-life in practice is influenced by local conditions such as soil type and climate, it is useful for describing the relative rates at which various herbicides are broken down in the soil.

Sunlight, temperature, soil and water pH, microbial activity and other edaphic characteristics may affect the breakdown of herbicides. Soil organic matter and soil properties such as moisture, temperature, aeration, and pH all affect microbial degradation. Microbial activity increases in soil that is warm, and moist with a neutral pH. In addition to microbial action, chemical degradation of herbicides can occur by reaction with water, oxygen or other chemicals in the soil. As soil pH becomes extremely acidic or alkaline, microbial activity usually decreases, however these conditions may favor rapid chemical degradation.

Table 3-6 of the 1991 Vegetation Treatment FEIS (page 3-45) gives field half-lives for the 19 herbicides proposed for use in the FEIS. Triclopyr has a soil half-life of 46 days (with a range of reported half-life of 30 to 90 days) and is considered to be a "moderately persistent herbicide". Clopyralid has a soil half-life of 30 days (with a range of reported half-life of 12 to 70 days) and is considered to be a "Moderately persistent herbicide". Moderately persistent herbicides are those with typical half-lives of 30 to 100 days. These values are considered most representative of the values reported in the literature, as the rate of degradation by natural processes is not only dependent on the herbicide chemistry, but also environmental factors.

In addition to degradation, these herbicides may be unavailable for movement with surface or infiltration water due to volatilization and plant uptake. Volatilization is the loss of herbicide vapor to the atmosphere from plant and soil surfaces. The rate of volatilization is determined by the herbicide's vapor pressure and how strongly it is adsorbed. Vapor pressures for the herbicides proposed for use in the 1991 Vegetation Treatment FEIS are given in Table 3-6 (page 3-45).

The vapor pressure for triclopyr is 1.3×10^{-6} mm HG/g. The vapor pressure for clopyralid is 0 mm HG/g. The higher the vapor pressure the greater the potential for loss due to volatilization. Also, higher temperature usually results in increased volatilization. The degree of plant uptake is partially determined by the herbicide's water solubility. The more water soluble an herbicide is, the greater the possibility for plant uptake.

Soil adsorption is also important in determining mobility in surface or infiltrating water. Adsorption of a herbicide varies with the properties of the chemical, as well as the soil's texture (relative proportions of sand, silt, and clay), moisture level, and amount of organic matter. Soil high in organic matter or clay tend to be the most adsorptive, and sandy soil low in organic matter least adsorptive. Therefore, the higher the organic matter content of the soil, the more adsorptive it is and is less likely the herbicide is to move from the point of application.

The degree of herbicide adsorption is often represented by the ratio of amounts of herbicide in the soil water to the amount adsorbed. This ratio is called the adsorption coefficient or K_d . The degree of adsorption depends on both the herbicide and the soil properties. The K_d for a herbicide is soil specific and would vary with soil texture and organic matter content.

Another herbicide adsorption coefficient, which is less soil specific is called the K_{oc} . The K_{oc} is the K_d divided by the percent of organic carbon in the soil, a major component of soil organic matter. The higher the value for K_d or K_{oc} , the greater the adsorption. Water solubility and K_{oc} values for herbicides proposed for use in the FEIS are given in Table 3-6 of the FEIS (page 3-45 of the FEIS). The K_{oc} for triclopyr is 780 and clopyralid is 6 ($pH=7$).

Impacts to surface water as the result of prescribed burning would be short-term (less than 3 years) and would take the form of increased sediment loading due to storm runoff. Impacts would be expected to be less after the first full growing season and diminish over time.

Ground Water Impacts: After treatment, herbicides may move through the soil and into underlying ground-water aquifers by leaching. Herbicide mobility and persistence greatly affect potential for leaching. To pollute ground water, they must then move laterally at concentrations high enough to impair water quality at a point of use. Herbicides move most easily through sand, which is the most porous soil and has the least adsorption potential. The potential for ground-water contamination increases as the depth to the water table and distance to the point of use decrease. Applied at typical rates, herbicides should never occur in ground-water supplies at concentrations exceeding a small fraction of EPA's most stringent drinking-water standards.

Mobility depends on solubility and adsorption; persistence depends on degradation mode and rate. Herbicide properties which determine the likelihood of movement with infiltrating water and leaching index based upon the work of Goss (1988) are given in Table 3-6 of the 1991 Vegetation Treatment FEIS (page 3-45). The leaching index is a relative ranking of the 19 herbicides based upon their chemical properties only. The higher the value, the greater the potential that the herbicides would move through the soil profile with infiltrating water.

Triclopyr has a leaching index of 1.84 and clopyralid has a leaching index of 5.46. Prediction of actual amounts of these herbicides that may reach groundwater must also consider the method and rate of application, as well as the soil characteristics and other environmental and climactic factors described above.

In response to the concern for ground water contamination, the Environmental Protection Agency developed a rating system to delineate ground water contamination vulnerability. This system, known as DRASTIC, (Aller et al. 1985) is used nationwide and identifies potentially vulnerable areas by factoring depth to water, net recharge, aquifer media, soil media, topography, impact to unsaturated zone, and gross hydraulic conductivity. Figure 2-8 of the 1991 Vegetation Treatment FEIS shows those vulnerable areas. The project area is considered to be a moderate vulnerability ($102 \leq \text{varscore} \leq 142$) area. A site specific DRASTIC would be completed prior to application of herbicides.

Impacts to ground water as the result of prescribed burning would be negligible because of vegetation recovery after application.

Vegetation: Mechanical, chemical and fire treatments would have beneficial and adverse effects on vegetation within the project area. Target and non-target vegetation in treated areas would be directly affected. The degree to which vegetation would be affected would depend on the types of treatment used and amount of acreage treated. The overall effect of treating vegetation would be to achieve the desired successional stage, create a more stratified age structure for wildlife habitat improvement and fuel hazard reduction, accelerate succession for forest management and reduce or eliminate populations of undesirable species in noxious weed eradication programs.

Annual plants are generally more sensitive than perennial plants to chemical treatments because they have limited food storage mechanisms and annual plant populations are greatly reduced if plants are killed before producing seed. Perennials are most sensitive when exposed to herbicides during periods of active growth. Exposure to herbicides during active growth and before plants become reproductive also would have the greatest negative effect on populations of many annuals. The ability of annual or perennial plants to maintain viable seeds in the soil for several years reduces their susceptibility to herbicides. Control of some woody plants on some sites may open the community to dominance by annuals (Evans and Young 1985).

Susceptibility of perennial plants to herbicides depends largely on their ability to resprout after aerial shoots area damaged (Table 3-3 of the FEIS, page 3-23). Plants that have the ability to resprout after aerial shoot damage area generally least sensitive to herbicides. These plants are damaged most when exposed to herbicides when translocation to meristematic areas and to roots (Sosebee 1983). This generally occurs only when soil temperatures are adequate for root activity and soil water is available. These plants are generally less susceptible to foliar-applied herbicides with limited exposure periods, such as 2, 4-D, than to soil-active herbicides, such as tebuthiuron, that persist in the soil long enough to be taken up when optimum translocation conditions occur.

Differences in active growth periods and phenology of non-target and target species that correspond to differences in sensitivity to herbicides can be used to minimize damage to non-target species.

Response of non-target species to broad-spectrum herbicides, such as glyphosate and tebuthiuron, may be highly dependent on the rate of application. Damage to non-target

species is minimized if they are tolerant of these herbicides applied at rate sufficient to reduce target species.

Plants may vary greatly in their sensitivity to different herbicides (Sosebee 1983). Effectiveness of herbicides may vary with different climatic and soil conditions. Soil-applied herbicides are less effective on fine textured soils relative to coarse-textured soil, because herbicide molecules may be adsorbed to clay colloids. Response of non-target plant species to herbicides depends not only on their susceptibility to the herbicide directly, but also on their response to a decrease of target plant species in the community.

Herbicides are mainly used to control woody species, such as mesquite, creosotebush (*Larrea tridentata*), and snakeweed (*Gutierrezia sarothrae*), in the southwest grassland (Martin 1975, McDaniel 1984). When these plants are successfully controlled, production of herbaceous vegetation may greatly increase (Cable 1976, McDaniel et al. 1982, Gibbens et al. 1987).

Triclopyr is an auxin-type selective herbicide effective against woody plants and broadleaf weeds. The herbicide is particularly effective against root sprouting species, including ash (*Faxinus* spp.) and oaks (*Quercus* spp.) and is used for brush and weed control on rangelands, industrial sites, permanent grass pasture and broadleaf and aquatic weed control in rice. However, most grass species are tolerant to triclopyr.

Clopyralid is a systemic, postemergent herbicide that is effective against many species of Compositae, Fabaceae, Solanaceae, and Apiaceae. It has auxin-like activity, inducing severe epinasty (downward bending of the plants parts, caused by excessive growth of the upper side) and hypertrophy (a nontumorous increase in the size of the plants parts due to the enlargement without increase in number of constituent cells) of the crown and leaves.

Triclopyr and clopyralid significantly reduced brush species, including creosotebush, tarbush (*Flourensia cernua*), wolfberry (*Lycium* spp.), fourwing saltbush (*Atriplex canescens*), snakeweed, and mariola (*Parthenium incanum*). Perennial grass basal areas were initially reduced by treatment, but total grass production of bush muhly (*Muhlenbergia porteri*), threeawn (*Aristida* spp.), bristle grass (*Setaria* spp.), alkali sacaton (*Sporobolus airoides*), spike dropseed (*Sporobolus contractus*) and fluffgrass (*Dasyochloa pulchella*) combined was 11 times greater on the treated than untreated areas after 4 years. Perennial forbs, such as desert holly (*Perezia nana*) and hairyseed bailey (*Baileya* spp.), were decreased slightly by tebuthiuron treatment. Production of annual forbs, mainly desert marigold (*Baileya multiradiata*), round leaf wild buckwheat (*Eriogonum rotundifolium*), and Russian thistle (*Salsola iberica*), was seven times higher on the treated than the untreated area.

Control of mesquite by triclopyr and clopyralid allowed seeded grasses to persist and native grasses to increase on sites in Arizona and Mexico (Cox et al. 1986). Southwestern grasslands treated with moderate rates of triclopyr and clopyralid should generally have decreased woody plant production and increased herbaceous production. Certain sensitive grass, forb and shrub species would be replaced by more tolerant species. Moderate application rates and strip treatments are recommended to minimize damage to desirable sensitive species.

In summary, many species are sensitive to the rates and types of herbicides that are effective in controlling woody plants in the southwestern shrubsteppe. However, herbicidal treatment usually decreases woody plant growth and increases growth of grasses. Herbaceous production initially decreases then increases after a few years as woody species die and herbaceous species recover and respond to reduced competition. The lack of competition would readily allow grass and forbs to flourish, increasing the amount of ground cover, reducing the amount of soil erosion as well as producing an abundance of livestock and wildlife forage.

The change in composition of the vegetative community would have the effect of changing the entire area of treatment from a desert shrubland habitat to a grassland habitat in a very short period of time (approximately 2 to 3 years). A change from shrubland to grassland would change the animal community to one that is representative of grassland habitats.

The application of prescribed fire within two to three years after the application of triclopyr and clopyralid would more effectively control mesquite than the application of prescribed fire alone. After chemical treatment, the amount of herbaceous vegetation would increase to a level that would facilitate the effectiveness of prescribed fire to carry through an area while removing standing dead material. A more effective control of mesquite would speed the return to native plant composition. Short-term (less than five years) impacts of burning desirable species would be offset by nutrient recycling and regrowth after burning, dependent on precipitation.

Prescribed fire typically does not kill southwestern grass species (Warren, et al 1999). This is because fires are usually fast moving and do not burn into the root crown. This allows the grass plants to resprout. Prescribed fires topkill sprouting shrubs such as mesquite and seedlings, which maintains the area as a grassland with scattered shrubs. Grass species recovery is dependent upon post-treatment precipitation, plant vigor prior to burning, relative humidity at time of burning and post-treatment grazing pressure. Depending upon the amount of post-treatment precipitation, grasses can recover as quickly as the first growing season. Without sufficient post-treatment moisture, recovery could take several years to reach pre-treatment levels and support less desirable species during the interim.

Some sensitive grasses, broadleaves and non-target shrub species may be damaged by the application of the herbicides. It is expected that these species would recover rapidly and would increase in production. An increase in grass production would allow for prescribed fire to be used to maintain the herbicide treated areas in their desired condition.

North Pecos River and Overflow Wetlands ACECs: Aerial application of herbicides for mesquite control would not be allowed in either ACEC to protect the wetland and riparian habitat but may receive ground-based treatment in the form of backpack sprayers or sprayers mounted on all-terrain vehicles. Impacts of such treatment would be similar to those described in other sections of this document.

Livestock: The goals of rangeland treatment methods for livestock include suppressing plant species that are undesirable or toxic and improving forage production by controlling competing vegetation. Livestock could be affected directly by ingesting poisonous weeds and indirectly by changes in forage supply and herbicide exposure.

Chemical treatments are generally applied in a form or at such low rates that they do not affect livestock. Treatment would be applied when livestock are not in the treated pasture.

Based on the risk analysis in Appendix E-8 of the 1991 Vegetation Treatment FEIS, the estimated doses for livestock would be well below the EPA risk criterion of 1/5 LD50 for all of the program herbicides. Therefore, the risk of direct toxic effect to these animals is negligible, even assuming exposure immediately after treatment.

Using herbicides is the most efficient and effective way to control some competing vegetation and noxious weeds. However, some aerially applied herbicides also may eliminate some shrubs and trees that livestock need for shelter.

Following chemical application and prescribed burning, the treated areas would be rested from livestock grazing to allow the forage species time to produce leaves, stems and leaders which would build up root reserves. This post-treatment rest could be considered a negative impact, as alternative grazing must be located for the livestock normally using the treated area.

Invasive, Non-native Species: African rue, Russian knapweed and salt cedar would not be impacted by the applications rates being proposed for either of the two herbicides.

Wildlife: Wildlife species depend directly on vegetation for habitat, so any change in a particular plant community is likely to affect the wildlife species associated with that community. Any change in community vegetation structure or composition is likely to be favorable to certain animal species and unfavorable to others (Maser and Thomas 1983).

Chemical treatments traditionally have been applied most frequently to decrease woody plant cover and increase the production of grasses. The control of woody plants, especially by selective herbicides, often results in the initial control of associated broadleaf forbs, both categories of plants contain species which may be important food for many different wildlife species.

Aerial herbicide applications have the most significant potential for affecting wildlife due to the magnitude of treatment area. However, there would be large areas adjacent to proposed project areas that would be left alone which would contain mesquite and other large woody plants for those species that favor shrubs in the grassland community. These treatments can be considered tools for wildlife habitat management when vegetative responses and habitat requirements are understood.

Chemical treatments are designed to increase and decrease other vegetation components for the benefit or exclusion of different groups of wildlife species which are associated with different types of habitat. This usually has a temporary effect on all wildlife species. Enhancing the structural diversity of vegetation by controlling shrubs and increasing understory species in a mosaic pattern should increase bird diversity.

After treatment of mesquite, an increase of forb and grass species would most likely lead to an increase in use of treated areas by wildlife species such as pronghorn (*Antilocapra americana*), mule deer, quail, and dove, which in turn could lead to an increase in the number of hunters using the area. The recreational value would correspond to the availability of animals for hunting or viewing.

All treatments would affect some change in the existing wildlife communities, including amphibians, reptiles, and invertebrates. The end result of the treatment should be more beneficial to wildlife in general than the community and/or populations foregone by the treatment.

Most riparian areas are crucial habitat for wildlife and no chemical treatments are proposed in these areas. The primary practice would be for riparian areas to be buffered and protected from any impacts. Treatments that reduce runoff and sedimentation would have positive benefits for fish and aquatic wildlife and there would be shifts or changes in forage and habitat for wildlife, depending on species.

The BLM Pest Control Handbook, H-9011-1, requires buffering of domestic waters, perennial marsh areas, important fishing and recreational waters, and/or significant fish spawning, rearing and migration streams. Recommended buffers are the larger of the herbicide label recommendation or 25 horizontal feet for vehicle spraying and 100 horizontal feet for aerial spraying.

The Roswell Resource Management Plan (Appendix 9, Treating Vegetation with Herbicides) also states buffers for herbicide applications: Aerial Spraying 100 feet, 25 feet for vehicle spraying and 10 feet for hand application for projects adjacent to the Pecos River, any livestock watering locations, ranch houses or known locations of threatened or endangered plants. The RMP also includes requirements for protective buffer zones to be provided around important riparian or wetland habitats along streams, rivers lakes that are not designed to be treated and around xeroriparian areas along important dry water courses. Each of these buffering requirements has been included in the project stipulations and designs.

The application of prescribed fire would have immediate impacts in the form of displacement of many terrestrial species during the actual firing operations. Impact to wildlife would naturally be short term following the prescribed burn. As with any fire,

whether natural or man caused, some mortality of small animals, reptiles and birds would occur. A negative impact would occur if the timing of the proposed action coincides with nesting activities. There is the potential that nests would be destroyed during the proposed action; however, the adult birds should be able to escape and re-nest in unburned areas.

In most cases, wildlife would be displaced in the short term by the fire and the loss of vegetation and then would return when vegetation begins to grow back. Some shift of wildlife may occur within the burned areas. Species favoring dense, heavy brush may vacate the area, while species favoring open or savannah type habitat may inhabit the area.

Special Status Species: There would be no effect to listed species as they do not occur nor would be impacted by the proposed action as designed.

Cultural: Before authorizing vegetation treatment actions that could affect cultural resources, cultural properties eligible for inclusion in the National Register of Historic Places would be identified and considered through the process outline in the National Historic Preservation Act of 1966 and implement in 36 CFR 800 and the BLM 8100 Manual series. It is unlikely that cultural artifacts protected by soil or plant cover would be adversely affected by chemical treatments. The effect of herbicide treatments on cultural resources depends on the method of herbicide application and the herbicide used.

Wherever bladed firelines are to be built, a cultural survey would occur prior to blading. Significant archaeological and historic sites would be avoided. Should cultural material be discovered during blading, fireline work would cease until the cultural resource issue is resolved. Significant cultural resources would be protected from further disturbance.

Cave/Karst: This area is located in an area of high, medium and low cave/karst potential. There is one significant cave named "Bat Hole" that should be avoided during November through April because of a hibernating bat colony within the cave. There should not be any adverse actions by the majority of the proposed actions.

Recreation: Hunting and hiking, off highway vehicle activity and other actions would still occur within propose area. It is anticipated that improved habitat conditions would result in increased wildlife numbers and additional use by the public for hunting activities. There should not be any adverse actions by the proposed action.

Visual Resource Management: Public land has many different visual values. Visual values are identified through the Visual Resource Management (VRM) inventory and are grouped into four visual resource inventory classes, which represent the relative value of the visual resources. Classes I & II are the most valued, Class III is moderately valued, Class IV is the least valued. The criteria for determining the classes are scenic quality, sensitivity level, and distance zone. Landform, vegetation, water, color adjacent scenery, scarcity and cultural modification area used in determining an area's scenic quality (BLM 1986).

An adverse visual impact is any modification in landforms, water bodies, or vegetation or any introduction of structures that disrupt negatively the visual character of the landscape and the harmony of the basic elements (that is, form, line, color and texture).

Where areas are treated by methods that could significantly change visual contrast (quality), short-term adverse impacts on visual resources would occur. However, based on standard operating procedures and long range plans, the long-term impacts would be beneficial. The intensity of the impacts would depend on the treatment method and the area where it was implemented. Most of the land considered for the vegetation treatment program in the FEIS is Class IV; therefore, the impacts that might occur from any of the treatment methods would not be as distinct as in a Class I or II area. Factors that effect the degree of visual contrast area: distance, angle or observation, length of time in view, relative size or scale, season of use, light conditions, recovery time, atmosphere conditions and motion.

Herbicide use reduces the variety of vegetation and may prevent the manifestation of seasonal changes such as spring flowers and fall color in a treated area. Areas treated with herbicides turn brown and contrast with surround vegetation for a short period of time. However, applying herbicides could have the positive visual impact of allowing regrowth of more aesthetically desirable vegetation.

The proposed action would change the color and texture of the landscape by replacing the creosotebush cover with grasses and forbs. However, it can be argued whether the visual change is positive or negative. The resulting landscape, as seen from Highway 70 or 380, would still appear natural to the casual observer. To mitigate potential visual impacts, lines between treated and untreated areas should be irregular with no straight edges.

There are no unique natural or man-made features which would interfere with the proposed action or the alternatives. The area has been placed in Visual Resources Management Class III or IV. Both of these Classes allow change in the scenery to occur. The sensitivity of the area is low.

Prescribed burning would have an effect for approximately one growing season while the area is in a blackened condition. After one year the area should return to a normal looking condition.

Social and Economic: A description of the social and economic impacts are discussed on pages 3-119 of the FEIS. Site specific conclusions would be essentially the same.

Social Resources: Many of the social effects of vegetation treatment programs occur as a result of changes in jobs or personal income. Compared with total employment or personal income, employment or income changes resulting from the implementation vegetation treatment may seem small. However, these changes may be important when considered on a local or a site specific basis to individuals who rely on the continued productivity of public lands and employment in vegetation treatment activities for their livelihood.

Direct impacts would occur if an individual's sense of well-being or economic security were affected by BLM's decision on the use or restriction of particular vegetation treatment methods. Indirect effects would occur as a result of economic outcomes of BLM policies and in response to gains or losses of recreational opportunities or access to subsistence activities. All of these impacts, direct or indirect, could affect lifestyles and community stability.

Economic Resources: The direct economic impacts of all of the vegetation program alternatives include increases in both employment and sales of treatment materials. The subsequent increase in personal incomes and revenues would benefit the economy of the area if the employees and equipment needed are acquired within the area.

Indirect Economic Impacts: Indirect economic impacts occur as a result of other actions. They are generally difficult to quantify and the incidence of the sort of these impacts is not always clear. Poor range management may result in the death of livestock and wildlife because of ingestion of noxious weeds and poisonous plants.

Human Health: A detailed hazard analysis was conducted for clopyralid and triclopyr as proposed here for use in the FEIS (See Appendix E of the FEIS). Additionally, a worst-case analysis was conducted for the herbicides proposed for use. It has been determined that the worst-case is that someone would get cancer from exposure to herbicides used in the Bureau of Land Management (BLM) Vegetation Treatment Program. The probability of occurrence was projected for two basic populations considered at risk (occupational and general public). The highest probability of cancer for workers in the extreme-case is on the order of one out of 10,000 workers exposed under the lifetime exposure scenario. The highest probability for the general public is on the order of one out of 10 million individuals exposed in the extreme case scenario presented.

B. Impacts of Alternative A – Manual Treatment

Air: This alternative eliminates the potential impacts from herbicides of the Proposed Action.

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield soil from erosion, or alter the presence and abundance of soil microorganisms or larger organisms that contribute to overall soil quality.

The effects of this alternative on the soil would be substantial. The increased organic material, caused initially by the mesquite leaves, stems and roots and secondarily by the increased production of grasses and forbs would improve the fertility of the soils.

Water: This alternative eliminates the potential impacts from herbicides of the Proposed Action. This alternative would not increase peak flows because plant water use would be little affected. Stream nutrients and sediment loads would not increase because litter and duff would be left intact.

Vegetation: Vegetation treatments would have beneficial and adverse effects on terrestrial vegetation within the treatment area. Target vegetation in treated areas would be directly affected. Non-target vegetation would not be affected.

Livestock: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Due to longer time frames which are required for manual treatments, alternate locations would be needed for the displaced livestock. Impacts to livestock grazing management (rest until the treated area recovers, usually two growing seasons) would be the same as the Proposed Action.

Invasive, Non-Native Species: African rue and Russian knapweed may be spread by manual treatment if normal care is not taken to clean all equipment being used in and around infested sites. Salt cedar would resprout after manual treatment if the root crown is not removed. If the same treatment method is applied to the salt cedar as is proposed for mesquite, control of the salt cedar would be affected.

North Pecos River and Overflow Wetlands ACECs: This alternative eliminates the potential impacts from herbicides of the Proposed Action.

Wildlife: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Manual treatment, however, would negatively affect those species that depend on the target plants for food or cover.

Special Status Species: Impacts would be similar to those in the Proposed Action.

Cultural: Before authorizing vegetation treatment actions that could affect cultural resources, cultural properties eligible for inclusion in the National Register of Historic Places would be identified and considered through the process outline in the National Historic Preservation Act of 1966 and implement in 36 CFR 800 and the BLM 8100 Manual series. It is unlikely that cultural artifacts protected by soil or plant cover would be adversely affected by manual treatments.

Visual Resource Management: Impacts would be similar to those in the Proposed Action.

Recreation: Hunting and hiking, off highway vehicle activity and other actions would still occur within propose area. There should not be any adverse actions by the proposed action.

Cave/Karst: Some of the area is in Medium Karst potential. Within these areas vehicles traveling over cave/karst areas should be careful not to drive over cave entrances as well as highly developed karst areas that may collapse under the vehicle

Social and Economic: The direct and indirect social and economic impacts of manual treatment would be essentially the same as the Proposed Action.

Human Health: Under this alternative, risks of public and worker health effects from herbicides would be eliminated. Risks to workers, however, from manual or mechanical treatment would increase.

C. Impacts of Alternative B – Mechanical Treatment

Air: This alternative eliminates the potential impacts from herbicides of the Proposed Action. The impacts of this alternative, however, would be increased dust particles during the treatment itself as well as dust as the result of wind erosion until the grasses and forbs re-establish themselves in the treated areas,

Soil: Vegetation treatments may affect the physical characteristics of soil directly, alter the abundance and types of vegetation that may shield soil from erosion, or alter the presence and abundance of microorganisms or larger organisms that contribute to overall soil quality.

The effects of this alternative on the soils would be substantial. Removing mesquite by this method also removes grasses and forbs, resulting in large areas of bare soil. This alternative would result in an increased risk of soil erosion due to wind and rain until the grasses and forbs re-establish themselves in the treated area.

Water: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Precipitation runoff would increase and an associated increase in stream volume and peak volume. Loss of vegetation cover would result in increased erosion potential and subsequent sediment loads.

Vegetation: Vegetation treatments would have beneficial and adverse effects on terrestrial vegetation within the treatment area. Target and non-target vegetation in treated areas would be directly affected.

Invasive, Non-Native Species: African rue and Russian knapweed may be spread by mechanical treatment if normal care is not taken to clean all equipment being used in and around infested sites. Salt cedar would resprout after mechanical treatment is the root crown is not removed. If the same treatment method is applied to the salt cedar as is proposed for mesquite, control of the salt cedar would be effected.

North Pecos River and Overflow Wetlands ACECs: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Surface disturbance from bladed equipment such as bulldozers, however, would likely produce impacts at a level to be contrary to the management goals or either ACEC. Extractor techniques (pulling the plants from the ground) have proven to be efficient while reducing the amount of surface disturbance to acceptable levels.

Livestock: This alternative eliminates the potential impacts from herbicides of the Proposed Action. Due to longer time frames which are required for mechanical treatment, alternate locations would be needed for the displaced livestock. Impacts to livestock grazing management (rest until the treated area recovers, usually two growing seasons) would be the same as the Proposed Action.

Wildlife: Impacts would be similar to those of Alternative A.

Special Status Species: Impacts would be similar to those in the Proposed Action.

Cultural: Mechanical treatment could damage archeological and historic sites. In order to avoid damaging sites, cultural inventory surveys would need to be conducted prior to project implementation in order to locate and avoid eligible and potentially eligible sites. Buried sites discovered by mechanical treatment may also increase the possibility of artifact theft due to site exposure. Performing cultural surveys to mitigate these impacts would add substantially to the cost of the project.

Visual Resource Management: Impacts would be similar to those in the Proposed Action. There could be some change in the form and color of some of the treated areas by plant and shrub materials being piled up and turning brown prior to removal or burning. The texture of the area could be affected by root plowing and mechanical removal of plant and shrub materials.

Recreation: Hunting, hiking, bird watching, off highway vehicle activity and other actions would still occur within propose area. There should not be any adverse actions by the proposed action.

Cave/Karst: Some of the area is in High and Medium Karst potential. Within these areas vehicles traveling over cave/karst areas should be careful not to drive over cave entrances as well as highly developed karst areas that may collapse under vehicles. There is one significant cave named "Bat Hole" that would probably be avoided because of its location along the Llano Estacado escarpment.

Social and Economic: The direct and indirect social and economic impacts of manual treatment would be essentially the same as Alternative A – Manual Treatment.

D. Impacts of the No Action Alternative

The No Action Alternative avoids the impacts of herbicide applications and prescribed fire. Therefore, under the No Action alternative present conditions would not significantly change. The area would primarily remain in a status quo condition with the area dominated by mesquite and its present effects. Mesquite would continue to encroach and increase to the detriment of the native habitat and the species that rely on that habitat. Endangered species occurrence as well as mule deer, pronghorn and quail populations would remain unchanged. No increase of forage or stabilization of soil would occur. Expansion of existing blowout areas would occur under the no action alternative. No increase in use by recreationists would occur. Movement towards the goals of Desired Plant Community or improvement in public land health would not occur.

E. Mitigation Measures and Residual Impacts

Mitigation Measures

Any project involving herbicides would follow the policies, standards and practices listed in Appendix 9, Treating Vegetation with Herbicides, of the 1997 Roswell RMP. In addition to the mitigation measures listed in the Proposed Action, the following measures would also apply:

- In areas of Medium cave/karst potential the area would be reviewed by the Roswell Field Office Outdoor Recreation Planner to determine if there is cave or karst features within the area. If cave/karst features are found, heavy equipment should not be used within these areas and surface disturbance shall be kept to a minimum within these areas.
- Livestock numbers would not increase as a result of any of the treatments covered in this analysis. The livestock operator must demonstrate to BLM staff that any net increase in animal unit months (AUMs) is the direct result of the livestock operator's ability to manage livestock in balance with watershed capacity to provide forage, maintain livestock distribution and proper grazing use to restore rangeland health prior to any increases in authorized increases in animal numbers.
- BLM would ensure that the agreed upon level of cultural inventory is completed prior to implementation, and would protect sensitive areas using buffer zones, hand treatment of vegetation, removal of heavy fuels or other actions agreed to under the provisions of the Protocol Agreement between the New Mexico Bureau of Land Management and New Mexico State Historic Preservation Officer. These procedures would ensure compliance with the National Historic Preservation Act. The appropriate mitigation measures may be implemented after consultation with New Mexico State Historic Preservation Officer.
- Treatment would be conducted to avoid the nesting season and other times of the year when loss of cover would be critical to wildlife; for example reproductive periods (from April to June).
- Monitoring studies would be conducted to determine those areas that meet or exceed the treatment threshold. Post-treatment monitoring would be conducted to evaluate the effectiveness of treatments.

Residual Impacts: Implementation of the proposed action or of the alternatives of either a different rate of chemical or different amount of acreage would all have the same potential for unavoidable adverse environmental impacts. They are as follows:

- Short-term reduction in air quality from dust and engine emissions resulting from the equipment being used in the application of the herbicide.

- Short-term change in chemical composition of the uppermost soil layers due to the change in abundance of organic matter.

-A temporary increase in fire hazard from waste material (dry vegetation) left on the ground after treatment.

-Short-term decrease in habitat for wildlife species.

V. COST ANALYSES

This EA is tiered to the Vegetation Treatment on BLM Lands in Thirteen States Final EIS (FEIS) of May 1991. The Record of Decision for this document states:

“Land treatments proposed for livestock forage improvements would be subject to a cost benefit analysis to ensure total benefits gained would equal or exceed the cost of treatments. The economic analysis would identify the most economical treatment practice.”

As stated elsewhere in this document, the stated purpose of this project is not livestock forage improvements and no increase in livestock numbers would accompany treatments analyzed in this document. Therefore, a cost-benefit analysis is not necessary, however, this EA would identify the estimated costs of treatments.

This EA has identified 88,000 acres, (approximately one-half the public land acres within the project area) as the upper limit of public land acres that would be treated within the Pecos Uplands landscape. Actual treatment acres, regardless of the method used, is dependent on the future budget BLM would receive to carry out these types of projects.

Table 3. Estimated Treatment Costs

Alternative		Estimated Cost Per Acre	Possible Acres Treated	Estimated Total Cost
Proposed Action	Chemical	\$30	88,000	\$2,640,000
	Prescribed Fire	\$20	88,000	\$1,760,000
A. Manual Treatment		\$450	88,000	\$39,600,000
B. Large Scale Mechanical Treatment		\$300	88,000	\$26,400,000

In the implementation of the Proposed Action, BLM does not anticipate either 100 percent treatment with chemicals or 100 percent treatment with prescribed fire. Instead BLM anticipates using the most appropriate method based on site specific conditions to achieve the goals of this project.

VI. CUMULATIVE IMPACTS

A cumulative impact is defined in 40 CFR 1508.7 as:

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

The analysis of cumulative impacts focuses on the geographical area defined as the set of BLM-administered allotments within the Pecos Uplands as illustrated on the attached maps and listed under Table 2. The specific resources being impacted are limited to those that are most important in terms of impacts resulting from remedial actions needing to be implemented to improve current environmental conditions. The proposed action is the treatment of invasive mesquite within a grassland community type using a combination of methods to reach the goals and objectives for the restoration of the native grassland community. Environmental considerations are presented to mitigate impacts and include standard operating procedures for vegetation treatments, as well as specific design features that would be developed on a case-by-case basis for individual treatments and environmental conditions and resource concerns warrant.

The health, viability and sustainability of grassland resources within the project area has been impacted by land use activities that have occurred over the last 150 years. Impacts from open-range livestock grazing in the last century are still being addressed by the Bureau of Land Management. The impacts of such past practices coupled with climatic conditions such as long-term drought periods has encouraged the encroachment of brush species such as mesquite, broom snakeweed, yucca and cactus species, saltcedar and other non-native plant species (noxious weeds) that increase when rangeland conditions deteriorate. The suppression of range fires has also contributed to the increase in brushy species and deterioration of rangeland health. On its own, these rangelands cannot revert back to the once pristine grassland prairie ecosystems of the past, and prior to man's activities, without resource management actions to improve soil and vegetation resources.

Past vegetation treatments within the project area have occurred. BLM records show 13 other chemical treatment projects totaling 42,000 acres in the past 20 years. Also, 11 prescribed fires covering 18,000 acres have been conducted in the project area during the same time period. Collectively, these treatments account for about 13 percent of the total area, regardless of land status, or about 32 percent of federal lands.

Other major resource uses that have been occurring within the project area, and expected to continue, include oil and gas development and rights-of-way construction. These legitimate activities under BLM's multiple use mandate are nevertheless cumulative impacts to grassland ecosystems as well. The reasonable and foreseeable development scenario for oil and gas and rights-of-way development, found in the 1994 Draft Roswell RMP, indicates that in the Pecos Uplands approximately 10 new wells would be drilled per year and approximately four wells would be plugged and abandoned.

Livestock grazing is expected to continue in the project area but allocation of forage resources above current uses is not expected to occur. As markets for beef production fluctuates, so does actual livestock use on federal lands. As drought conditions and effects are seen on the landscape, this natural event also affects livestock grazing on public lands. Livestock numbers are expected to fluctuate following market conditions and rangeland health, with a decrease in stocking rate following a decline beef prices in the market and/or in rangeland vegetation production from lack of precipitation.

In the long term, the treatment of up to 88,000 acres would most likely occur in stages spanning several years to allow for project planning and optimum treatment prescriptions. This “staggering” of site-specific projects reduces the amount of direct impacts to resources and buffers the cumulative impacts of repeated actions over the landscape. Individual treatments could range from 500 acres up to 1,000 acres in size, and possibly larger for prescribed fire activities. The size and number of treatments would be, in part, determined by economies of scale, with the costs reduced by efficiently implementing control over the project area. The degree of cumulative impacts would increase as the size of the individual treatments increases.

All authorized activities which occur on federal land can also take place on private and state lands. It is expected that additional land treatments would occur on other private and state lands through either private funding or through programs through the National Resource Conservation Service (NRCS). The amount of specific treatments that may be proposed on other lands within the project area is not known.

The very nature of the proposed action is to improve the grassland community while limiting and reducing impacts to other resources and uses by design, it is not a surface disturbing activity such as those associated with developments. Direct and indirect impacts of the proposed action to resources are adequately addressed above. Improving the grassland community within the project area has the effect of sustaining the viability and health of grasslands in the long term, and countering other ongoing and foreseeable impacts generated by activities such as oil and gas development and rights-of-way which tend to fragment habitat.

In addition to the proposed action for the Pecos Uplands, there are three similar-in-action project areas to receive vegetation manipulation projects to enhance current rangeland conditions. These are the Hondo, Turkey Track and East Chaves project areas, all located within the Roswell Field Office area. These three additional areas are disjunct and support a different type of grassland ecosystem with differing site conditions. These are mentioned here in the context of cumulative impacts of grassland restoration efforts on a large scale. As pointed out, site conditions differ and a reason for the development of additional environmental assessments covering proposed vegetation manipulation projects in their respective areas. As a matter of disclosure, the collective acreage for treatment of public lands for this grassland restoration endeavor is about 310,000 acres of federal land, or about 21 percent of all public lands within the Roswell Field Office.

Overall, the cumulative impacts associated with the proposed action are not expected to be an additive negative impact to the environment but rather a beneficial additive impact to various resources over the entire landscape, given the mitigation, standard operating procedures and case-by-case project design and implementation. As mentioned, the degree of cumulative impacts may vary based on the size of individual treatments. In general, long term vegetation and soil health would benefit the grassland ecosystem and wildlife species dependent on this habitat type, custom and culture would be sustainable from enhance rangeland conditions, other land use impacts would be buffered, or balanced with grassland restoration efforts. Sustaining the projects would require monitoring efforts to detect appropriate livestock utilization levels, modification of future projects to reach objectives, and other resource use restrictions as needed to ensure the longevity of the restoration efforts. The conclusion of impacts to other resource values from mesquite control would not be significant are discussed in detail in Section IV of the EA.

VII. COMMITMENT OF RESOURCE

The proposed action is a non-reversible and irretrievable commitment of the rangeland resource. Irreversible and irretrievable commitments would be minimal, but would include some short-term soil movement and some level of mortality to small mammals within the proposed burn areas.

VIII. SUMMARY

The results of the proposed action would change the plant and animal communities of the treatment area. The proposed action would result in beneficial effects to the soil, water, and animal life although they may be different than present. The treatment of a small area as proposed would not affect the environment as a whole, but would be site specific in its effect.

IX. PERSONS OR AGENCIES CONSULTED

BLM Staff

Howard Parman, planning and environmental coordinator

Richard Hill, environmental protection specialist

Dan Baggao, wildlife biologist

Melvin Moe, wildlife biologist

Pat Flanary, archaeologist

Paul Happel, natural resource specialist

Michael McGee, hydrologist

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John Spain, range conservationist specialist

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APPENDIX A

Herbicide Labels and MSDS Sheets

APPENDIX B

Best Management Practices

APPENDIX B Best Management Practices

Vegetation treatments within the Roswell Field Office would utilize the following best management practices (BMPs) for chemically or mechanically treating mesquite:

- The specific mesquite treatment areas would be evaluated on an individual, site specific basis. For any treatment project both pre- and post-treatment monitoring data would be collected.
- Only herbicides approved for use by the Environmental Protection Agency (EPA), BLM, and the State of New Mexico would be applied on public lands.
- Application of herbicides may be made via either aerial or ground methods.
- Aerial application of the herbicide would be conducted when the correct phenological stage of mesquite growth occurs; generally between the first of June and the end of September.
- Ground applications would be made at any time of the year, except when the ground is frozen.
- Treatments are conducted in such a manner to reduce straight edge lines, and contain areas or islands of untreated mesquite left for the preservation of habitat important to the maintenance of existing and future populations of game and non-game animals.
- Treatments would serve to create a regional mosaic within the landscape.
- Site-specific mitigation and design features would be incorporated in the Administrative Decision document.
- Appendix 9 of the Roswell RMP outlines the policies, standards and practices to be used on public land in the Roswell Field Office when treating vegetation with herbicides. These requirements are derived from BLM policy, the Final EIS on Vegetation Treatment on BLM Lands in Thirteen Western States, decisions made in Roswell Resource Area Land use plans, and mitigations developed through environmental assessments.
- The applicable federal regulations concerning the storage and disposal of herbicides and herbicide containers would be followed. These are described in the Environmental Protection Agency "Regulations for Acceptance and Procedures for Disposal and Storage," Federal Register May 1, 1974, pages 15236 through 15241. This notation can be found on the label of each herbicide.
- The response of vegetation to treatment would be monitored by methods established prior to treatment. Onsite evaluation of herbicide effectiveness and resulting secondary succession would be conducted. Data gathered would be used to improve the brush control process.
- A resumption of livestock grazing would be made with the consultation of the grazing permittee and BLM.
- Considerations for wildlife habitat, watershed conditions and livestock operations would be factored into each project. These may include leave out areas, timing of treatment and additional management actions after treatment.
- Mechanical methods of treatment would be used in locations where herbicide application is not appropriate, such as floodplains, riparian areas and some sites within Areas of Critical Environmental Concern (ACECs).
- Before surface disturbing mechanical treatments are allowed on any site, surveys for the presence of cultural resources would be conducted. Cultural sites discovered by these surveys would be avoided or left out of the treated area.
- For any site proposed for pesticide (herbicide) treatment, the potential for groundwater contamination would be evaluated with the Environmental Protection Agency (EPA)

rating system, DRASTIC (Aller et al. 1985). If the site proposed for treatment has a DRASTIC index greater than 100, it has a moderate to high potential for groundwater contamination, and would require a more detailed analysis prior to a decision being made on the proposed treatment. Factors that would be studied further include: pesticide solubility, mobility, speciation, and degradation, and highly localized recharge areas. A DRASTIC analysis for the entire Roswell Field Office Area has not been performed or incorporated into this EA. Therefore, a detailed DRASTIC analysis would be prepared for all pesticide treatment projects developed under this EA prior to pesticide treatment project implementation and prior to a decision being made on each of the proposed pesticide treatments. The Drastic Analysis for each proposed pesticide treatment would be included with the Documentation of Land Use Plan Conformance and National Environmental Policy Act (NEPA) Adequacy (DNA) review and decision document. A DNA would be prepared for each proposed Mesquite pesticide (herbicide) treatment project.

The following photographs depict areas within Pecos Upland Grassland Restoration project.



Figure 1: Illustration of area which would not meet criteria for mesquite treatment. Note the low number of mesquite plants. (Allot 64039, West Huggins Pasture, Nov. 1999)



Figure 2: Illustration of potential mesquite treatment by either Mechanical, Manual or individual plant herbicide treatment. (Allot 64049, Finley Pasture, Dec. 2005)



Figure 3: Illustration of potential mesquite treatment by aerial application of Herbicide (Allot 65024, 8 Mile Pasture, Oct. 2004)



Figure 4: Illustration of potential mesquite treatment by combination of aerial application of Herbicide and prescribed fire (Allot 65137, North Big Pasture, Oct. 2004)