DECISION RECORD

It is my decision to defer livestock grazing on public lands on Allotments 64056 and 64057 for the reasons outlined in environmental assessment NM-060-99-089. Comments on this proposal were considered, and no changes to the environmental assessment were necessary.

Through the Rangeland Reform '94 initiative, the BLM developed new regulations for grazing administration on public lands. With public involvement, fundamentals of rangeland health were established and written into the new regulations. The fundamentals of rangeland health are identified in 43 CFR §4180.1, and pertain to (1) watershed function; (2) ecological processes; (3) water quality; and (4) habitat for threatened, endangered, and other special status species. Based on available data and professional judgement, the evaluation by this environmental assessment indicates that conditions identified in the fundamentals of rangeland health exist on Allotments 64056 and 64057.

In accordance with 43 CFR 4160.2, you are allowed 15 days after the receipt of this proposed decision to protest it to the Authorized Officer in person or in writing. Please be specific in your points of protest. In the absence of a protest, this proposed decision will become the final decision of the authorized officer without further notice, in accordance with 43 CFR 4160.3.

A period of 30 days following receipt of the final decision, or 30 days after the date the proposed decision becomes final, is provided for filing an appeal and petition for a stay of the decision, for the purpose of a hearing before an Administrative Law Judge (43 CFR 4.470). Any appeal should clearly and concisely state the specific points being appealed. Appeals can be filed at the following address:

Field Office Manager
2909 West Second Street
Roswell, NM 88201

Signed by T. R. Kreager — 6/8/99
Assistant Field Manager-Resources — Date

ENVIRONMENTAL ASSESSMENT

of the Effects of Deferring Livestock Grazing on

ALLOTMENTS 64056 and 64057

Township 8 South, Range 25 East
Sections 35-36 (portions)

Township 9 South, Range 25 East
Sections 2-3, 9-11, 14-16, 20-23, 28-30, 31-32 (all or part)

Township 10 South, Range 25 East
Sections 5-8 (portions)

EA-NM-060-99-089

April 1999

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

I. BACKGROUND

A. Introduction

Allotments 64056 and 64057 have unique resource values due to their location. Allotment 64056 lies between the North and Middle tracts of Bitter Lake National Wildlife Refuge (BLNWR), and 64057 shares the west boundary of the refuge Middle Tract. The allotments lie at the northwest limit of the Roswell ground-water basin, and along the Pecos River. The area is also close to Roswell, making it readily accessible to recreationists and other users.

The allotments provide a variety of environmental values, such as recreational opportunities, surface and ground water, river floodplain and riparian areas, aquatic habitat, and terrestrial wildlife habitat, including nesting habitat for the federally endangered interior least tern. The allotment lands also provide several commodity uses, such as livestock grazing, sand and gravel removal, and natural gas development. In addition, adjacent lands are being developed for residential use.

The Bureau of Land Management (BLM) must manage the public lands under the principles of multiple use and sustained yield, as required by the Federal Land Policy and Management Act (FLPMA). The term multiple use means the combination of uses that will best meet the present and future needs of the American people. FLPMA acknowledges the best use of some lands will be for less than all of the resources found there. The law also requires the BLM to consider the relative value of the resources, and not necessarily to the combination of uses that give the greatest economic return.

Managing the rare environmental values on Allotments 64056 and 64057 requires that the BLM address impacts from all uses of the area. The greatest observed impacts have been from livestock grazing; natural gas exploration and development; sand and gravel extraction; and recreation, particularly the use of off-highway vehicles (OHVs). This environmental assessment (EA) addresses only one use: livestock grazing. Other use activities will be addressed in separate documents in the future.

Livestock were grazed in the area of Allotments 64056 and 64057 since the last century. After passage of the Taylor Grazing Act, grazing preference was established, and livestock were permitted to graze public rangelands on the allotments until recently.

Livestock grazing has not been authorized on public rangeland on Allotments 64056 and 64057 since March 1998 and November 1996, respectively. The BLM canceled grazing privileges on 64056 because the permittee would not maintain the northwest boundary fence, and on 64057 because the permittee lacked qualifying base property. This EA addresses the impacts likely to result from deferring livestock grazing authorization on the two allotments. Both are included because of their proximity to each other, and because neither allotment currently has grazing authorized.

B. Purpose And Need For The Proposed Action

The purpose of deferring livestock grazing authorization on Allotments 64056 and 64057 is to allow the BLM to focus management of the area on the rare combination of resources described above. The Proposed Action addresses possible future applications for livestock grazing on the two allotments.

C. Conformance With Land Use Planning

The proposed action conforms with the Roswell Approved Resource Management Plan (RMP) and Record of Decision (BLM 1997) as required by 43 CFR 1610.5-3.

D. Relationships to Statutes, Regulations, or Other Plans

The proposed action and alternatives are consistent with the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1700 et seq.); the Taylor Grazing Act of 1934 (43 U.S.C. 315 et seq.), as amended; the Clean Water Act (33 U.S.C. 1251 et seq.), as amended; the Endangered Species Act (16 U.S.C. 1535 et seq.), as amended; the Public Rangelands Improvement Act of 1978 (43 U.S.C. 1901 et seq.); Executive Order 11988, Floodplain Management; and Executive Order 11990, Protection of Wetlands.

II. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action - Defer the Authorization of Livestock Grazing on Allotments 64056 and 64057 - (BLM Preferred Alternative)

The Proposed Action is to defer the authorization of livestock grazing on Allotments 64056 and 64057. While a grazing permit would not be issued under the Proposed Action, short-term grazing could still be considered as a tool for accomplishing vegetation management objectives.

Authorizing livestock grazing on the two allotments could be considered in the future, once the other management issues are addressed. To be considered for a grazing permit, an applicant must meet the requirements outlined in the range management regulations (43 CFR 4100), and must agree to terms and conditions of the offered permit, including those designed to address resource management issues.

Deferring livestock grazing is viewed as just one aspect of overall management of the area by the BLM. Other activities that could be considered are (1) regulating recreational use, particularly off-highway vehicles; (2) developing wildlife habitat enhancement projects; (3) conducting vegetation projects, such as saltcedar control; (4) removing or abandoning range improvements; (5) exchanging or purchasing lands to consolidate public lands in the area, thus making management more efficient; (6) adjusting allotment

boundaries; (7) developing cooperative management plans with BLNWR; and (8) closing the area to future oil and gas leasing.[1]

B .
Consider Livestock Grazing Authorization for a Qualified Applicant

Under this alternative, livestock grazing could be authorized in accordance with the Taylor Grazing Act and 43 CFR 4100, if a qualified application is submitted to the BLM. Terms and conditions of a Section 3 permit would be determined at the time of application, but would consider all resource values on the allotments. An Allotment Management Plan (AMP) would also be developed as a condition of the permit. Permitted use levels would be determined following receipt of the application, but for the purposes of this EA, it is assumed that permitted use levels would be the same as in the last permit.

C .
Permanently Exclude Grazing

Permanently excluding grazing from Allotments 64056 and 64057 was considered, but not analyzed in this EA. Until other resource management issues are addressed, there is insufficient information to determine whether a permanent exclusion to livestock is warranted.

III. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

A. General Setting

Allotment 64056 is in Chaves County, approximately eight miles northeast of Roswell (see Map 1). The allotment is bounded by U.S. 70 to the north and the Old Clovis Highway to the west. Several roads off the Old Clovis Highway provide ready access to the allotment. The allotment shares its south boundary with BLNWR, and the Pecos River forms a portion of the east boundary. A railroad runs from southwest to northeast on the west side of the allotment, and a number of other rights-of-way also exist, most of them for gas pipelines.

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[1]The U.S. Fish and Wildlife Service (USFWS) rendered a Biological Opinion on the Roswell Draft Resource Management Plan (RMP). The BLM (1997) incorporated the USFWS reasonable and prudent alternatives into the Approved RMP to avoid jeopardy to the continued existence of the Pecos bluntnose shiner and the Pecos gambusia. Included in the alternative for the gambusia was a requirement that the BLM ". . .[u]se the best available hydrologic information to map the source and movement of water that supplies springs occupied by Pecos gambusia on the [Bitter Lake National Wildlife Refuge] and the Salt Creek Wilderness. Close the lands within the mapped area to oil and gas leasing unless or until BLM can demonstrate that mandatory protective measures will ensure no aquifer contamination."

The Pecos River flows north-to-south through a broad alluvial valley, entering Allotment 64056 just south of U.S. 70. It meanders along the east boundary of the allotment, then enters Bitter Lake National Wildlife Refuge (BLNWR) as it exits the allotment. Much of the allotment lies within the 100-year floodplain of the Pecos River. Allotment 64056 is considered a riparian allotment because of its 6.4 miles of riparian habitat along the Pecos River. Riparian (and wetland) areas are directly influenced by permanent free water, whether at the surface or in the subsurface. Compared to adjacent upland sites, the riparian area has a greater amount and diversity of vegetation. The diversity of plant species and availability of water makes riparian areas prime wildlife habitat.

Though the riparian areas along the river have tremendous resource values, they have been altered by the regulation of river flows by upstream reservoirs, especially Sumner Lake. Reservoir releases are controlled by the the Bureau of Reclamation, and are primarily driven by irrigation demands. Management of allotment riparian areas will be within the constraints imposed by the regulation of river flows.

Allotment 64057 shares its north boundary with Allotment 64056, and its east boundary with BLNWR (see Map 1). The allotment lands nearest the refuge are privately owned, and could be grazed without authorization from the BLM. These lands could also be developed for purposes other than grazing (e.g., residential development). Except for areas of federal mineral estate, the BLM has no control over other potential uses of the private lands.

Allotment 64057 is readily accessible by several maintained roads. Pine Lodge Road forms the south boundary of the allotment and provides the southern access to the refuge. Adjacent lands to the west are being developed for residential use and are serviced by a county road on the west side of the allotment.

Environmental impacts occur on the allotments from uses other than livestock grazing. The most significant impacts result from sand and gravel removal, natural gas development, and recreation, particularly OHV use.

B. Affected Resources

The following resources or values are not present or would not be affected by the Proposed Action or Alternative B on Allotment 64056 or 64057: Areas of Critical Environmental Concern, Cultural Resources, Native American Religious Concerns, Prime or Unique Farmland, Minority/Low Income Populations, Hazardous or Solid Wastes, and Wild and Scenic Rivers. Affected resources and the impacts resulting from the Proposed Action or Alternative B are described below.

1. Livestock Management

Affected Environment

Livestock grazing has not been authorized on public rangeland on Allotment 64056 since March 1998. The last permittee was notified on March 4, 1997, that the northwest boundary fence was not being maintained, and that grazing privileges would be cancelled if needed repairs were not made. The repairs were not made and no protest or appeal was received by the BLM, so grazing privileges were cancelled on March 1, 1998.

Livestock grazing has not been authorized on public rangeland on Allotment 64057 since November 1996. The last permittee was notified on October 19, 1996, that he lacked qualifying base property, and that a proposed decision was issued that would cancel his grazing privileges if the requirement was not met. The permittee did not protest or appeal the proposed decision, so it became final on November 30, 1996.

Following the cancellation of grazing privileges on Allotments 64056 and 64057, the former permittee was notified on March 20, 1998 of a proposed decision to cancel all range improvement permits and agreements. He was allowed 180 days (as in accordance with 43 CFR 4120.3-6(d)) to salvage material owned by him. The range improvements have not been inventoried, but no salvaging of materials is known to have occurred. Protest and appeal periods passed without comment by the former permittee, and the proposed decision became final in September 1998. Table 1 lists the improvements that became the property of the federal government upon issuance of the decision:

Table1. List of Range Improvements Transferred to Federal Ownership

Project Number	Type Authorization	Description	Allotment
4495	Permit	Atkins Pipeline	64056
1572	Permit	Barbed-Wire Fence	64056
1116	Permit	Barbed-Wire Fence	64056
1176	Permit	Barbed-Wire Fence	64056
1796	Permit	Barbed-Wire Fence	64056
5053	Coop. Agreement	Longley Fence	64057
4782	Permit	Two-Strand Electric Fence	64057
4756	Permit	Pipeline	64057

The last grazing permit issued for Allotment 64056 authorized the grazing of cattle. Permitted use was for 100 animal units (AUs), which correspond to 526 animal unit months (AUMs).[2] During the term of the last permit, the allotment covered about 8182 acres, including 3605 acres of BLM land, 3422 acres of controlled private land (i.e., owned or leased by the permittee), 960 acres of state land, and 195 acres of uncontrolled land.

The last grazing permit issued for Allotment 64057 authorized the grazing of cattle. Permitted use was for 23 AUs, which correspond to 240 AUMs. During the term of the last permit, the allotment covered about 1402 acres, including 1000 acres of BLM land, 79 acres of controlled private land, and 323 acres of uncontrolled land.

Environmental Impacts

Under the Proposed Action, there would be no livestock grazing authorized on BLM lands on either allotment until other resource issues are addressed. If livestock were grazed on state or privately owned lands, adjacent BLM land would have to be fenced apart to prevent trespass on the BLM lands (43 CFR 4140.1(b)(1)). The expense of fencing would be borne by the private landowner.

Vandalism, littering, and OHV use occur on the allotments. These activities are likely to continue without the oversight of a permittee. Some range improvements on public land that came under federal ownership would probably fall into disrepair.

Under Alternative B, grazing could be authorized for a qualified applicant. To be qualified on either allotment, the applicant would need control of the base property, and would have to meet the terms and conditions of the permit. The terms and conditions would include bringing the fences and other improvements into a state of repair that would allow the allotment to be managed effectively. Development of an AMP would help ensure that grazing would be compatible with other resource concerns.

Section 3 permits would apply to either allotment because they are in the Grazing District. Therefore, the BLM would determine the permitted use that is appropriate for each allotment. Because a grazing application has not been received, a detailed analysis of a specific livestock operation is not possible. The impacts associated with issuance of a grazing permit would be evaluated in a separate EA if a decision is made to accept applications.

[2]For a cattle operation, an animal unit (AU) is defined as one cow with a nursing calf or its equivalent. An animal unit month (AUM) is the amount of forage needed to sustain that cow and calf for one month.

2. Vegetation

Affected Environment

Allotment 64056 is described as a riparian allotment because of its proximity to the Pecos River. Riparian vegetation, found primarily within a narrow band along the river, is discussed in the Riparian/Wetland section of this EA.

The upland vegetation on the allotment is comprised of mesquite, creosote, fourwing saltbush, broom snakeweed, fluffgrass, burrograss, muhly, dropseed, three-awn, black grama, and annual forbs. The floodplain has the appearance of a salt flat, and is comprised of plants that are tolerant of saline soils, such as alkali sacaton, saltgrass, witchgrass, pickleweed, buckwheat, tobosa, and coldenia.

Allotment 64056 is represented by the Drainages, Draws, and Canyons (DDC) community type (52 percent of the allotment), the Grasslands community type (38 percent), and the Mixed-Desert-Shrub community type (10 percent). General objectives for each vegetation community are described in the Roswell Approved RMP and Record of Decision (BLM 1997), and the Roswell Draft RMP/EIS (BLM 1994). Table 2 summarizes vegetation monitoring data on Allotment 64056 in terms of percent composition of vegetative cover, percent ground cover, and ecological condition.[3]

Though the ecological condition rating is adequate for the DDC community, vegetation objectives are not being met. The allotment averages 68 percent bare ground, but the maximum potential for bare ground on Salt Flats SD-3 ecological sites is 60 percent. The high salinity of the soils make vegetation growth difficult, but grass and forb cover is below potential for this site.

The ecological condition of the Grassland community is rated fair, but only five points above poor. The upward trend in the condition rating might be due to high precipitation levels in the years just before the last monitoring data were collected in 1992.

Vegetative cover by percent composition shows the community to be out of balance. Encroaching mesquite, creosote, and broom snakeweed have resulted in the shrub component dominating the community, making up 61 percent of composition. Monitoring shows forbs to be absent, though the objective is to see 10 to 15 percent of composition as forbs. The lack of forb composition is probably due in part to the fall/winter monitoring schedule. Vegetation data are collected after annual forbs have died off.

Bare ground covers 56 percent of the grassland community, almost the maximum potential for a Sandy SD-3 ecological site. Shrubs and trees account for 14 percent of ground cover, exceeding the

[3]Data for the Mixed-Desert-Shrub (MDS) community are omitted from the table. The west boundary was moved to the Old Clovis Highway in 1995, so the monitoring location now lies outside the allotment, making it less representative of allotment conditions. Inconsistencies in the data collected at this location also make analysis difficult.

10-percent potential for this site. These figures also reflect the encroachment of the shrub species.

Table 2. Allotment 64056 Vegetation Monitoring Data: Averages from 1983-92							
Drainages, Draws, and Canyons Community Type (52 Percent of Allotment)							
Parameter	Grasses	Forbs	Shrubs	Trees	Litter	Bare Ground	Rock
Percent Composition of Vegetative Cover	57	31	12	< 1	Not Applicable		
Percent Ground Cover	15		1		16	69	0
Ecological (Range) Condition and Trend[4]	The average condition ratings are 73 and 51 at the two monitoring locations in the DDC community. Condition appears stable at both locations.						
Grassland Community Type (38 Percent of Allotment)							
Percent Composition of Vegetative Cover	39	0	61	0	Not Applicable		
Percent Ground Cover	7		14		21	57	1
Ecological (Range) Condition and Trend[4]	The average condition rating is 31 and appears to be In an upward trend.						

Allotment 64057 lies a few miles west of the river. The vegetation is comprised primarily of grass species, including alkali sacaton, gyp dropseed, three-awn, gyp grama, vine mesquite, Hall's panicum, muhly, and annual grasses. Other species include coldenia, broom snakeweed, and cholla.

The entire allotment is included in a Salty Bottomland SD-3 ecological site. Table 3 summarizes vegetation monitoring data on Allotment 64057. Like Allotment 64056, the allotment is over 50 percent bare ground.

There is less shrub cover on this allotment, because the Salty Bottomland SD-3 ecological site is less conducive to invasion by mesquite, creosote, and other upland shrub species. This might also explain the ecological condition, which is rated as fair to good on the allotment.

Table 3. Allotment 64057 Vegetation Monitoring Data: Averages from 1983-92							
Parameter	Grasses	Forbs	Shrubs	Trees	Litter	Bare Ground	Rock

[4]The condition rating is defined as the percentage of the plant community that is climax for the ecological (range) site at the time of monitoring.

Percent Composition of Vegetative Cover	98	2	0	0	Not Applicable		
Percent Ground Cover	20		< 1		27	53	0
Ecological (Range) Condition and Trend	The average condition ratings are 55, 43, 51, and 44 at the four monitoring locations on the allotment. Condition appears stable at all locations.						

Environmental Impacts

Under the Proposed Action, a long-term increase in ground cover would be expected without yearlong livestock grazing. To achieve vegetation objectives on Allotment 64056, treatments might also be necessary because shrub species have become dominant. Treatments might include herbicide application, prescribed fire, or short-term livestock grazing. Reduced competition by shrubs would allow grasses and forbs to spread, thus increasing ground cover.

Under Alternative B, grazing would be authorized. If permits were issued with the same use levels as approved in the past, vegetation conditions would be expected to be similar to conditions observed in the past. Bare ground would be high overall, and would even exceed the maximum potential for some ecological sites. The ecological condition of the Grassland community of Allotment 64056 would would be reflected by a poor or a low-fair rating.

3. Soils

Affected Environment

The *Soil Survey of Chaves County, New Mexico, Northern Part (USDA Soil Conservation Service 1983)* was used to describe and analyze impacts to soils on Allotment 64056. There are two general soil map units represented on the allotment.

The Glendale-Ustifluvents-Harkey soil is found on the Pecos floodplain. It is a deep silt loam to very fine sandy loam derived from calcareous alluvium. The Hollomex-Reeves-Milner soil is found on terraces above the floodplain. It is a deep loam derived from calcareous, gypsiferous alluvium. The water erosion hazard on both of these soils is moderate, but the wind erosion hazard is high.

The *Soil Survey of Chaves County, New Mexico, Southern Part (USDA Soil Conservation Service 1980)* was used to describe and analyze impacts to soils on Allotment 64057. Two soil map units are represented on the allotment. The Holloman loam (thick solum) and Holloman-Gypsum land complex (0 to 3 percent slopes) are shallow soils found on the uplands west of the Pecos River. They formed in alluvium over gypsum, which is typically found at depths of 10 to 20 inches. The wind and water erosion hazards are moderate on these soils.

Environmental Impacts

Under the Proposed Action, any adverse impact from livestock grazing would be eliminated. However, it is possible that removing grazing animals from an area where they were a natural part of the landscape could result in poor use of precipitation and inefficient mineral cycling (Savory 1988). Bare soil could be sealed by raindrop impact, and vegetation could become decadent, inhibiting new growth. Therefore, the results of no grazing could be similar to those of overgrazing in some respects.

Adverse soil impacts due to the elimination of yearlong grazing could be reduced by using appropriate vegetation management tools. These might include prescribed fire, herbicide application, mechanical treatment, or short-duration livestock grazing.

Under Alternative B, livestock would remove some of the cover of standing vegetation and litter, and compact the soil by trampling. If livestock management were inadequate, these effects could be severe enough to reduce infiltration rates and increase runoff, leading to greater water erosion and soil losses (Moore et al. 1979, Stoddart et al. 1975). Producing forage and protecting the soil from further erosion would then be more difficult. The greatest impacts of removing vegetation and trampling would be expected in areas of concentrated livestock use, such as trails, waters, feeders, and shade.

Soils on the allotments are highly vulnerable to wind erosion when vegetation is sparse. Removal of the vegetative cover increases the exposure of soils to the erosive force of wind, and recent monitoring data show a high percentage of both allotments is bare ground. If grazing were authorized, rangeland monitoring would help ensure an adequate vegetative cover to protect soils from wind or water erosion by indicating when and where changes to livestock management are needed in the future.

4. Water Quality

Affected Environment - Surface Water

The Pecos River flows for approximately 6.4 miles through Allotment 64056 and along its east boundary. Salt Creek is a major tributary of the Pecos, which drains to the river just north of the allotment. Numerous small draws drain to the river from the uplands to the west, including Lost River, which flows through the southern end of Allotment 64056 before reaching BLNWR.

The eastern part of Allotment 64057 is also in the Lost River drainage area. Lost River is a poorly defined remnant channel, however, it is the principal drainage feeding Bitter Lake on the refuge. It is dotted with depressions that indicate a karst influence.

Allotment 64056 lies within the river reach from the Rio Peñasco to Salt Creek, which is

identified as Segment 2206 by the New Mexico Water Quality Control Commission (WQCC). Under the authority of the federal Clean Water Act, the WQCC (1995) designated uses for streams in New Mexico. Designated uses for Segment 2206 on the Pecos River include irrigation, livestock watering, wildlife habitat, secondary contact (e.g., wading), and a warmwater fishery.

The WQCC (1995) also established water quality standards to protect the designated uses, and directs periodic water quality assessments to ensure that standards are met. According to the New Mexico Environment Department (NMED), Segment 2206 is currently meeting the standards for all its designated uses (Hogge 1998, NMED 1998a).

Though the state conducted a recent, intensive assessment of Pecos River water quality, there is a lack of information on water quality impacts to BLNWR. No data were collected that provide information about possible livestock grazing impacts to Lost River or surface water resources on BLNWR.

Environmental Impacts - Surface Water

In general, livestock grazing is considered a potential cause of nonpoint source pollution, with sediment, bacteria, and nutrients as the principle contaminants. Livestock grazing on Allotments 64056 and 64057, however, would not be expected to be a significant cause of contamination to the Pecos River under the Proposed Action or Alternative B. Following their intensive assessment of Pecos River water quality in 1997, the NMED concluded that no water quality standards have been exceeded in the past ten years on Segment 2206 (NMED 1998a).

Livestock impacts to water quality in Lost River would not occur under the Proposed Action. The lack of water quality data for Lost River makes it difficult to evaluate possible impacts under Alternative B. Significant impacts would not be expected, however, because there are no records of past livestock impacts on the refuge.

Affected Environment - Ground Water

The hydrology in the area near the allotments is complex. The allotments lie at the northeast limit of the Roswell ground-water basin, and the Pecos River is just to the east. This is an area of karst topography, so there is significant interaction between surface water and ground water.

The Roswell ground-water basin generally consists of three components. First is an eastward dipping carbonate aquifer that is closely related to the San Andres limestone. It is often called the "artesian aquifer" though it is unconfined to the west.

The Artesia Group comprises the second component of the basin, a leaky "confining bed" overlaying the carbonate aquifer. The eastward dipping formations of the Artesia Group thin to a wedge near the allotments. Significant upward movement of water from the artesian aquifer to the shallow aquifer probably occurs in the allotment area. Finally, the confining bed is overlain by a water table aquifer of Quaternary alluvium, commonly called the "shallow aquifer." Ground water in the shallow aquifer converges locally toward Bitter Lake (Welder 1983). Therefore, shallow ground water beneath Allotment 64057 and the southern part of Allotment 64056 flows in the direction of Bitter Lake and gambusia habitat features on the refuge.

Well records from 1989 showed ground water in the shallow aquifer to be 25 to 30 feet below the surface on the allotments. Ground-water depth is probably 10 feet or less near the river (Wilkins and Garcia 1995, Hudson and Borton 1983). Yields of 100 gallons per minute or more from the alluvium are common (Geohydrology Associates, Inc. 1978).

Ground-water quality varies in the area of the allotments. Chloride concentrations range from less than 500 milligrams per liter near the west side of Allotment 64057, to more than 2000 milligrams per liter at the north end of Allotment 64056 (Welder 1983).

Environmental Impacts - Ground Water

In general, livestock grazing would not be expected to have an effect on ground-water quality under the Proposed Action or Alternative B. No known data indicate that livestock adversely affect ground water in the area. Livestock would be dispersed over the allotments, and the soil would filter potential contaminants.

Any risk of nutrient loading to gambusia habitat would cause some concern because of the proximity of the allotments to the habitat features on BLNWR. The karst topography, rapid rate of ground-water movement in the area, and the convergence of ground-water flow toward Bitter Lake and gambusia habitat are also factors to consider. As mentioned earlier, however, the lands nearest the refuge are privately owned. The BLM would have no control over private land uses that could have impacts on ground-water quality and gambusia habitat.

5. Floodplains

Affected Environment

For administrative purposes, the 100-year floodplain provides the basis for floodplain

management on public lands. It is based on Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (1983). The 100-year floodplain of the Pecos River covers approximately 2200 acres on Allotment 64056, including 1430 acres of BLM land, and 770 acres of state and private land. The floodplain width ranges from about one-half to one-and-a-quarter miles in this reach of the river. Current floodplain development on the allotment consists of several miles of roads, a railroad right-of-way, six producing gas wells, and several miles of fence. None of Allotment 64057 is in the 100-year floodplain.

The properties of any stream or river are due to the interaction of its channel geometry, streamflows, sediment load, channel materials, and valley characteristics (Rosgen 1996). The form and fluvial processes of the Pecos River have been modified by the construction of dams, which have drastically altered the streamflow and sediment regimes of the river. Flooding is less frequent and less severe than prior to dam construction, and sediment loads have been greatly reduced (see Figure 1). As a result, the channel has become moderately entrenched, and exhibits much less lateral migration.

Flow regulation with the dams has also changed the extent, character, and condition of the riparian area on the river (Durkin et al. 1994). Sediment deposition on floodplains is important for riparian succession, and seasonal flooding is required for obligate riparian vegetation.

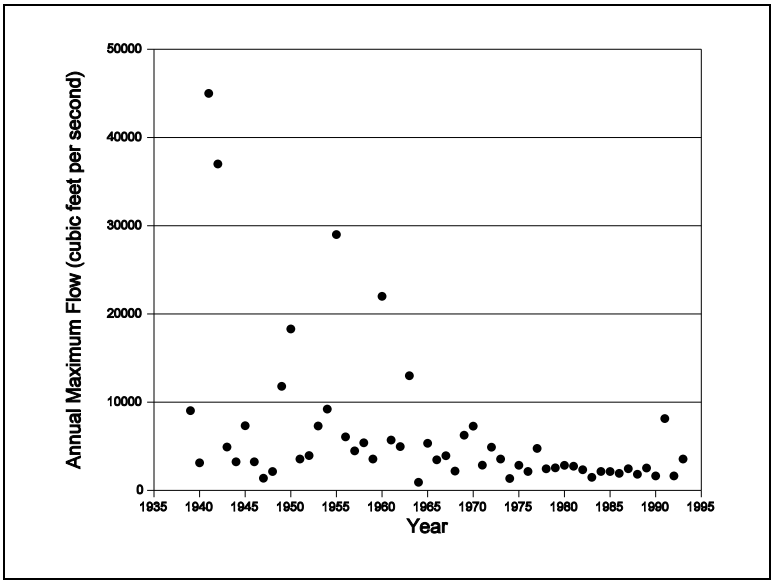

Figure 1. Annual maximum flow at USGS gage at Acme, New Mexico (08386000) for period 1939-1993 (Borland and Ong 1994). In the 25-year period 1939-1963, an annual maximum flow of 8000 cfs was exceeded nine times. In the 30-year period 1964-1993, 8000 cfs was exceeded only once (1991).

Environmental Impacts

The reduction in the frequency and magnitude of peak flows on the river would continue to be the primary influence on floodplain function. Whether or not grazing is authorized would have little additional influence.

Under the Proposed Action, significant changes to floodplain function would not be expected. Some roads could be abandoned and fences removed, but these changes would be minor. New fences might be constructed to prevent livestock from moving onto public rangeland. Vegetation cover and diversity would probably increase somewhat on the rangelands, and localized impacts, such as cow trails, would revegetate over time.

Subsequent management, such as controlling OHV access, would also help enhance vegetation and wildlife habitat.

There would be little change to the level of development on the Pecos floodplain under Alternative B. Roads and fences would continue to be used and maintained.

Development unrelated to livestock grazing (e.g., natural gas production) would be unaffected.

Neither management alternative would have a significant cumulative effect on floodplain function beyond the current level of development. The Proposed Action might improve floodplain function slightly because vegetation cover would increase, and some roads and fences might be removed or abandoned. The improvement expected would be negligible, however, because current livestock impacts are minor compared to all other impacts to the floodplain, and because additional fences might be constructed.

6. Riparian/Wetland Areas

Affected Environment

Riparian areas are found along 6.4 miles of the Pecos River on Allotment 64056, most of it on BLM land. The BLM administers approximately four river miles, consisting of two reaches. There are no riparian or wetland areas on Allotment 64057.

The riparian vegetation community is tied to landform within the floodplain and is influenced by flooding intervals. The landform is comprised of exposed and stabilized river bars, the floodplain, and terraces. The river channel is moderately entrenched and slightly confined by the valley. Channel banks are fairly stable, but are sloughing or actively being cut in some locations. Bank erosion is most likely due to entrenchment of the channel rather than disturbance associated with livestock grazing or other land uses activities. The channel material is primarily a sand and gravel bed with small cobbles and silt, and the stream gradient is relatively flat (0.25 percent).

Riparian vegetation on the allotment is dominated by dense thickets of saltcedar. Seep willow and saltgrass are other common species, found on point bars where sediment is deposited. Wetland vegetation, such as cattail, rushes, and sedges grow on parts of the river bank. Sandy sites may have stickleleaf, goldenrod, curlycup gumweed, ragweed, and kochia, or have little vegetation except for annual forbs. Only a few scattered cottonwoods are found on the allotment.

Environmental Impacts

Under the Proposed Action, the condition of vegetation in the floodplain and riparian areas would improve. Enhancements in vegetative cover and diversity would continue to be limited by the regulation of river flows and channel entrenchment, which promote the growth of saltcedar and other exotic species. Grasses would initially increase following the exclusion of livestock, but plant vigor could decline from lack of vegetation removal, making ground cover species rank. Vegetation treatments could be proposed to address these problems.

In the past, livestock have had yearlong access to the Pecos River. Under Alternative B, livestock would likely have use of the riparian area again. Bank sloughing would occur from trampling in some locations. Utilization of grass species would be heavy within the floodplain and along the river, if annual use during the growing season were permitted as it was in the past. The greatest vegetation impacts would occur at livestock concentration areas, such as crossings, shaded areas, and accessible points along the river.

7. Wildlife

Affected Environment

The allotments provide a variety of habitat types for terrestrial and aquatic wildlife species. The diversity and abundance of wildlife species in the area are due to the presence of open water, the numerous drainages interconnecting upland habitats to the Pecos floodplain, a mixture of grassland habitat and mixed desert shrub vegetation, and riparian vegetation found within the floodplain of the river.

Common mammal species using the area include mule deer, 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.

Allotment 64057 also supports one of the largest active black-tailed prairie dog towns in the area. The prairie dog has been petitioned for emergency listing as a threatened or endangered species by the National Wildlife Federation. The petition is currently being reviewed by the USFWS to determine whether listing is warranted. A decision in the Roswell RMP (BLM 1997) states that prairie dog control will not be authorized on public lands, except in emergency situations involving public health. The prairie dog has no legal protection, and varmint hunting does occasionally occur in the area.

Numerous avian species use the Pecos River during spring and fall migration, including nongame migratory birds. The Bitter Lake National Wildlife Refuge (BLNWR) is just downriver of Allotment 64056 and immediately east of Allotment 64057. It serves as a major focal point for migratory birds (e.g., ducks, geese, cranes, waterbirds). 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.

The Pecos River once supported a wide variety of native fish species adapted to the flow regime that existed prior to dam construction, agriculture development, and the introduction of non-native fish species. The greatest impact to fish habitat is the manipulation of water supply to meet irrigation needs. Representative fish species

include the red shiner, sand shiner, Arkansas River shiner, Pecos bluntnose shiner, plains minnow, silvery minnow, plains killifish, mosquitofish, speckled chub, river carpsucker and channel catfish.

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

Environmental Impacts

Under the Proposed Action, wildlife habitat would moderately improve. Livestock would no longer compete directly with wildlife for forage, browse, and cover. Improvement would continue to be limited by invasive species (e.g., mesquite, snakeweed), which affect plant composition. Because livestock grazing would be deferred under the Proposed Alternative, range improvement projects that had benefitted wildlife, such as water developments, might be abandoned.

If livestock grazing were not properly managed under Alternative B,wildlife habitat could be impacted if vegetation that provides forage, browse, and cover for a variety of wildlife species is overutilized. Authorizing livestock grazing as in the past would produce a gradual decline in wildlife and habitat diversity.

8. Threatened and Endangered Species

The Pecos bluntnose shiner, Pecos gambusia, and interior least tern are federally listed species that occur or have the potential to occur on the allotment. Federally proposed species include the Pecos pupfish and Pecos sunflower. The status and presence of these species in the RFO area are discussed in the following section.

Pecos Bluntnose Shiner *(Notropis simus pecosensis)* - Federal Threatened

Affected Environment

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. Neither of the allotments are within the designated critical habitat.

The primary threat to the Pecos bluntnose shiner appears to be the manipulation of flows in the Pecos River to meet irrigation needs, and the subsequent drying of the river channel (Hatch et al. 1985). High flows in late winter-early spring before natural spring runoff appear to displace fish into marginal downstream habitats, including Brantley Reservoir. The cessation of reservoir releases after spring runoff and before summer rains dries 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.

Livestock grazing does not appear to be a threat to the bluntnose shiner based on a review of the literature. Nor was grazing identified in the Pecos Bluntnose Shiner Recovery Plan as having the potential to adversely affect water quality, and thus the bluntnose shiner (USFWS 1992).

Environmental Impacts

Impacts to the Pecos bluntnose shiner due to livestock grazing would be negligible under either the Proposed Action or Alternative B. Based on the assessment of Pecos River water quality conducted by the NMED in 1997, it appears that the shiner would not be affected by poor water quality if a grazing permit were issued.

Section 303(d) of the federal Clean Water Act requires that the State identify those waters for which existing required pollution controls are not stringent enough to meet State water quality control standards. The State must then establish total maximum daily loads (TMDLs) for pollutants of these water-quality-limited stream segments.[5] The presence of critical habitat for the threatened Pecos bluntnose shiner raised the Pecos River to a priority one on the New Mexico 303(d) ranking system.

Segment 2206 (Pecos River from Rio Peñasco to Salt Creek) had been listed for TMDL development because of concerns about stream bottom deposits, dissolved oxygen, total dissolved solids, metals, and un-ionized ammonia. Following a review of historical data

[5] The TMDL is defined as "the greatest loading or amount of the pollutant that may be introduced into a watercourse or stream reach from all sources without resulting in a violation of water quality standards."

and their survey, however, the NMED (1998a) concluded there was no basis for developing TMDLs on Segment 2206. The NMED (1998b) removed the segment of the Pecos River from the 1998-2000 303(d) list.

NMED's decision to remove Segment 2206 from the 303(d) list bears directly on the Biological Opinion rendered by the USFWS on the Roswell Resource Management Plan. The USFWS cited the New Mexico Water Quality Control Commision's 305(b) report in their opinion. The report identified siltation, reduction of riparian vegetation, and streambank destabilization as among the probable causes for the Pecos River in the RFO area not supporting its designated use as a warm water fishery, and identified rangeland agriculture as a probable source of the nonsupport. Just as Segment 2206 was removed from the 303(d), the next 305(b) report will no longer list the segment as water quality-limited (Hogge 1998).

Pecos Gambusia *(Gambusia nobilis)* - Federal Endangered

Affected Environment

The Pecos gambusia is endemic to the Pecos River Basin in southeastern New Mexico and western Texas. Historically, the species occurred as far north as the Pecos River near Fort Sumner, and south to Fort Stockton, Texas. Recent records indicate, however, that its native range is restricted to sinkholes and springs and their outflows on the west side of the Pecos River in Chaves County.

In spite of population declines, the species remains locally common in a few areas of suitable habitat. The BLNWR and the Salt Creek Wilderness Area contain the key habitat of the species in the RFO area. On the refuge, the gambusia is primarily restricted to springs and sinkholes in the Lake St. Francis Research Natural Area.

Endangerment factors include the loss or alteration of habitat (e.g., periodic dewatering) and introduction of exotic fish species (e.g., mosquitofish). Potential impacts to habitat may also occur from surface disturbing activities at sinkholes or springs and their outflows.

Environmental Impacts

No impacts to the Pecos gambusia would result from grazing authorization on BLM lands under the Proposed Action. Under Alternative B, impacts to gambusia habitat would not be expected, but there could be a small risk of nutrient loading to ground-water (see Ground-Water Environmental Impacts section). Impacts to gambusia habitat from livestock have not been observed in the past.

Any risk could be virtually eliminated by preventing livestock from concentrating in the Lost River drainage. This could be accomplished by fencing, or simply providing water, mineral, and feed supplements away from the drainage.

Interior Least Tern *(Sterna antillarum athalassos)* - Federal Endangered

Affected Environment

The interior least tern nests on shorelines and sandbars of streams, rivers, lakes, and man-made water impoundments. Records of breeding terns in New Mexico are centered around BLNWR where the species has bred regularly since it was first recorded in 1949. BLNWR is considered "essential" tern breeding habitat in the state. Besides BLNWR, the only known nesting habitat in the RFO area is an alkali flat north of the refuge on public lands on Allotment 64056. These are small populations with only a few nesting terns.

Sporadic observations of least terns have been recorded elsewhere in the Pecos River valley. 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). Approximately 44 potential nesting sites are found throughout the RFO area. 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. No other nesting terns have been found to date.

Environmental Impacts

Impacts to the interior least tern due to livestock grazing would be negligible under either the Proposed Action or Alternative B. Tern nesting habitat would be protected under either Alternative by applying terms and conditions to livestock grazing authorization. Terms and conditions might include (1) fencing the nesting habitat (i.e., alkali flats), (2) controlling seasons of use, and (3) avoiding the area when developing range improvements.

Pecos Pupfish *(Cyprinodon pecosensis)* - Federal Proposed

Affected Environment

The Pecos pupfish is found in a variety of habitats from saline springs and gypsum sinkholes to desert streams with highly fluctuating conditions. Pecos pupfish populations are most dense in gypsum sinkholes on BLNWR. The species apparently thrives in these saline waters that support few other fish species. It occasionally occupies fresher waters in the Pecos River, but is uncommon in such habitats. In the river, the pupfish is most often found in backwater areas and side pools that lack sunfish or other predators

(NMDGF 1988; Sublette et al. 1990; NMDGF 1997). The pupfish also inhabits the Overflow Wetlands Wildlife Habitat Area adjacent to the Bottomless Lakes State Park.

Endangerment factors include habitat loss caused by groundwater pumping and channel alterations, hybridization and/or replacement by the sheepshead minnow, and predation by non-native fish species. Potential impacts to habitat may occur from surface disturbing activities at or near springs or seeps. Other activities that severely impact habitat are not within the purview of the BLM, such as transportation and utilization of water associated with agricultural irrigation. Livestock grazing may impact springs or seeps but most of these sites have been protected with exclosures.

Environmental Impacts

Impacts to the Pecos pupfish due to livestock grazing would be negligible under either the Proposed Action or Alternative B. Conclusions regarding riverine habitat are based on the same information used for the Pecos bluntnose shiner. Suitable sinkhole or spring habitat does not exist on the allotment.

Pecos (Puzzle) Sunflower *(Helianthus paradoxus)* - Federal Proposed

Affected Environment

The Pecos sunflower is found along alkaline seeps and cienegas of semi-desert grasslands and short-grass plains (4,000-7,500 ft.). Plant populations are found both in water and where the water table is near the ground surface.

In the RFO area, the sunflower is found in only a few areas outside of the BLNWR. In 1994, a new population was found growing on the margins of Lea Lake and its outflow at Bottomless Lakes State Park. Lloyd's Draw, east of the Pecos River, has the only known Pecos sunflower population on BLM land. It became evident at this location following a prescribed fire. Potential habitat also occurs on BLM land within the Overflow Wetlands Wildlife Habitat Area.

Potential habitat for the sunflower occurs on Allotment 64056 as low lying areas where the water table is near the ground surface. The low lying areas are not necessarily along the existing river channel, but in old channel courses and oxbows. These areas are now invaded by saltcedar growing in dense stands due to the availability of ground water. The areas appear to be potential wetland-type sites for Pecos sunflower if saltcedar was not present. No Pecos sunflower populations have been found on either allotment to date. Endangerment factors include dewatering of riparian or wetland areas where the sunflower is found, surface disturbing activities, and excessive livestock grazing.

Environmental Impacts

Impacts to the Pecos sunflower due to livestock grazing would be negligible under either the Proposed Action or Alternative B. The dominance of its potential habitat by saltcedar appears to be a major factor controlling the sunflower's abundance and distribution.

9. Wilderness

Affected Environment

The North Tract of BLNWR is a 9621-acre parcel, which has been designated the Salt Creek Wilderness by the U.S. Fish and Wildlife Service. The southeast corner of the wilderness abuts the north end of Allotment 64056, but they are separated by U.S. 70, the Clovis Highway. Most of the allotment within two miles of the wilderness consists of state and private lands.

Environmental Impacts

Direct impacts to the wilderness would be expected to be minor under the Proposed Action or Alternative B because BLM lands are far from the wilderness boundary. Some reduction in dust levels would result from increased vegetation cover, and reduced disturbance by livestock.

Some important indirect benefits would be realized, however, by implementation of the Proposed Action. Managing Allotment 64056 for a variety of resource values would provide an almost continuous river corridor between the Salt Creek Wilderness and the Middle Tract of BLNWR. If the future management activities described in the Proposed Action (e.g., regulating OHVs, enhancing wildlife habitat, and blocking up BLM lands) follow the grazing deferment, management on the wilderness and the Middle Tract should benefit because USFWS and BLM management objectives would complement one another.

10. Visual Resources Management

Affected Environment

The allotments are a combination of Class II and Class III areas for visual resources management. The boundary of the Class II area generally lies about one mile outside the Middle Tract of BLNWR.

Changes in any of the basic landscape elements (e.g., form, line, color, texture) caused by a management activity should not be evident in a Class II area. A contrast may be seen, but should not attract attention. In a Class III area, contrasts to the basic elements

caused by a management activity may be evident and begin to attract attention in the landscape. The changes, however, should remain subordinate to the existing landscape.

Environmental Impacts

The basic elements of the landscape would not change on BLM lands within the allotments under either management alternative. If livestock grazing were authorized, potential impacts to visual resources would be analyzed and mitigated as allotment management activities are proposed in the future.

11. Recreation

Affected Environment

A network of roads provide access to public and private lands within the allotments. Access to most of the private and state land is not currently controlled by fences, locked gates, or no-trespass signs. The BLM has designated off-highway vehicle use on public lands in the area as limited to existing roads and trails.

The allotments provide habitat for numerous game species including desert mule deer, mourning dove, and scaled quail. Predator and feral pig hunting may occur on the allotments, as well as trapping for predators or furbearers. Access to the river is limited, though it is possible that fishing or minnow seining could take place.

General sightseeing, wildlife viewing, and photography are nonconsumptive recreational activities that may occur. Rock collectors find various minerals unique to the area, such as Pecos diamonds.

Environmental Impacts

Under the Proposed Action, no conflicts between ranching activities and recreational use would occur on public lands. Success of hunts and nonconsumptive opportunities would remain the same or slightly improve. Future management of the area could include regulation of recreation activities, particularly OHV use. The impacts of this type of action would be analyzed when proposed.

Under Alternative B, no direct negative impacts to recreational activities on public lands would occur. Potential conflicts could arise between recreational pursuits and ranching activities, depending on hunting seasons and livestock use in a given pasture.

12. Significant Caves and Karst

Affected Environment

Allotments 64056 and 64057 are in a designated area of high potential for the occurrence of caves and karst. Although a complete inventory of significant cave and karst features has not been completed for BLM lands, significant cave and karst features are known to exist on Allotment 64057. No significant features have been documented for Allotment 64056.

Environmental Impacts

Under the Proposed Action livestock would not affect the cave and karst resources on Allotment 64057. Impacts from other activities, such as OHV would still be possible, but will be addressed in future management decisions.

Continued grazing of the allotment under Alternative B could result in impacts to the cave and karst features. If adverse impacts are detected, protective measures would be required. Protective measures could include (1) fencing sinks, cave entrances, or arroyos; (2) removing erosion-control structures or stock ponds; (3) closing roads; (4) providing "leave-out areas" on herbicide projects; or (5) other appropriate mitigation.

13. Air Quality

Affected Environment

The allotments are in a Class II area for the Prevention of Significant Deterioration of air quality as defined by the federal Clean Air Act. Class II areas allow a moderate amount of air quality degradation. The Salt Creek Wilderness, encompassing 9621 acres, is a mandatory Class I area just north of Allotment 64056.

Air quality in the region is generally good, with winds averaging 10-16 miles per hour depending on the season. Peak velocities reach more than 50 miles per hour in the spring. These conditions rapidly disperse air pollutants in the region.

Environmental Impacts

Dust levels resulting from allotment management activities would be slightly less under the Proposed Action than Alternative B. The cumulative impact on air quality from the allotment would be negligible compared to all pollution sources in the region.

IV. CUMULATIVE IMPACTS

A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or 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" (40 CFR 1508.7).

The analysis of cumulative impacts is driven by major resource issues. The action considered in this environmental assessment (EA) is deferring livestock grazing on Allotments 64056 and 64057, and the major issues include:

(1) threatened and endangered species associated with the Pecos River and Bitter Lake National Wildlife Refuge (BLNWR), primarily the Pecos bluntnose shiner, the Pecos gambusia, and the interior least tern;

(2) water quality in the Pecos River and in Pecos gambusia habitat features on BLNWR; and

(3) riparian/wetland habitat within the Pecos River floodplain.

The incremental impact of deferring grazing on these resources must be analyzed in the context of impacts from other actions. Other BLM actions that could have impacts on the identified resources include: livestock authorization on other allotments along the Pecos River; oil and gas activities on the river floodplain and on the uplands; rights-of-way crossing the river; and recreation use, particularly off-highway vehicles.

All authorized activities which occur on BLM land can also take place on state and private lands. In addition, significant impacts could result from urban development, reservoir management and the manipulation of river flows, and agricultural activities (e.g. dairies, crop production, and irrigation diversions and return flows).

Many of the actions which could contribute to cumulative impacts have occurred over many years. Impacts from open-range livestock grazing in the last century are still being addressed today. Sumner Dam, the principal structure controlling river flows in this reach, was built in 1937. Major irrigation projects were begun in the 19th century, and oil and gas activities began in the early part of the 20th century. All these activities are still occurring today, and are expected to continue into the foreseeable future to some degree.
The Proposed Action would result in an incremental decrease in the cumulative impacts to threatened and endangered species, water quality, and riparian habitat. It would also reduce the risk of an irreversible or irretrievable commitment of resources by deferring the authorization of livestock grazing until after other resource issues on the allotments are

addressed. If Alternative B were chosen, conditions on the allotments would remain similar to current conditions.

V. MITIGATION MEASURES

Mitigation measures are actions which could be taken to avoid or reduce impacts likely to result from the Proposed Action or Alternatives. No mitigation measures would be needed under the Proposed Action. If Alternative B were chosen, an EA would be prepared before issuing a new grazing permit. Mitigation measures would be prescribed as needed in that EA.

VI. RESIDUAL IMPACTS

Residual impacts are direct, indirect, or cumulative impacts that would remain after applying the mitigation measures. No mitigation measures are to be applied, therefore, no residual impacts would occur.

VII. PERSONS OR AGENCIES CONSULTED

Bitter Lake National Wildlife Refuge
Chaves County Public Land Use Advisory Committee
New Mexico Department of Game and Fish
New Mexico Energy, Minerals, and Natural Resources Department
- Forestry and Resource Conservation Division
New Mexico Environment Department - Surface Water Quality Bureau
New Mexico State Land Office
U.S. Fish and Wildlife Service - Ecological Services
U.S. Fish and Wildlife Service - Fishery Resources Office

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