U.S. Department of the Interior
Bureau of Land Management
Arizona State Office

Tucson Field Office

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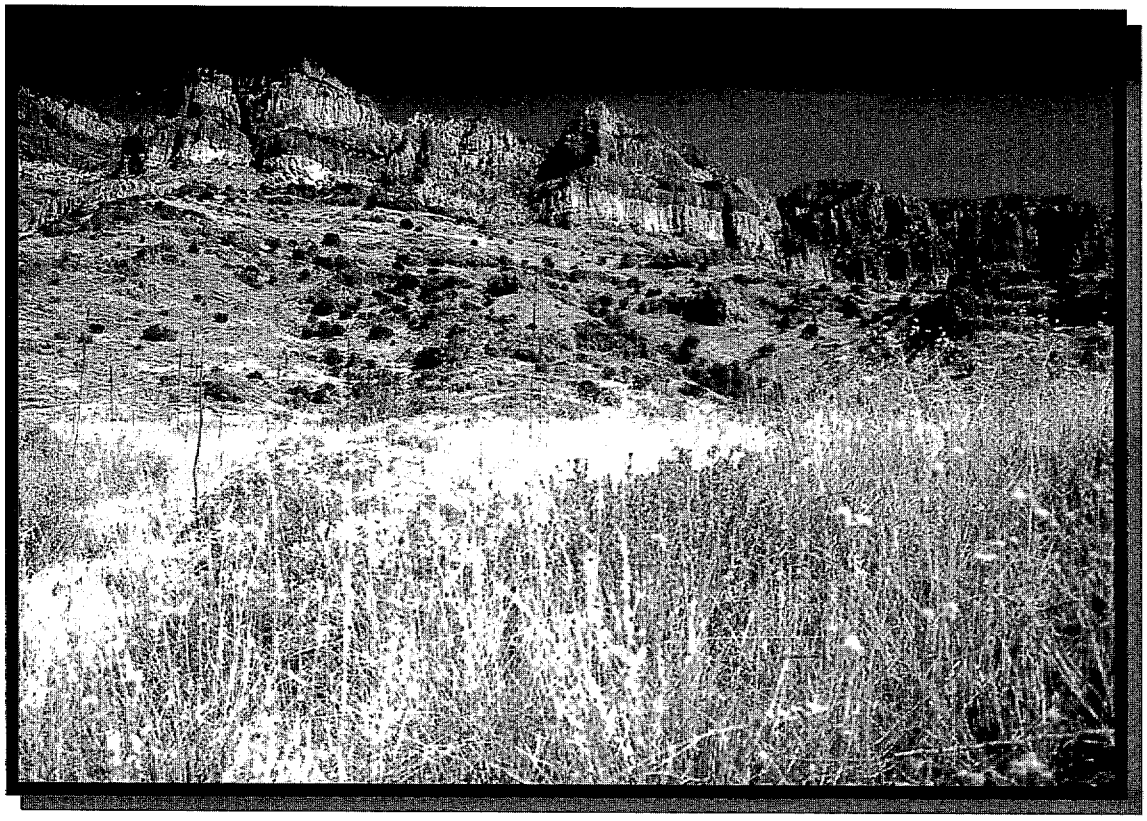
FINAL

Muleshoe Ecosystem Management Plan and Environmental Assessment



The Bureau of Land Management is responsible for the balanced management of the public lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that take into account the long term needs of future generations for renewable and nonrenewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific and cultural values.

BLM/AZ/PL-98/024

MULESHOE ECOSYSTEM MANAGEMENT PLAN

U.S. Department of the Interior
Bureau of Land Management
Tucson Field Office

U.S. Department of Agriculture
Coronado National Forest
Safford Ranger District

Arizona Game and Fish Department

The Nature Conservancy

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EXECUTIVE SUMMARY

Background

The Muleshoe Ecosystem is located in the Galiuro Mountains in southeastern Arizona within northern Cochise County and southern Graham County. The Ecosystem planning area encompasses the Muleshoe Cooperative Management Area (CMA) which is jointly managed by the Bureau of Land Management (BLM), Forest Service (FS), and The Nature Conservancy (TNC). The 57,500 acres comprise major portions of the Redfield, Hot Springs, and Cherry Springs watersheds. Included within the planning boundary are the Redfield Canyon Wilderness and Hot Springs Watershed Area of Critical Environmental Concern (ACEC), administered by the BLM, and a portion of the Galiuro Wilderness, administered by the FS.

The Bureau of Land Management (BLM) brought together an interdisciplinary team of resource specialists from the BLM, Arizona Game and Fish Department (AGFD), FS, TNC, Soza Mesa Ranch, Saguaro-Juniper Association, and Bayless and Berkalew Company to prepare a plan for the Muleshoe Ecosystem. The team members own or manage land or resources within or adjacent to the Muleshoe Ecosystem and share the common goal of restoring and enhancing the resources and ecological processes of the Muleshoe Ecosystem through cooperative effort.

Additional public participation came from an open house, scoping mailings, and several field trips.

The Muleshoe Ecosystem Management Plan (EMP) will become the primary guide for management of all BLM-administered public lands (including wilderness) within the Muleshoe Ecosystem. This plan also provides management guidance for TNC private lands within the CMA. Although the FS had already developed plans for the Galiuro Wilderness, their participation was important for achieving consistency in management of the two adjoining wilderness areas. The Muleshoe EMP includes interdisciplinary activity planning for the Redfield Canyon Wilderness, Hot Springs ACEC, Soza Mesa and Muleshoe allotments, wildlife habitat, recreation and cultural resources.

Ecosystem Management Approach

Ecosystem management can be defined simply as keeping natural environments healthy, diverse, and productive so people can benefit from them year after year. The ecosystem management approach means identifying limits to use and development of the land's resources and managing within those limits in order to ensure the long-term health, biodiversity, and productivity of the environment. For some areas, it also means trying to restore damaged land to a healthy condition. Ecosystem management recognizes that natural systems must be sustained in order to meet the social and economic needs of future generations.

The ecosystem management approach for the Muleshoe Plan had several major steps. Since ecosystems do not stop at traditional boundary lines, the first step was to look across boundaries and develop an active partnership between public and private interests to work on the plan. This was accomplished by bringing together the interagency and interdisciplinary team. The next step was to use inventory data and the best scientific information available to determine existing and potential resource conditions and current and future potential impacts on the resources of the ecosystem. The team then used this information in subsequent steps including development of a vision and goals, consolidation of planning issues, and development of resource objectives and management actions to respond to the issues. The team also developed monitoring and an evaluation schedule to track progress in achieving the objectives.

Proposed Plan

The proposed action provides for the protection and enhancement of ecosystem resources, processes and function including riparian and upland vegetation, wildlife, wilderness, cultural and social environment values while allowing for compatible levels of use. Six resource objectives were developed by the planning team and management actions were prescribed to achieve them. A monitoring schedule was developed to track progress in achieving the objectives. Informal evaluations of the plan will be conducted annually and formal evaluations will be conducted at least every five years.

Riparian Objective

The objective for the riparian areas on the Muleshoe is to achieve or maintain proper functioning condition and high seral ecological states for the riparian vegetation. In this condition, the riparian areas will support a diversity of native riparian vegetation with all age classes of woody riparian vegetation well represented, will have dense vegetation with structural complexity, will support a diversity of aquatic habitats including pools, runs, and riffles, and will have natural processes working near optimum in this zone of the ecosystem. The objective recognizes the dynamic nature of riparian areas by specifying that the areas recover to desired conditions within five years of any major flood that decreases the tree density by at least 1/3 through scouring and removal.

Proposed actions to achieve the riparian objective include pursuing instream flow water rights, removing non-native vegetation, implementing closure of Hot Springs Canyon riparian area to vehicles, eliminating livestock grazing in riparian areas, designating Bass Canyon as a day use area, ensuring that recreation activities in riparian areas do not cause adverse impacts to stream bank stability, and prohibiting commercial collection of plant materials or wood-cutting in riparian areas. Casual uses and traditional use collecting by Native Americans will be allowed. Prescribed fire units will include riparian areas, but special practices will be used to avoid burning them except for small experimental areas.

Upland Objective

For the Muleshoe portion of the planning area, the upland objective is to improve watershed conditions and wildlife habitat by converting shrub-invaded grassland to more open, denser stands of grass with mid-tall statured perennial grasses replacing annual or short growth forms of perennial grasses. For the Soza Mesa and Soza Wash portions of the planning area, the upland objective is to maintain current high and potential natural community (PNC) range conditions and also for Soza Mesa to improve mid- condition range to high or PNC.

Proposed actions to achieve the upland objective include implementation of a prescribed fire program and changes in livestock grazing management. Livestock management actions include reducing the size of the Muleshoe Allotment to exclude riparian areas, placing the grazing on the remaining area of the allotment in Pride Basin in nonuse until desired upland vegetation conditions are achieved and then constructing necessary range improvements when grazing is resumed. In addition, active grazing will continue on Soza Mesa and Soza Wash under rotational grazing plans, and the necessary range improvements on Soza Mesa will be cooperatively developed.

Fish and Wildlife Objective

The fish and wildlife objective is to maintain and enhance the biological diversity of the Muleshoe Ecosystem by re-establishing extirpated native species to the Muleshoe and removing threats to, and supplementing or extending the ranges of existing native species on the Muleshoe.

Proposed actions to achieve the fish and wildlife objective include evaluating habitat potential for reintroduction, reestablishment, range extension or supplementation of fish and wildlife including several native fish species, bighorn sheep, and

turkey. Where habitat potential is present, the appropriate action will be pursued using AGFD established procedures. Other actions include inventories for exotic species and removal of any exotics which are threatening native species and inventories of natural and artificial water sources to assess the adequacy of permanent water for wildlife.

Cultural Resources Objective

The objective for cultural resources (prehistoric and historic properties and artifacts as well as Native American traditional use plants) is to protect and preserve them on the planning area while making them available for scientific, public, and sociocultural uses.

Proposed actions to achieve the cultural objective include conducting Class III inventories of the planning area on a project-by-project basis and if funding becomes available, conducting a combined Class II survey and ethnoecology study of the planning area, posting regulatory and interpretive signs about cultural resources, classifying traditional use plants and areas, creating a partnership education program with universities, fencing livestock out of significant cultural properties, and pre-treating cultural properties that could be impacted by prescribed burns.

Wilderness Objective

The wilderness objective is to maintain and improve wilderness values of naturalness and outstanding opportunities for solitude and primitive, non-motorized types of recreation in the Galiuro Wilderness and Redfield Canyon Wilderness.

Proposed actions to achieve the wilderness objective include placing wilderness boundary signs, limiting group size to 15 persons, maintaining or redeveloping necessary range improvements, providing for wildlife management in wilderness including annual surveys and maintenance and development of waters, attempting to acquire wilderness inholdings if they become available, and limiting prescribed burns in wilderness to those occurring by natural ignitions.

Social Environment Objective

The social environment objective is to maintain or improve the current range of open-space recreation opportunity settings (rural, semi-primitive motorized, semi-primitive non-motorized and primitive) that provide existing recreational activities on the Muleshoe.

Proposed actions to achieve the social environment objective include developing pullouts along Jackson Cabin road, constructing a visitor kiosk with sign-in station at the beginning of Jackson Cabin road, developing informational recreational brochures, maintaining and improving hunting opportunities, pursuing legal public access as identified in the Safford RMP, implementing road closures in the Safford RMP, and maintaining Jackson Cabin and Soza Mesa roads to four wheel-drive standard.

I. INTRODUCTION

The Muleshoe Ecosystem is located in the Galiuro Mountains in southeastern Arizona within northern Cochise County and southern Graham County. The Muleshoe Ecosystem planning area boundary (Figure 1) encompasses the Muleshoe Cooperative Management Area (CMA) boundary. The CMA is jointly managed by the Bureau of Land Management (BLM), Forest Service (FS), and The Nature Conservancy (TNC) through a Cooperative Management Agreement. Within the planning area boundary are private lands on Soza Mesa and private and state lands that are within the boundary of the Redfield Canyon Wilderness.

The planning area includes approximately 26,500 acres of BLM public lands, 22,000 acres of FS lands, 6,000 acres of private lands and 3,000 acres of Arizona state lands (Figure 2). These lands comprise major portions of the Redfield, Hot Springs, and Cherry Springs watersheds. Included within the planning boundary are the Redfield Canyon Wilderness and Hot Springs Area of Critical Environmental Concern (ACEC), administered by the BLM, and a portion of the Galiuro Wilderness, administered by the FS.

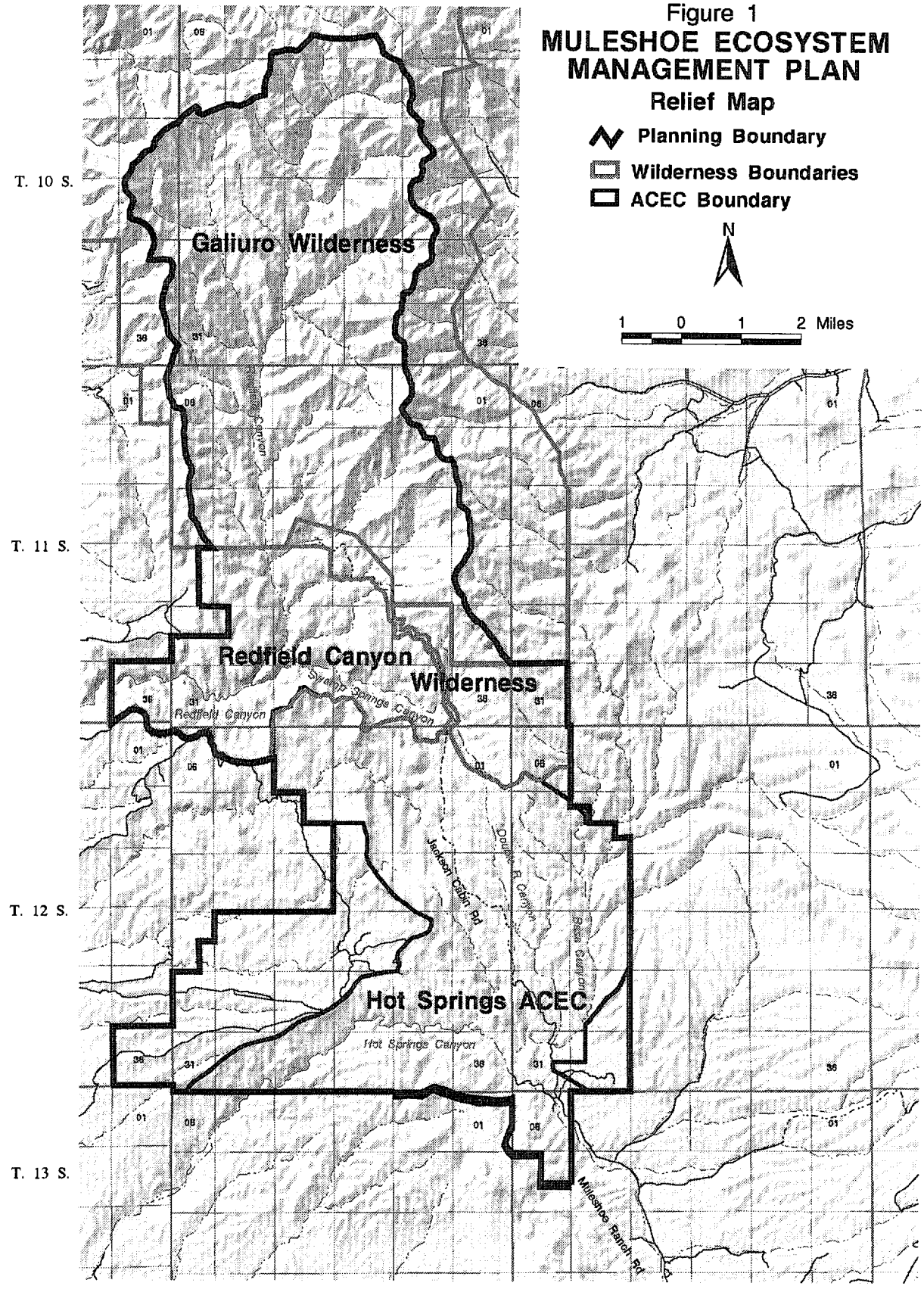
In 1982, TNC purchased the Muleshoe Ranch and its grazing leases to protect and manage its riparian areas and associated aquatic, plant, and animal communities. A land exchange in 1986 allowed the BLM to acquire the state lands of the Muleshoe. The Muleshoe CMA was established through the signing of a Cooperative Management Agreement by the BLM, FS and TNC in 1988. The FS Galiuro Wilderness was originally designated by Congress in 1964 and was enlarged in 1984. The Redfield Canyon Wilderness was designated by Congress in 1990. The Hot Springs Watershed ACEC was designated through the Safford Resource Management Plan, Partial Record of Decision II, in 1994 in order to provide special management for the significant riparian resources in the Hot Springs watershed.

To eliminate duplicate planning efforts and increase efficiency, the Muleshoe Ecosystem Management Plan (EMP) includes interdisciplinary activity planning for all BLM lands within the planning area including the Redfield Canyon Wilderness, Hot Springs ACEC, and the Soza Mesa Allotment. The Muleshoe EMP functions as the BLM's Redfield Canyon Wilderness Plan, Hot Springs Watershed ACEC Plan, Muleshoe and Soza Mesa allotment management plans, and as the Habitat Management Plan, Recreation Activity Plan and Cultural Resources Activity Plan for the Muleshoe. The Muleshoe EMP also prescribes management for TNC lands within the CMA.

When the ecosystem planning process began, the Forest Service's Safford Ranger District had in place plans which covered the Galiuro Wilderness including a Wilderness Implementation Schedule. Therefore, a primary purpose of the FS involvement was coordination to ensure as much consistency as possible in management of the adjoining BLM and FS wilderness areas. The Muleshoe EMP does not prescribe new management actions for FS lands.

The Arizona Game and Fish Commission has responsibility for the conservation and management of all wildlife species of the State of Arizona. The Arizona Game and Fish Department (AGFD) acts under authority of the Commission and represented wildlife resources on the planning team.

The plan was prepared by an interdisciplinary team of resource specialists from the BLM and representatives from AGFD, FS, TNC, Soza Mesa Ranch, Saguaro-Juniper Association, and Bayless and Berkalew Company (Appendix 1). The team developed a vision statement, reviewed and consolidated planning issues, and developed resource objectives and management actions to respond to the issues. The team also developed a monitoring program and evaluation schedules to track progress in achieving the objectives.


R. 19 E.
R. 20 E.
T. 10 S.
T. 11 S.
T. 12 S.
T. 13 S.
Galiuro Wilderness
Redfield Canyon Wilderness
Hot Springs ACEC
Redfield Canyon
Sand Springs Canyon
Jackson Cabin Rd
Double R Canyon
Bass Canyon
Hot Springs Canyon
Muleshoe Ranch Rd
Figure 1
MULESHOE ECOSYSTEM MANAGEMENT PLAN
Relief Map
Planning Boundary
Wilderness Boundaries
ACEC Boundary
N
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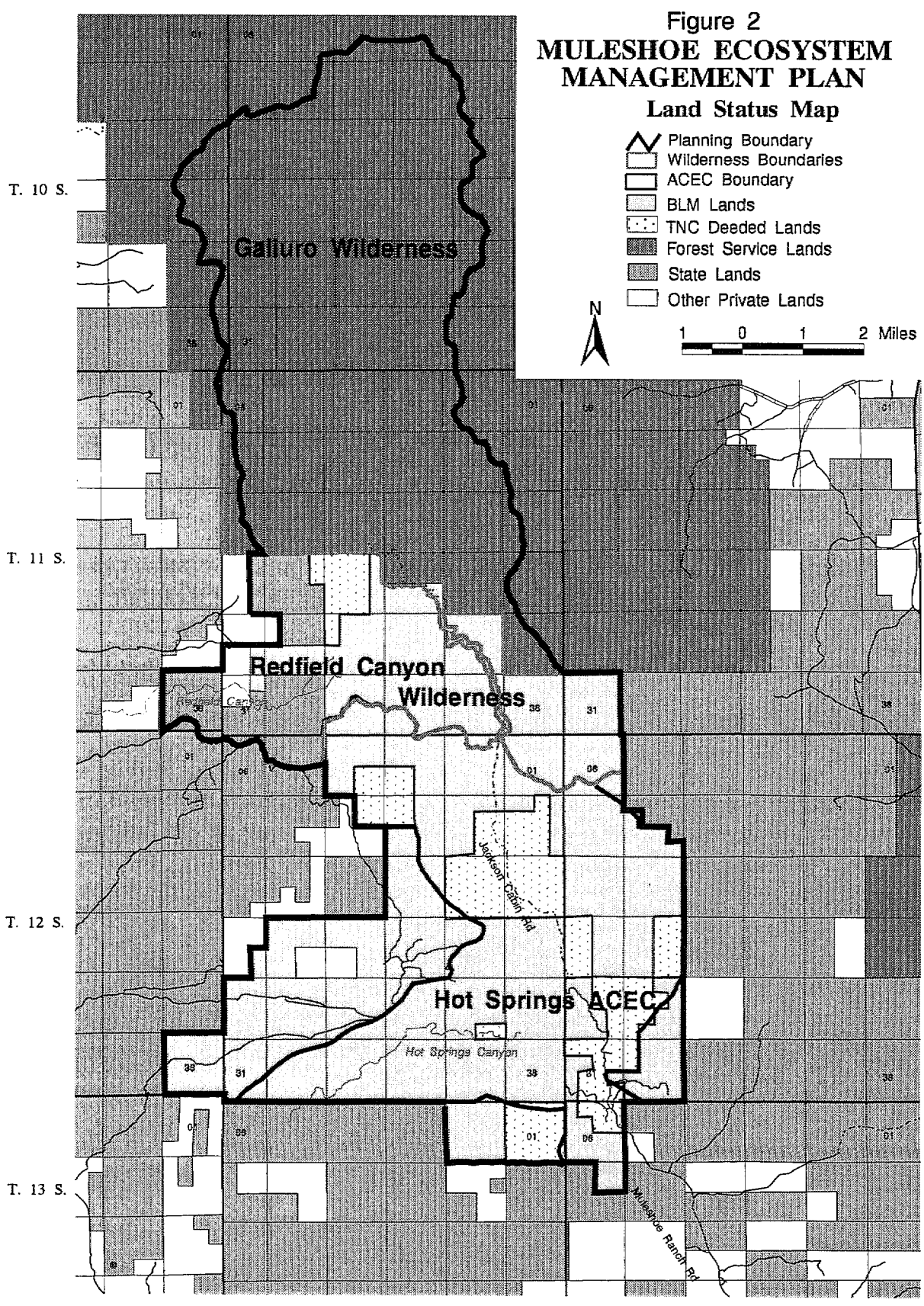

R. 19 E.
R. 20 E.
T. 10 S.
T. 11 S.
T. 12 S.
T. 13 S.
Galiuro Wilderness
Redfield Canyon Wilderness
Hot Springs ACEC
Hot Springs Canyon
Jackson Cabin Rd
Mulespike Ranch Rd
Figure 2
MULESHOE ECOSYSTEM MANAGEMENT PLAN
Land Status Map
Planning Boundary
Wilderness Boundaries
ACEC Boundary
BLM Lands
TNC Deeded Lands
Forest Service Lands
State Lands
Other Private Lands
N
1 0 1 2 Miles

II. ECOSYSTEM MANAGEMENT APPROACH

Ecosystem management can be defined simply as keeping natural environments healthy, diverse, and productive so people can benefit from them year after year. The ecosystem management approach means identifying limits to use and development of the land's resources and managing within those limits in order to ensure the long-term health, biodiversity, and productivity of the environment. For some areas, it also means trying to restore damaged land to a healthy condition. Ecosystem management recognizes that natural systems must be sustained in order to meet the social and economic needs of future generations.

The ecosystem management approach for the Muleshoe Plan had several major steps. Since ecosystems do not stop at traditional boundary lines, the first step was to look across boundaries and develop an active partnership between public and private interests to work on the plan. This was accomplished by bringing together the interagency and interdisciplinary team. The team was composed of public and private land owners and managers within and adjoining the planning area boundary. The planning boundary was based on several factors; watershed boundaries, scope of issues, willingness to participate, and feasibility.

The next step was to use inventory data and the best scientific information available to determine existing and potential resource conditions and current and future potential impacts on the resources of the ecosystem. The resource inventory data is summarized in more detail in the Muleshoe Ecosystem Analysis (BLM Files). This information was then used in several subsequent steps including developing a vision for the area, analyzing issues and developing measurable resource objectives. Next the team looked at what management actions were needed to achieve the resource objectives and resolve issues relating to riparian management, watershed condition, livestock grazing, wildlife, access, wilderness, cultural resources, and recreation. Part of this step was also determining the limits on uses which are imposed by the objectives relating to reaching and maintaining a healthy, functioning ecosystem over the longterm. Monitoring was then prescribed to track progress toward achieving the objectives. Finally, a plan evaluation schedule was specified. This step builds flexibility into the plan allowing it to be amended as we learn more about the natural functioning of ecosystems through studies and monitoring. Management can then change as we acquire new knowledge.

III. PLAN PURPOSE

The purpose of the Muleshoe EMP is several fold: to provide for on-the-ground management of the public lands within the Muleshoe CMA; to implement management direction and decisions made in the Safford District RMP; to implement multiple use management in a manner that ensures ecosystem health and integrity with an emphasis on riparian and grassland biotic communities and to fulfill the intent of Congress to protect and preserve part of the area for the use and enjoyment of present and future generations as wilderness.

A. Conformance to Land Use Plans

The proposed plan is in conformance with the approved Safford District RMP and Final Environmental Impact Statement (EIS) (Partial Record of Decision I, September 1992 and Partial Record of Decision II, July 1994). The Safford RMP, Partial Record of Decision II directs that a coordinated activity level plan (the Muleshoe EMP) be developed for the Muleshoe (CMA) including the Hot Springs ACEC. The EMP is to be prepared by an interdisciplinary team of BLM resource specialists, landowners, lessees, academia, and representatives of other state and federal agencies with management responsibilities in the planning area. The EMP will propose specific resource allocations and prescriptions for multiple uses to achieve identified resource objectives. Range suitability will be determined through a range evaluation process as part of the resource inventory for the EMP, but suitability will not be used to establish livestock carrying capacity.

The RMP left livestock use on the Hot Springs ACEC in suspension pending resource allocations made in the interdisciplinary activity plan. The RMP authorized livestock use on the new Soza Mesa allotment at an initial stocking rate of 44 cattle yearlong. The RMP directed that watershed conditions in the upland areas of the Muleshoe CMA will be improved by vegetation manipulation and sound range management practices. Prescribed fire will be one of the tools used to achieve the resource objectives for the Muleshoe CMA.

B. Relationship to Statutes, Regulations or Other Plans

The proposed plan actions comply with mandates of the Federal Land Policy and Management Act (FLPMA) of 1976, which require the Bureau of Land Management to manage public lands for multiple use on a sustained yield basis.

The Muleshoe EMP includes interdisciplinary activity planning for the Muleshoe CMA including the Redfield Canyon Wilderness, Hot Springs ACEC, and the Soza Mesa Allotment. This approach eliminates the need to develop separate wilderness, ACEC, wildlife habitat, allotment, recreation or cultural activity plans. In the Muleshoe EMP, resource objectives are integrated and management prescriptions include actions to achieve resource objectives as well as constraints to achieve compatible and sustainable levels of public land uses.

Those actions pertaining to the Redfield Canyon Wilderness comply with the Wilderness Act of 1964 and the Arizona Desert Wilderness Act of 1990, and are guided by wilderness management policy as outlined in BLM Manual 8560.

Those actions relating to cultural resources are managed according to mandates set forth by the National Historic Preservation Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act, management policy specified in BLM Manual 8100, and the Programmatic Memorandum of Agreement between the BLM, Arizona State Historic Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation.

Those actions pertaining to threatened and endangered species management conform to regulations of the Endangered Species Act of 1973 as amended, BLM Manual 6840, and relevant endangered species recovery plans which include the following: The Desert Pupfish Recovery Plan (USFWS 1993), Sonoran Topminnow [Gila and Yaqui] Recovery Plan (USFWS 1984), Spikedace Recovery Plan (USFWS 1991), Loach Minnow Recovery Plan (USFWS 1991), **draft** lesser long-nosed bat recovery plan, Mexican Gray Wolf Recovery Plan (USFWS 1982), and American Peregrine Falcon Recovery Plan (USFWS 1984). The Muleshoe EMP plan meets the Sikes Act (1974) requirements for a wildlife habitat management plan. The Muleshoe EMP replaces those portions of the Mescal-Dripping Springs Habitat Management Plan (HMP) which applied to lands on the Muleshoe CMA. The Mescal-Dripping Springs HMP directed the agencies to prepare a new, separate HMP for the Muleshoe. The Muleshoe EMP is consistent with BLM's Arizona Fish and Wildlife 2000 Plan and with the Arizona Game and Fish Wildlife 2000 Strategic Plan.

Those actions pertaining to range management are consistent with the Eastern Arizona Grazing EIS (1986), conform to provisions of the Taylor Grazing Act of 1934, and meet requirements of the Public Rangeland Improvement Act of 1978. All proposed grazing and rangeland improvement practices are consistent with Arizona Standards for Rangeland Health and Guidelines for Grazing Administration.

The Ecosystem Resources section on water quality, and the proposed management actions and monitoring strategies for each objective in the Muleshoe EMP comply with the requirements of Arizona Department of Environmental Quality and the Clean Water Act for state water quality certification. The management actions described in Chapter VII for grazing and recreation management are consistent with the best management practices identified by ADEQ for maintaining and improving surface water quality.

IV. ECOSYSTEM RESOURCES

The following summaries of resources and conditions relate primarily to BLM and TNC lands within the planning area.

A. Climate

Average annual precipitation ranges from 10-12 inches along the eastern margin of the lower San Pedro Valley to approximately 16-20 inches on the higher mountain elevations. The annual rainfall is typically distributed in a bimodal pattern with about half falling as intense thunderstorms between July and September, and the other half as frontal, less intense, but longer lasting winter storms between November and April.

Temperatures range from 20 to 110 degrees Fahrenheit. At lower elevations, frost-free days may exceed 300 annually. At higher elevations frost is common at night from December through April. Summers are warm to hot at lower elevations with temperatures above 110 degrees Fahrenheit common.

B. Geology

Structure and Landscape

Southeastern Arizona was the site of major volcanic activity and tectonic extension (horizontal stretching of the Earth's crust) during mid-Tertiary time between about 17 and 30 million years ago. After the volcanic activity ceased about 17 million years ago, the modern landscape began to take shape. Renewed tectonic extension broke the Earth's crust along northwest-tending faults, forming the Basin and Range physiography of today.

In the Muleshoe Ecosystem Planning Area, one of these northwest-tending faults is the Muleshoe fault just west of the ranch headquarters. Movement on the Muleshoe fault over the last 17 million years has displaced the rocks beneath the Allen Flat basin, on the east side of the fault, downward more than 3200 feet relative to the rocks exposed in the southern Galiuro Mountains to the west. As the Allen Flat basin subsided, it was filled with sediment eroded from the adjacent Galiuros and from the Winchester Mountains and other ranges to the east.

Tectonic extension has waned in southeastern Arizona over the past 1.5 million years, the basins are not subsiding as rapidly, and through-flowing drainages, such as Hot Springs Canyon, have developed. These streams have begun to cut into the basin-fill sediments and, in places, have eroded to depths of hundreds of feet.

Rock Types and Topography

Tertiary volcanics and conglomerates are the predominant rock types in the Muleshoe planning area. These include a wide variety of rock types, from light-colored rhyolites through gray andesites to black basalts. Major mountain ranges are oriented in a northwest-southeast direction and resulted from uplift along parallel fault systems. Valleys are filled with alluvial deposits eroded from mountain ranges.

The Muleshoe Ecosystem lies within the Basin and Range physiographic province. The topography of much of the Muleshoe is characterized by steep, stony and rocky hills and escarpments as high as 10,000 feet rising from narrow, deeply incised canyons. The escarpments diminish on the southern end of the planning area where the topography consists of subdued rolling hills cut by a few deep canyons.

Minimum elevation of the Muleshoe is about 3,250 feet above mean sea level (MSL) at the west end of Redfield Canyon. Steep, rocky mountains rise above the plateaus to an elevation of 7,650 feet above Mean Sea Level (MSL) at Bassett Peak.

Mineral Potential

The potential for undiscovered resources of gold, silver, and copper is low within the Muleshoe planning area (USGS 1995). An evaluation completed in 1987 states that there are no identified minerals in the area nor are there indications of undiscovered resources (Summary of Mineral and Mineral Resource Potential of the Galiuro Addition Wilderness Study Area (AZ-040-081), Graham County, Arizona, William J. Keith, U.S. Geological Survey and Terry J. Kreidler U.S. Bureau of Mines). Due to differences in geologic histories, the area north of Redfield Canyon could host gold, silver, and copper vein and replacement deposits associated with the rocks that resulted from volcanic activity in mid-Tertiary time while the area to the south of Redfield Canyon could host porphyry copper and related deposits in older rocks beneath volcanic and sedimentary rocks of Tertiary and Quaternary ages. As yet, no evidence for deposits of this type has been found. It is unlikely that significant resources of gold, silver, or copper will be found in the rocks presently exposed.

C. Soils

An "Order 3" soil survey was published for the planning area in 1990 (Norgren and Spears 1990). The survey identified six soil types (in order of relative abundance): Grey eagle cobbly loam, Bonita-Bonita Variant complex, Arizo-Brazito-Riverwash complex, Caralampi gravelly loam, Arguistolls-Haplustolls complex, and Greyeagle-Eloma complex. The majority of the soils on the planning area are moderately erodible with highly erodible soils found primarily in riverwash bottoms and on remnant stream terraces.

D. Watersheds

Watershed Characteristics

The Muleshoe Ecosystem is drained by two major watersheds, and one minor watershed. All three are tributaries of the lower San Pedro River. Redfield Canyon drains the northern portion of the Muleshoe Ecosystem. The Redfield watershed covers 62.1 square miles with 45.3 square miles on the planning area. Swamp Springs, Bear, Sycamore, Jackson, Mitchell, and Negro canyons are major tributaries to Redfield Canyon. Hot Springs Canyon drains the southern portion of the Muleshoe Ecosystem. The Hot Springs watershed covers 109.4 square miles with 23.9 square miles on the planning area. Wildcat, Bass, N.O., Polecat, Rattlesnake, Redrock, and Davis canyons are major tributaries to Hot Springs Canyon. Double R, Hackberry, Redus, West Fork, East Fork, Rockhouse, and Pine Canyons are tributaries to Bass Canyon. The Cherry Spring watershed covers 26.3 square miles with about 14 square miles on the planning area. The watersheds are steep. The average gradient from the top of Basset Peak, to the lower boundary of the planning area in Redfield Canyon is about 489 feet per mile.

Watershed Condition

The soils on the Muleshoe are generally very shallow with rock outcrops on ridges and sideslopes. Inventories in 1994 found that approximately 40% of the Muleshoe Allotment is composed of slopes greater than 50%, and that the ground cover averages almost three-fourths rock and gravel (Appendix 3, Table 3-1).

Although the watershed terrain is steep, the amount of bare soil subject to erosion is rather small. Approximately three-fourths of this ground cover has an overstory of protective grass, shrubs, and litter. On the average, only 3% bare soil is exposed to direct raindrop impact (Appendix 3 , Table 3-2). While the soils are moderately permeable, they have a low water holding capability (Norgren and Spear 1990). Therefore, these steep, rocky slopes will tend to shed water quickly, producing high volumes of runoff during storm events. These high peak flows tend to scour wash bottoms and creek channels rather than deposit sediments.

Watershed condition in the BLM managed portions of the Redfield Canyon and Hot Springs watersheds has been classified as fair (BLM, Safford District RMP, Management

Situation Analysis, 1989). Local residents have expressed concerns about flood peaks damaging riparian terraces in lower Hot Springs and lower Redfield Canyon at the confluences with the San Pedro River. Increasing the vegetative cover of perennial grasses in the upland areas could help slow the runoff, which should also help attenuate peak flows in the lower reaches of the streams. The Hot Springs Canyon watershed contributes a significant portion of base flow to the lower San Pedro River (Braun and Maddock 1992). Good watershed management on the CMA helps to ensure delivery of high quality water into the San Pedro River.

Stream Flows

There are seven perennial streams on the Muleshoe Ecosystem with over 23 miles of perennial water (Table 1). There are 10.1 miles of perennial stream on the Redfield watershed, 12.5 miles on the Hot Springs watershed, and 0.7 miles on the Cherry Springs watershed.

Stream flow sampling is conducted to support water rights applications for instream flow and to provide resource information. Stream flows are taken monthly at Upper and Lower Hot Springs, Bass, and Wildcat Canyons. Flows have been taken irregularly on Swamp Springs and Redfield Canyons. Stream flow data collected thus far indicate flows are highly variable with season and seem to exhibit a flashy response to moderate and significant precipitation events. Base flow may become interrupted in dry summer months.

Water Quality

Water quality monitoring is conducted to evaluate progress in reducing soil erosion and non-point source pollution, in maintaining and enhancing water quality at or above established state water quality standards for designated use and to assess improvement in watershed conditions from management such as prescribed fire.

Arizona Department of Environmental Quality (ADEQ) establishes and administers state water quality standards for a variety of contaminants. Many occur in natural concentrations. Others such as fecal coliform and turbidity may have concentrations increased by land use. Responsibility has been delegated to BLM under the Clean Water Act to manage the Public Land with practices that maintain or improve water quality to meet the state standards. These practices are referred to as best management practices.

Stream segments that are not currently meeting state water quality standards for one or more contaminants are considered "impaired" or "limited" and are targeted by ADEQ and BLM for improvement. The connection between the Muleshoe Ecosystem and the nearest impaired water is described below, so that the impacts of the proposed actions and opportunities to improve water quality may be more fully assessed.

The closest stream segments to the Muleshoe Ecosystem with impaired water quality are Redfield Canyon Creek (Segment 15050203-014) and the San Pedro River (Segment 15050203-014: Aravaipa Creek to the Gila River). San Pedro River Segment 15050203-014 (Aravaipa Creek to the Gila River) is approximately 30 miles north of where streams draining the Muleshoe Ecosystem enter the San Pedro River. Redfield Canyon Creek is impaired for aquatic and warm water fisheries. Stressors are arsenic, low dissolved oxygen, chromium and zinc. ADEQ and BLM last sampled in 1993. The San Pedro River between Aravaipa Creek and the Gila River is also impaired for aquatic and warm water fisheries, as well as for full body contact. The principle stressor is turbidity, although that standard is under review. USGS monitored suspended solids through 1993 and ADEQ has a fixed monitoring station with last sample in 1994 (ADEQ, 1996 Arizona Water Quality Assessment Report).

Surface water hydrologic connections exist between the Muleshoe and Soza Wash grazing allotments and Redfield Canyon Creek (Segment 15050203-014) via Swamp Springs and Sycamore Creeks and unnamed washes in the allotments by the tributary rule. Hydrologic connections exist between the Muleshoe Allotment and the San Pedro River (Segment 15050203-014: Aravaipa Creek to the Gila

River) via the San Pedro River above Aravaipa Creek, Hot Springs Canyon, Wildcat, Bass, and Double R Canyon Creeks and unnamed washes by the tributary rule. Hydrologic connections also exist between the Muleshoe Allotment and the San Pedro River (Segment 15050203-014: Aravaipa Creek to the Gila River) via the San Pedro River above Aravaipa Creek, Soza Wash, Cherry Springs Canyon Creek and unnamed washes by the tributary rule. Hydrologic connections exist between the Soza Mesa Allotment and the San Pedro River (Segment 15050203-014: Aravaipa Creek to the Gila River) via the San Pedro River above Aravaipa Creek, Soza Wash and Poor Canyon.

Redfield Canyon Creek, Hot Springs Canyon Creek, and Bass Canyon Creek all have high water quality and appear to be good candidates for nomination as Unique Waters under the state-approved program.

TABLE 1

Perennial Stream Lengths, Ownership, and Average Flows

Stream	Reach Length in Miles BLM	STATE	PVT.	TOTAL	Average Flow CFS
Hot Springs	4.5	0.0	0.6	5.1	5.4
Bass	0.5	0.0	2.4	2.9	3.02
Double R	0.0	0.0	3.6	3.6	N/A
Wildcat	0.9	0.0	0.0	0.9	0.08
Redfield	0.6	3.0	3.9	7.5	3.9
Swamp Springs	2.2	0.4	0.0	2.6	N/A
Cherry Springs	0.0	0.0	0.7	0.7	N/A
Total	8.7	3.4	11.2	23.3	

Water Rights

In 1988, the BLM Safford District filed applications for instream flow permits for Hot Springs and Swamp Springs canyons with the Arizona Department of Water Resources (ADWR). A permit was issued for Hot Springs Canyon in 1992. The BLM must continue to collect data on Hot Springs until 1996 in order to receive a certificate of water right. Due to the remoteness of Swamp Springs, few flow measurements in support of the instream flow application have been taken.

Following congressional designation of the Redfield Canyon Wilderness, the BLM filed a Federal Reserve Water Right in 1990, and a Statement of Claimant for the Gila River Basin Adjudication. The Federal Reserve Right claims a total of 1659.06 acre-feet per year for springs, seeps, tanks, and streams. The Nature Conservancy filed an instream flow application for their reach of lower Hot Springs Canyon in December 1989 and received a certificate in May 1994 (Appendix 3, Table 3-3).

Water Sources and Developments

Permanent springs occur in Redfield, Swamp Springs, Hot Springs, Bass, Double R, Wildcat, and Cherry Springs canyons. There are also several perennial springs along the mid-lower slopes of the Galiuro escarpment. Many of the wells are non-operational. There are two bighorn sheep developments within the Redfield Canyon Wilderness. A complete water sources inventory is needed for the planning area. A complete list of the known natural and developed water sources can be found in the Muleshoe Ecosystem Analysis (BLM Files).

E. Airshed Classes and Conditions

Because of its remote location and relatively high elevation, the air quality of the Muleshoe Ecosystem is excellent. The Redfield Canyon Wilderness and other public lands are a Class II airshed. The Galiuro Wilderness is a Class I airshed. The nearest source of urban air pollution is Tucson, which is 32 miles west. The copper smelter at San Manuel, a potential source of sulfur dioxide pollution, is about 20 miles northwest and agricultural fields around Willcox, potential sources of dust pollution, are 16 miles east. These may influence air quality depending on wind direction. Wind generally comes from the west or northwest in winter and west or southwest in summer. The Forest Service maintained a photographic air quality monitoring station in the Galiuro Wilderness from April 1985 to November 1987 and from December 1988 to September 1992 to monitor impacts from the smelter at San Manuel. Data collected during these periods indicate high visibility ratings with only occasional haze.

F. Vegetation

The Muleshoe Ecosystem is located primarily within the Southeastern Arizona Basin and Range Major Land Resource Area (MLRA) in the 12 to 16-inch precipitation zone. The western end of Hot Springs Canyon is in a transitional zone where the Central Arizona Basin and Range MLRA extends upstream along the San Pedro River into the Southeastern Arizona Basin and Range MLRA, blending the Upper Sonoran Desert Scrub and Chihuahuan Semidesert Grassland biotic communities.

Anderson, Warren & Reichenbacher (1985) mapped five major vegetation communities from 14 vegetation associations on the Muleshoe Ecosystem: Sonoran desert scrub, desert grassland/semi-desert shrub land, broadleaf deciduous woodland (riparian), evergreen woodland/chaparral, montane forests and woodlands. The lower elevation mesa tops and hotter south- and west- facing slopes are dominated by Sonoran desert scrub with creosote bush, palo verde, diverse shrubs and saguaro. Mid-elevations have semi-desert grassland/scrub communities consisting of open stands of evergreen and deciduous trees such as mesquite and hackberry with an understory of native perennial grasses such as sideoats grama and curly mesquite and with varying levels of shrubs such as acacias, amole, snakeweed and burroweed. Riparian areas support large broad-leaved deciduous forests of sycamore, cottonwood, willow, walnut, ash, and white oak. Mesquite bosques line higher terraces above the floodplain. Steeper slopes at middle and upper elevations support evergreen woodlands of Mexican blue oak and juniper, and on north slopes, a mixed chaparral with species typical of Sierra Madrean vegetation. The highest elevations of the planning area support montane forests and woodlands consisting of open stands of evergreen trees such as Arizona cypress, pinon pine, and ponderosa pine with dense understories of evergreen chaparral shrub species such as manzanita, buckbrush, and snowberry.

Ecological Sites

An ecological site (range site) is a unit of land in a specific environmental zone that is capable of supporting a native plant community typified by an association of plant species that differs from other ecological sites in the kind or proportion of species. In terms of vegetation, it expresses the potential vegetation, or what could grow, not necessarily what grows there now. The potential vegetation may differ greatly from the existing plant community, or from the original or pristine vegetation, which may have changed due to long-term environmental variation or past management practices.

The criteria for delineating ecological sites are based on certain physical characteristics, not vegetation. The primary characteristics include topographic position and percent slope, soils and parent geologic material, precipitation, and elevation.

To evaluate an individual ecological site it is necessary to conduct a condition analysis. The ecological condition rating compares the

similarity of the existing vegetation to the potential of which it is capable, or to the desired condition expressed in a management objective. Range condition is typically described by four condition classes of excellent, good, fair, or poor as compared with the potential vegetation community for the site. In this analysis, ecological condition is also described by four classes: Low, Mid, High, and Potential Natural Community (PNC). The rating is based on the comparison of the existing vegetation community to the PNC. The higher the correlation to PNC, the higher the ecological rating.

The ecological sites on the Muleshoe CMA east of Soza Mesa are predominately volcanic and granitic hills range sites (92%) (Figure 3). These sites occur on hill slopes and ridge tops with slopes ranging from 15-70%. The soils are shallow and formed primarily on basic igneous rocks and related conglomerates. They are non-calcareous, clay loam to clay textured, with well developed covers of cobbles, gravels, and stones. Numerous areas of rock outcrop occur intermingled with soil areas. Plant-soil moisture relationships are good.

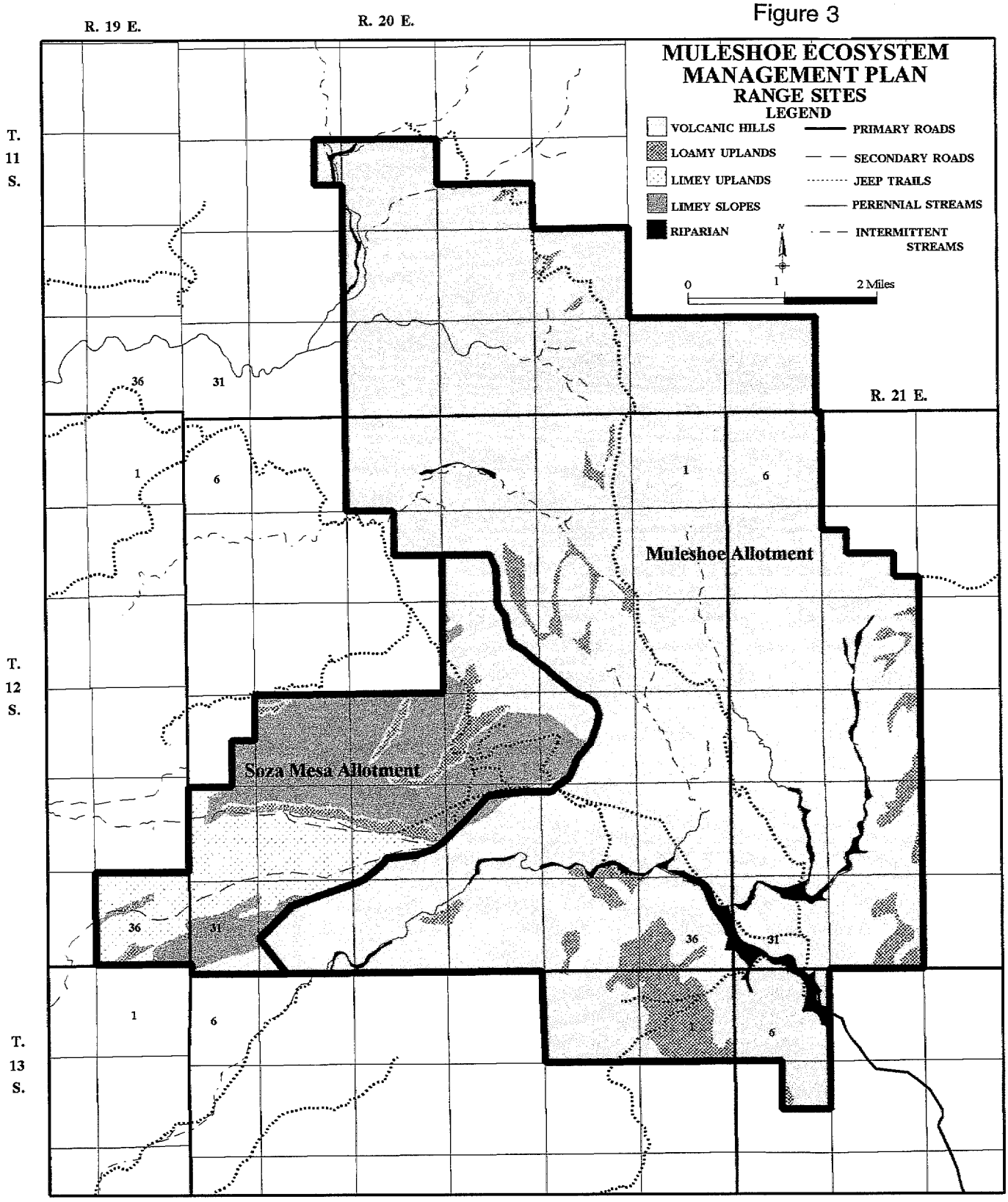
The potential plant community on these ecological sites is dominated by warm- season perennial grasses such as sideoats grama, curly mesquite, black grama, bush muhly, and various threeawns. All of the major grass species are well dispersed throughout the plant community. Many species of shrubs are well represented with larger concentrations occurring at the edges of rock outcrops and in the canyon bottoms. The dominant shrubs include whitethorn, ratany, false mesquite, creosote bush, mimosa, palo verde, burroweed, and snakeweed. Various leaf succulents and cacti may also be present, including yucca, amole, agave, cholla, saguaro and barrel cactus. The aspect is open grassland. Well developed stone and cobble covers protect the soil from erosion and tend to protect forage species from heavy utilization. Natural fire was a factor in the development and maintenance of the open grassland aspect on these sites.

The ecological sites on the Soza Mesa portion of the Muleshoe CMA are influenced by the calcareous nature of the geology. Most of the soils have developed on calcareous mixed gravelly or loamy alluvium and conglomerate. Limy slopes (44%) and limy upland (30%) range sites dominate (Figure 3). These sites occur on pediments, fan terraces, and hill slopes. Slopes range from 1% to 40%. The soils are limy throughout and may be underlain by lime pans or calcic horizons at shallow depths. Volcanic and granitic hills sites (20%), and loamy upland sites (6%) also occur in lesser amounts on the Soza Mesa portion of the CMA.

The potential plant community on the Limy Slopes ecological sites is dominated by warm-season perennial grasses. Perennial forbs and a few species of low shrubs are well represented. The major perennial grasses are well dispersed throughout the plant community. In high condition, the grass component may account for 60 to 80% of total plant composition in the community. The aspect is open grassland. With continuous heavy grazing the more desirable grasses (sideoats and black grama, and bush muhly) are replaced by increases in species like threeawns and fluffgrass. Low shrubs which can increase include snakeweed and desert zinnia. Large shrubs such as creosote and whitethorn acacia can invade this site from adjacent areas. Natural fire may have been an important factor in development and maintenance of the grass dominance of the plant community. Gravel cover of the soil surface may not be adequate in preventing water erosion when herbaceous cover is reduced on the steeper slopes on these sites.

The potential plant community on the Limy Upland ecological sites is a diverse mixture of desert shrubs and perennial grasses and forbs. In high condition, the grass component in the community will only account for 25 to 40% of the total plant composition by dry weight. The aspect is shrub land. The large woody perennials such as creosote and whitethorn acacia can increase to the exclusion of herbaceous species. Natural fire may have been important in maintaining a balance between herbaceous and woody species, but fire-free intervals were probably higher than on

Figure 3


R. 19 E.
R. 20 E.
R. 21 E.
T. 11 S.
T. 12 S.
T. 13 S.
MULESHOE ECOSYSTEM MANAGEMENT PLAN
RANGE SITES
LEGEND
VOLCANIC HILLS
LOAMY UPLANDS
LIMEY UPLANDS
LIMEY SLOPES
RIPARIAN
PRIMARY ROADS
SECONDARY ROADS
JEEP TRAILS
PERENNIAL STREAMS
INTERMITTENT STREAMS
N
0
1
2 Miles
Muleshoe Allotment
Soza Mesa Allotment
36
31
1
6

other more productive sites, due to the time needed for fine fuels to accumulate.

Grasslands

Semi-Desert Grasslands

Historically, the ecological sites on the Muleshoe were producing near their natural potential. The aspect of the rangeland was an open grassland dominated by perennial grasses such as plains lovegrass, cane beardgrass, black grama, slender grama, sprucetop grama, bush muhly, curly mesquite, vine mesquite and several threeawn species intermixed with leaf succulents including beargrass and amole. However, partial or extensive invasion of mesquite, juniper, whitethorn, Mormon tea, mimosa, snakeweed, and burroweed has occurred over much of the area. Intense grazing pressure and wildfire suppression over the past century have resulted in the transition of much of the area from grassland to a desert shrub vegetative state. Continuous yearlong livestock grazing prior to The Nature Conservancy's acquisition of the ranch in 1982 resulted in a reduction of some of the desirable perennial grasses (such as plains lovegrass and cane beardgrass) and an increase of invasive shrubs (such as mesquite and whitethorn) and succulents such as amole.

Grassland Process

Upland vegetation communities change over time due to environmental influences. The vegetation communities continuously transition among a series of ecological states from disturbance factors such as climate, grazing, fire, or disease. The present vegetation communities on the Muleshoe are an expression of the past disturbance regimes and land use practices.

In the semidesert grasslands on the Muleshoe, fire was probably the single most common disturbance controlling the transition from grassland to shrub land in the volcanic hills, granitic hills and loamy upland ecological sites prior to European settlement. Periodic wildfires reduced shrub cover and allowed grasses to remain dominant.

Livestock grazing practices played a major role in defining the present ecological state of the grasslands on the Muleshoe. Yearlong grazing management allowed maximum opportunity for cattle to selectivity graze preferred plants resulting in undue intensity and frequency of defoliation of these species putting them at a disadvantage in plant competition. The frequency of fire in these grasslands was subsequently reduced by removal of these perennial grasses as fuels, and by man's fire suppression efforts. Under heavy grazing use and with low fire occurrence, the shrubs will generally remain until removed by fire or some other type of disturbance. Mesquite, catclaw, whitethorn, juniper, snakeweed, and other shrubs have increased and now dominate the perennial grasses in some areas.

In order to more easily understand the transitional changes that occur to vegetation on ecological sites within the semi-desert grassland communities, a modification of a Grassland State -Transition Model (Appendix 4) was used to describe the ecological states and processes occurring within the semi-desert grasslands on the Muleshoe (Volcanic Hills, Granitic Hills and Loamy Upland Ecological Sites).

In the semi-desert grassland model, grasslands are viewed as a system cycled by climate, fire, and grazing, which contributes runoff and sediment to watershed, riparian, and aquatic systems. Fire and grazing management actions are considered the manageable forces driving the model. Although climatic cycles interact with fire and grazing regimes to affect the grass/shrub ratio, climate is not a manageable variable and is not used in the model. In the model, fire suppression and increased grazing drive the system to grassland states III and IV, the situation now at Muleshoe, where shrubs, annual grasses, and lower-statured, lower-producing perennial grasses occur. Restoration of high fire frequency (every 3-10 years) combined with low grazing intensity drives the system back to states I and II, where mid-tall statured perennial grasses dominate and shrubs are much less prevalent.

Using this model, the semidesert grasslands within the Muleshoe Ecosystem have been classified into five ecological states based on

the composition of the vegetation (amount of shrub invasion, amount of perennial versus annual grass and amount of mid-tall statured perennial grasses): State 1 - perennial grassland - dominated by mid stature grasses, State 2 - shrubby grassland - dominated by mid stature grasses, State 3 - shrubby grassland - dominated by short stature grasses, State 4 - shrub land - dominated by annual grasses and forbs, and State 5 - perennial grassland - dominated by short stature grasses (Table 2, Figure 4).

Management of this upland vegetation community will affect watershed function, which affects the function of other plant communities and habitats. Watersheds consist of interdependent aquatic, riparian, and upland components.

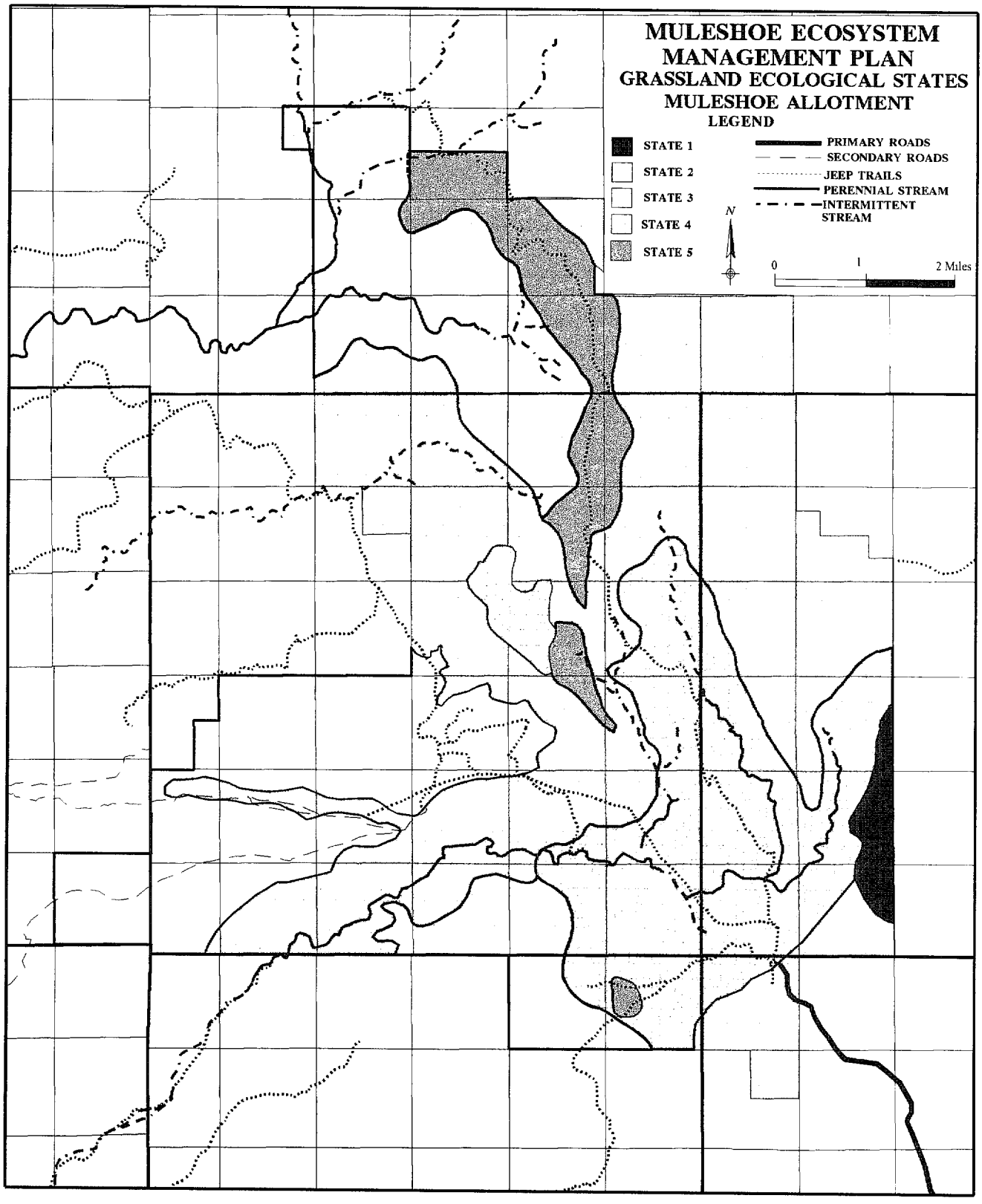
TABLE 2

Muleshoe Grassland State - Transition Model Data
1994 Transect Data

State	Description	Shrub Canopy & Grass Composition (by weight)	Acres	Percent
I	Perennial Grassland Mid Grass Dominant	Shrub Canopy <20% Perennial Grass >70% Mid Grass >50% Annuals <30%	400	2
II	Shrubby Grassland Mid Grass Dominant	Shrub Canopy >20% Perennial Grass >70% Mid Grass >50% Annuals <30%	5,900	22
III	Shrubby Grassland Short Grass Dominant	Shrub Canopy >20% Perennial Grass >70% Mid Grass <50% Annuals <30%	10,236	39
IV	Shrubs and Annuals Annual Grasses Dominant	Shrub Canopy >20% Perennial Grass <70% Annuals >30%	7,000	27
V	Perennial Grassland Short Grass Dominant	Shrub Canopy 0% Perennial Grass >70% Mid Grass <50% Annuals >30%	2,200	8
	Riparian	N/A	624	2
Total			26,360	100

Watershed condition is largely determined by upland vegetation and soil type. When properly functioning, watersheds capture, store, and release moisture efficiently, providing high infiltration of precipitation into the soil, low movement of soil off-site, reduced flood peaks, high quality water, and reduced evaporation of water from the soil profile. Attaining proper function and desired plant communities in the uplands contributes the physical and biological

Figure 4


MULESHOE ECOSYSTEM
MANAGEMENT PLAN
GRASSLAND ECOLOGICAL STATES
MULESHOE ALLOTMENT
LEGEND
STATE 1
STATE 2
STATE 3
STATE 4
STATE 5
PRIMARY ROADS
SECONDARY ROADS
JEEP TRAILS
PERENNIAL STREAM
INTERMITTENT STREAM
N
0
1
2 Miles

stability necessary to restore and maintain the aquatic and riparian ecosystems.

Riparian Areas

Riparian Habitats

The stream channels in the riparian areas of the Muleshoe Ecosystem are characterized by narrow aquatic zones bordered by wide zones of river-wash rock and sand bottom sites (Appendix 3, Table 3-4). Narrow bands of woodland sites are restricted to the sandy or loamy terraces back away from the velocity of the main flows below the steep hills. During periods of low flow events, these bottom sites will aggrade with sediments covering the riverwash rock, thus narrowing the active channel and allowing the development of stream banks capable of supporting perennial vegetation.

The riparian vegetation along Redfield and Hot Springs canyons and their tributaries is within the Mixed Broadleaf series of the Southwestern Riparian Deciduous Woodland biotic community. The dominant species include velvet ash, sycamore, Arizona walnut, and willows. In the wider canyon bottoms Fremont cottonwood and Goodding willow may dominate locally as the tree component. Major understory species include wild rye, deer grass, seepwillow, sedges, and rushes. Mesquite bosques occur on the few loamy bottom sites found along stream terraces, and at major drainage ways. Past heavy livestock use along these canyons had resulted in heavy utilization of woody riparian tree seedlings and a subsequent lack of regeneration. A preliminary inventory of the riparian areas in Redfield, Hot Springs and Bass canyons in the summer of 1986 found all three to be in less than satisfactory condition. Channel banks and terraces lacked proper vegetative armoring and barren gravel bars and cobble fields were present.

No livestock grazing has occurred on the Muleshoe Ranch since the property was acquired by The Nature Conservancy in 1982. This rest from livestock use over the past decade has allowed natural processes to resume and has helped restore proper functioning condition to the riparian systems on the Muleshoe. This has resulted in improved riparian function, greater diversity in the age structure of the woody riparian species, and increased streambank stability (Appendix 3, Tables 3-5 through 3-7).

Riparian Processes

Riparian areas and the associated stream channels are not static features of the landscape as they are constantly undergoing change. The riparian area and associated aquatic habitat are exposed to natural external factors primarily stream flow and sediment transport.

Riparian areas that are functioning properly change gradually and have adequate vegetation, flood plain development or woody debris to dissipate flood energies. Water from floods is slowed and spread out on floodplains where it can seep into the soil and drop sediment which builds banks. Riparian vegetation holds soil against erosion. This improves fish habitat by holding banks which allows for a diversity of fish habitat types to form through sediment scour and deposition. In this way riparian plants influence the formation of pools, cover, riffles, runs, bars, braids and clean spawning habitat. However, excessive flooding may scour away riparian vegetation and stream banks, especially where floods are concentrated in canyons. Flooding is influenced by rainfall and watershed health.

Watersheds dominated by bare ground or that have been impacted in such a way that ground cover is reduced foster flash flooding which can destabilize riparian areas in associated drainages. Excess sediment from these unstable watersheds can fill in important fish habitat features such as pools and riffles with fine sediment.

Through scour and sediment deposition, the topography of the floodplain continually changes, which influences riparian composition. The composition and structure of the riparian community can likewise influence sediment deposition, creating a dynamic feedback response between the plant community and physical processes. As an example, dense

stands of young cottonwoods and willows are effective in trapping sediment during floods. As a terrace begins to form in the vicinity of young trees, the site is elevated above the flood scouring zone, enabling young trees to mature into forest stands. Continued sediment deposition and terrace building may lead to formation of a mesquite bosque, as the depth to water table increases to where young cottonwoods and willows can no longer become established. In overall floodplain dynamics, the same floods which build terraces in one location may erode sediments from another site, creating new opportunities for cottonwood and willow recruitment. This dynamic balance maintains the essential structural diversity of the community.

The riparian vegetation goes through stages of development as young trees grow older, and sediment deposition builds banks and terraces that alter soil/water relationships which influences plant species composition, density and abundance. Early seral stages are characterized by fewer species and younger age classes of trees while later seral stages have more species and a higher ratio of older trees. Finally if the riparian area is allowed to function unimpaired by disruptive land practices it may attain its potential (Figure 5) (BLM Tech. Ref. 1737-9). Flooding serves to disturb the riparian community which provides opportunity for new seed beds to develop for tree seedlings and openings for herbaceous plants resulting in a mosaic of plant species, age classes, and microclimates that support a diversity of conditions and animals.

Impairment of vegetative development that causes reduction in vegetative density, plant vigor or production directly alters the integrity of floodplains and stream banks. This leaves the degraded riparian area vulnerable to further damage by flooding as the riparian community has lost its ability to dissipate flood energy and resist erosion (Figure 6)(BLM Tech Ref 1737-9).

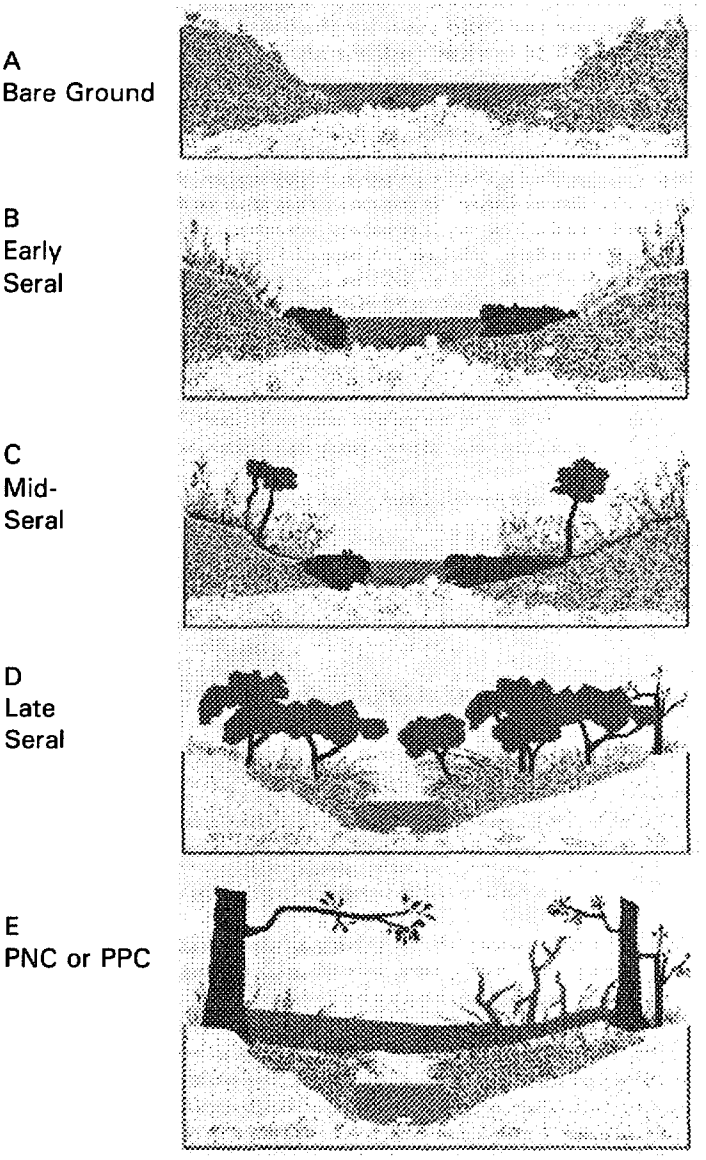


Figure 5 - Riparian Area Development Process

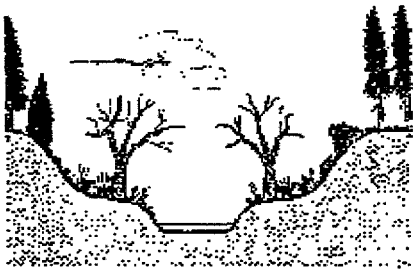
Aquatic Habitats

Habitat diversity in the form of the variety of pools, riffles, and runs available to fish will influence which species of fish can exist in a stream. For example, both Gila chub and Sonora sucker require pool habitat. Cover such as undercut bank and woody debris provide additional habitat features that enhance habitat quality for these fish.

In order to determine the quality of existing fish habitat on the Muleshoe, an intensive basin stream (fish habitat) survey was conducted in Redfield, Bass, and Hot Springs canyons in the

First, good to excellent conditon channel

then, channel beginning to become wider and shallower,



finally, channel very wide and shallow

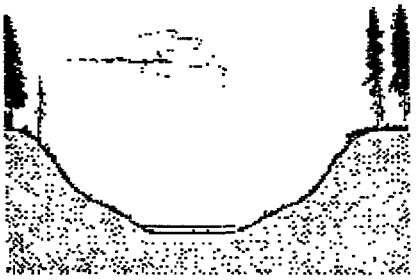


Figure 6 - Riparian Area Degradation Process

spring of 1994 (Appendix 3, Table 3-9). Fish habitat characteristics were cataloged in conjunction with key areas used for riparian inventories. Pools were counted over long reaches of stream to better quantify their abundance. Fish habitat was most diverse in Redfield Canyon. This canyon had the most pools per mile, pools > 2 feet deep, most woody cover and undercut bank. All three canyons had good to excellent bank stability. Both Hot Springs and Bass canyons have fewer pools and much less undercut bank than Redfield Canyon. Bass Canyon had more woody cover but appeared to be impacted by the large flood of 1993 which scoured out the channel leaving few deep pools. Fish habitat in Hot Springs Canyon appears to be well below its potential. The number of large pools in Bass Canyon are expected to increase as it recovers from the 1993 flood. However, fish habitat in Bass Canyon still appears to be below potential.

Aquatic Habitat Processes

Fish habitats are controlled primarily by sediment input and transport, which are functions of the volume and pattern of precipitation and runoff. As discussed in the previous section (Riparian Processes), watershed and riparian health influence sediment transport and runoff characteristics that affect flood magnitude. Along the stream channel, high gradient, narrow channels receive coarser substrate, while finer sediments are deposited in areas where floodplains are wider and gradients lower. Pools tend to be permanent only where there are large obstructions like boulders and trees. When sediment input is excessive, pools may become rare due to sediment filling (Swantson 1991).

Flooding is not only an important process that influences channel geometry and plant community, it also influences fish community structure as well. In constrained canyon bound reaches of streams and rivers, non-native fish species are unable to resist flooding. Unlike native fishes that have adapted to flooding in canyon reaches, these exotic fishes tend to be eliminated or severely reduced in number by flood events (Minckley and Meffe 1987). Non-native fishes, once established, constitute a biotic habitat element that is incompatible with and can eliminate native fishes (Deacon and Minckley 1992). Therefore, maintaining a natural flooding regime is a key element in maintaining the native fish community.

Riparian/Aquatic Area Management

Management of riparian and aquatic habitats is largely passive due to the present resource conditions, low impact activities and low use levels currently occurring on the Muleshoe. The

only intensive management occurs on private land at the Muleshoe Ranch Headquarters which is the major destination point in the area. Selected riparian areas have been monitored since 1984. Acquisition of detailed data on Redfield, Hot Springs, Sycamore, Swamp Spring, Bass and Wildcat canyons has provided a basis for determining riparian condition and in some cases long-term data allows for determination of trend.

G. Fish and Wildlife

The variety of vegetation communities within the Muleshoe Ecosystem provide habitats which support a high diversity of animal species. Of particular management concern are the 29 special status fish and wildlife species (Table 3) which inhabit the Muleshoe Ecosystem. Special status species include five fishes, four reptiles, one amphibian, eight birds, and 11 mammals. One special status plant is also included on the list. The majority of these species are aquatic or riparian dependent.

Fish surveys with habitat monitoring have been conducted by TNC in Redfield, Hot Springs, Bass and Double R canyons since 1991. The purpose of these surveys is to follow trends in the native fish community and to track exotic invaders such as the green sunfish found in Redfield Canyon.

Aquatic habitats in the 23 miles of streams on the Muleshoe Ecosystem support five native fish species: longfin dace, speckled dace, desert sucker, Sonoran sucker, and Gila chub. All five species were formerly candidates for federal listing and are now being considered for the Arizona BLM sensitive species list. The Gila chub is on AGFD's Wildlife of Special Concern list. Lowland leopard frogs and Mexican garter snakes, both formerly federal candidates, are also found in close association with these aquatic habitats. These streams are largely canyon-bound with narrow floodplains but have diverse habitat development. Aquatic habitat is characterized by pool, run and riffle development. Undercut banks, woody debris and boulder ledges provide a diversity of micro habitats as does variation in shading by trees and brush along the banks.

The riparian areas support the highest diversity of wildlife on the Muleshoe Ecosystem. Many species, including Mexican garter snake, yellow warbler, summer tanager and red bat, are riparian obligates, spending most of their time in these areas. Others are attracted to riparian areas for breeding, foraging, or travelling. Substantial numbers of neotropical birds including summer tanagers, northern orioles, yellow-billed cuckoo, gray hawk, black hawk, and zone-tailed hawk nest in riparian habitats. A variety of insectivorous bats, including southwestern cave myotis and California leaf-nosed bat (both former federal candidates), are attracted to the riparian areas to forage on the abundance of insects. The riparian corridors are important migration and movement corridors for wildlife such as black bear, coati, and neotropical bird species. Mexican spotted owl, a federally threatened species, has been observed in riparian areas within the Muleshoe and may use them for breeding, roosting, or travel corridors. The southwestern willow flycatcher, a federally endangered species, is a riparian obligate and possible visitor to the Muleshoe's riparian areas. However, recent surveys have found no breeding pairs and only one migrant present on the Muleshoe.

The desert grassland provides habitat for desert kingsnake, desert grassland whiptail, southwestern earless lizard, desert box turtle, Gila monster, scaled quail, Gambel's quail, mourning dove, loggerhead shrike (former federal candidate), Botteri's sparrow, Baird's sparrow, badger, javelina, white-tailed deer and mule deer. The federally endangered lesser long-nosed bat and former federal candidate Mexican long-tongued bat are summer and fall residents of the area feeding primarily on nectar of agave blossoms in the grassland areas. The rocky terrain provides many suitable caves or crevices for potential roost sites for these and other bat species. Several old buildings also provide roosting sites for various bat species. Bighorn sheep and the endangered peregrine falcon inhabit the rugged cliffs and remote canyons that border and cross through the desert grassland.

TABLE 3
Special Status Wildlife and Plants of the Muleshoe Ecosystem

Common Name	Scientific Name	Federal Status[1]	State Status[2]
Gila chub	*Gila intermedia*	fC2	WC (ST)
Longfin dace	*Agosia chrysogaster*	fC2	
Speckled dace	*Rhinichthys osculus*	fC2	
Sonoran sucker	*Catostomus insignis*	fC2	
Desert sucker	*Catostomus clarki*	fC2	
Mexican garter snake	*Thamnophis eques*	fC2	WC (SC)
Canyon spotted whiptail	*Cnemidophorus burti*	fC2	
Desert tortoise	*Gopherus agassizzi*	fC2	WC (SC)
Texas horned lizard	*Phrynosoma cornutum*	fC2	
Lowland leopard frog	*Rana yavapaiensis*	fC2	WC (SC)
Common black-hawk	*Butegallus anthracinus*		(SC)
Northern gray hawk	*Buteo nitidus maximus*	fC2	(ST)
Peregrine falcon	*Falco peregrinus*	FE	(SC)
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*		WC (ST)
Mexican spotted owl	*Strix occidentalis mexicanus*	FT	WC (ST)
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE	WC (SE)
Loggerhead shrike	*Lanius ludovicianus*	fC2	
Baird's sparrow	*Ammodramus bairdii*	fC2	WC (ST)
Western yellow bat	*Lasiurus xanthinus*		WC (SC)
Western red bat	*Lasiurus blossevillii*		WC (SC)
Townsend's big-eared bat	*Plecotis townsendii*		WC
Spotted bat	*Euderma maculatum*	fC2	(SC)
Southwest cave myotis	*Myotis velifer brevis*	fC2	
Occult little brown bat	*Myotis lucifugus occultus*	fC2	
California leaf-nosed bat	*Macrotus californicus*	fC2	(SC)
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	FE	WC (SE)
Mexican long-tongued bat	*Choeronycteris mexicana*	fC2	(ST)
Greater western mastiff bat	*Eumops perotis californicus*	fC2	WC
Yellow-nosed cotton rat	*Sigmodon ochrognathus*	fC2	
Aravaipa sage	*Salvia amissa*	fC2	

[1]Federal Status: FE=Federally endangered, FT=Federally threatened, fC2=former Category 2 Candidate. *Note:* Former Category 2 Candidate species are being considered for inclusion on a BLM sensitive species list.
[2]State Status: WC=Proposed Wildlife Species of Special Concern, Arizona Game and Fish Department, October 1996, Former state designations in existence at time of plan preparation, (SE)=State endangered, (ST)=State threatened, (SC)=State candidate.

In the western portion of the Muleshoe Ecosystem, the desert grasslands typical of most of the Muleshoe transitions into a Sonoran desertscrub community. Wildlife species common to desert grasslands and desertscrub (mule deer, javelina, Gambel's quail, nectar-feeding bats) occur in this transition, or ecotone, area. The area also supports a large population of Sonoran desert tortoise and has been designated as Category 2 Tortoise Habitat.

Montezuma quail and black bear are more commonly found in the oak woodlands and pine-oak woodlands of the higher elevations of the Muleshoe. An unsuccessful attempt was made in February 1994 to reintroduce Gould's

turkeys to woodland habitat on FS lands in the Galiuros. In January and February of 1997, an additional 46 turkeys were released in the Galiuro Mountains in 8 separate release events. Of the birds released, only 9 (20%) survived to the present (AGFD 1997).

Large mammalian predators on the Muleshoe include mountain lion, bobcat, black bear, and coyote. Historically, Mexican wolves once roamed the Galiuro Mountains. The Galiuros were analyzed as a possible reintroduction site in the draft Mexican wolf recovery plan (USFWS 1982), but the site is not being pursued in the preferred alternative. The ranges of these species may cross into several vegetation communities. The Muleshoe Ecosystem boundary is not large enough to contain more than a few home ranges or portions of home ranges of these large predators.

Fish and Wildlife Management

Wildlife and its habitat are managed cooperatively under a Master Memorandum of Understanding (MOU) (1987) between BLM and the Arizona Game and Fish Commission. The MOU provides for coordination between the two agencies to accomplish wildlife habitat improvement projects and to develop Habitat Management Plans pursuant to the Sikes Act. This has allowed for improvements for wildlife such as the water developments for bighorn sheep. The BLM manages habitat for species identified as Wildlife of Special Concern by AGFD in conformance with state objectives which are identified in the AGFD Wildlife 2000 Strategic Plan. Federally listed species and those proposed for listing are protected by the Endangered Species Act of 1973 as amended (ESA). The BLM is mandated to protect threatened and endangered species and the ecosystems (habitats) upon which they depend. Under the ESA, all actions authorized, funded or carried out by BLM must be in compliance with the Act. In addition, the BLM is directed to cooperate in planning and providing for the recovery of threatened and endangered species and to retain all habitat essential to the recovery or survival of any threatened or endangered species, including habitat historically used by these species. BLM also manages habitat for former Federal candidate species (BLM sensitive species) to prevent their listing.

H. Cultural Resources

Archaeological Resources

Human occupation of what is now the Muleshoe Ecosystem may stretch back some 12,000 years. Five major periods of human occupation likely occurred on the Muleshoe including Paleo-Indian (10,000 B.C. to 5,500 B.C.), Archaic (ca. 5,500 B.C. to A.D. 100), Hohokam/Mogollon (ca. 300 B.C. to 1400 A.D.), Apache (ca. 1680 A.D. to 1873 A.D.), and Euroamerican (1875 A.D. to present). Little archaeological survey has been done on the planning area, and evidence of the different periods varies.

Today the San Pedro River Valley contains one of the highest concentrations of Paleo properties in the nation. Although conclusive evidence has yet to be discovered, the Muleshoe Ecosystem's proximity to the San Pedro River Valley makes it highly probable that Paleo-Indian bands visited the area to hunt game and collect wild plant foods.

Although evidence of human occupation on the planning area during the Archaic is not plentiful, some flaked and ground tools documented at several sites may represent this period when small nomadic bands roamed the area hunting and gathering.

The Muleshoe Ecosystem is located on what present-day archaeologists consider the boundary between the areas inhabited by the Hohokam and Mogollon cultures. Pottery and stone tools collected from surface scatters and recovered from excavations in the planning area represent both Hohokam and Mogollon affiliation. Both of these groups practiced horticulture, cultivating corn, squash and beans and both built and lived in pithouse villages although the Hohokam were much more sedentary. The Hohokam and Mogollon farmers in the Muleshoe Ecosystem faced different challenges and solved different

problems than their contemporaries growing crops at lower elevations and in different terrain. Comparatively little information exists on this subject, which makes these sites extremely valuable.

Historic narratives by Father Kino and others document the presence of Apaches in the vicinity of the Muleshoe indicating a high possibility of archaeological properties representing the Apache occupation being present within the planning area. However, no properties have been documented so far.

The greatest amount of evidence is from the Euroamerican period including remains of several old homesteads throughout the planning area. The Muleshoe Ranch headquarters at Hooker's Hot Springs began as a homestead filed by Dr. Glendy King and was later developed into a health resort by Henry C. Hooker. It is now owned by The Nature Conservancy and provides staff and visitor facilities.

Documented Properties

Only scattered locations in the planning area have been inventoried for archaeological resources. Approximately 347 acres on the southern and southeastern end of the management area were systematically inventoried (Class III inventory) by New Mexico State University's (NMSU) Cultural Resources Division for the All-American Pipeline right-of-way. A Class II cultural resource inventory has been conducted over approximately three-quarters of the Soza Mesa Allotment, and several small Class III inventories have been conducted for small-scale projects. The known cultural resources of the planning area include two occupation properties, two artifact scatters, four lithic scatters, three rock shelters, and six historic properties.

To date, 11 prehistoric properties have been documented in the planning area. All are located in drainages and appear to represent intensive resource utilization and seasonal occupation. Seven are located within a mile of the Hooker's Hot Springs. Five have been tested. One, identified as "a pithouse village with an anomalous, possibly ceremonial, communal structure," was excavated by the NMSU field crew. Those properties which produced ceramics represent both Mogollon and Mimbres affiliation. Some flaked and polished stone artifacts suggest an Archaic affiliation. No diagnostic evidence of Paleo-Indian occupation has been documented in the planning area.

The historic occupation of the Muleshoe Ecosystem is represented by six ranch and homestead properties, which includes Hooker's Hot Springs, Pride and Browning ranches and the Paterson, Jackson and Bradbury cabins. Other historic resources include several line shacks, corrals and roads. Hooker's Hot Springs is the only property in the planning area that is listed on the National Register of Historic Places. Although the existing Pride Cabin is of fairly recent construction (1950's), several adjacent buildings and structures date back to the original homestead claim. As such, the Pride Ranch Homestead is believed to be eligible for listing as a National Register Property. There is the possibility of having the Muleshoe listed as an Archaeological District which would result in the listing of all the Muleshoe's properties.

Native American Concerns

The Muleshoe Ecosystem is located in what was once territory of the Aravaipa Band of the Western Apache. During a summer 1994 visit to the Muleshoe, Western Apache herbalists, along with the tribe's ethnobotanist, identified a number of medicinal and edible plants, mostly growing in the Muleshoe's riparian areas, that they would like to have protected. Many of the plants traditionally used by the Western Apache are no longer available on the reservation and the tribal herbalists must go elsewhere to find them.

No sacred sites were identified by the Apache. They did express concerns about the treatment of Native American human remains. As is standard procedure, if any remains are discovered, and for any reason threatened, the appropriate tribe will be notified. The Tohono O'Odham were also contacted but did not express any concerns about the area.

Management of Cultural Resources

Cultural resources located on public land administered by the BLM are managed according to criteria set forth in numerous laws, regulations and policies, including the National Historic Preservation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act and the Native American Graves Protection and Repatriation Act. The cultural resources on public lands are to be managed under three broad objectives: 1) information potential, 2) public values, and 3) conservation.

I. Livestock Grazing

Background

The Nature Conservancy has not grazed the Muleshoe Ranch since they acquired it in 1982. In September 1987, the Record of Decision for the Eastern Arizona Grazing Environmental Impact Statement proposed placing the active grazing preference of 4,032 AUMs (336 cattle yearlong on the public lands) in the Muleshoe allotment (No. 4401) into a five-year suspension effective upon the signing of a cooperative management agreement. The purpose of the suspension of livestock grazing was to promote recovery of the riparian areas and to enhance important wildlife habitat and watershed conditions. This suspension of grazing was implemented in 1988 through approval of the Muleshoe Cooperative Management Agreement by the BLM, TNC, and FS. The Redfield Canyon Wilderness Area was designated by Congress in 1990 with existing grazing preferences on the Muleshoe and Soza Wash allotments. In 1992 an Ecological Site Inventory of the vegetation on the Soza Mesa portion of the Muleshoe was conducted by the BLM. As a result, a stocking rate was established of 44 cattle yearlong on the Soza Mesa portion of the Muleshoe. In 1993, TNC sold a portion of the Muleshoe base property to Jack Hughes. The transfer of a portion of the grazing preference from TNC to Hughes was completed resulting in the creation of the Soza Mesa allotment. Correspondingly the grazing preference on the remaining portion of the Muleshoe allotment was reduced to reflect the deletion of the 6,030 acres now in the Soza Mesa allotment. The fencing necessary to physically separate the Soza Mesa and Muleshoe allotment was then constructed. In July 1994, the Safford District RMP Record of Decision II was issued. It provided for resumption of active grazing use on the Soza Mesa portion of the Muleshoe, and the development of this Ecosystem Management Plan for the Muleshoe.

Grazing Allotments

There are three BLM grazing allotments within the Muleshoe planning area. The Muleshoe allotment (No. 4401), Soza Mesa allotment (No. 4402) and Soza Wash allotment (No. 4409). The Muleshoe allotment includes the Hot Springs ACEC and the majority of the Redfield Canyon Wilderness. The Soza Mesa allotment is west of the Muleshoe allotment, and the Soza Wash allotment is at the western edge of the Redfield Canyon Wilderness near the confluence of Redfield and Swamp Springs canyons.

Muleshoe Allotment

The Muleshoe allotment consists of a series of narrow steep-sided canyons and gorges which dissect very rough rocky mountains and ridges. The basin around Pride Cabin at the center of the unit is the only relatively level open area. The northern portion of the allotment drains to the San Pedro River through Redfield Canyon, while waters in the southern portion flow to the San Pedro through Hot Springs Canyon. Seven of the larger canyons flow perennially, sustaining unique riparian habitats.

The current permitted use on the Muleshoe allotment (No. 4401) is 267 cattle from March 1 to February 28 at 100% public land use. This equates to 3,204 Animal Unit Months (AUMs). The permitted use is currently in suspended non-use status. Existing range improvements include wells, stock tanks, and boundary and pasture fencing (Appendix 3, Table 3-10).

Soza Mesa Allotment

The current permitted grazing use on the Soza Mesa allotment (No. 4402) is 44 cattle from March 1 to February 28 at 95% public land use. This equates to 502 AUMs. The existing range improvements include boundary fencing, stockponds, wells, pipeline and a developed spring (Appendix 3, Table 3-11).

Soza Wash Allotment

A portion of the Soza Wash allotment (No. 4409) is located within the planning area. The public lands in the allotment are leased for livestock grazing to Hope Jones of the C-Spear Ranch. The public and state lands in this ranch need to be addressed as they are located within the Redfield Canyon Wilderness boundary. The 440 acres of federal lands are: T.11S, R.20E., Section 29 S 1/2, Section 30 E 1/2 SE 1/4, and Section 31 NE 1/4 NE 1/4.

The current permitted grazing use on public lands within the Soza Wash allotment is five cattle from March 1 to February 28 at 100% public land use. This equates to 60 AUMs. The existing range improvements on public lands are some gap fences.

Ecological Condition

Ecological condition in the uplands adjacent to the creeks is generally Mid to High. Both the Muleshoe and Soza Mesa allotments were rested from livestock grazing from 1980 until 1993, when the Muleshoe allotment was divided and livestock grazing was resumed on the Soza Mesa allotment. The rangeland is slowly recovering from the past overuse by livestock.

Ecological Site Inventories (ESI) were completed in 1990, 1992, and 1994 to determine existing and potential ecological condition. The results indicate that while sites in low condition have improved to mid condition, there has been very little change in the total acreage in high and PNC condition (Table 4).

TABLE 4
Muleshoe Ecosystem
BLM and TNC Private Lands within the CMA
Upland Range Condition Summary
1990 vs 1994

Condition	1990 Acres	1990 Percent	1994 Acres	1994 Percent
PNC	0	0	340	1
High	24,076	74	21,711	67
Mid	5,786	18	10,241	31
Low	2,430	7	0	0
Not Rated (Soza Wash Allot)	440	1	440	1
Total	32,732		32,732	

Muleshoe Allotment Rangeland Suitability and Ecological Site Assessment

As required by the Safford District RMP Record of Decision II (July 1994), a Range Suitability study of the Muleshoe allotment was completed in 1994. The suitability study assesses the rangeland resource to determine the areas within the allotment where vegetation is available to livestock as forage.

Based on Safford District Instruction Memorandum No. AZ-040-93-07, "Rangeland Suitability for Livestock Grazing," the following criteria were determined appropriate to assess those areas unsuitable for livestock grazing:

1. All rangelands that are inaccessible to cattle.
2. All slopes over 50%.
3. Current production of usable perennial forage is less than two cattle yearlong per section.
4. Distance from reliable water is:
   a. Over 4.0 miles
   b. Over 0.6 miles on 21 to 30 percent slopes
   c. Over 0.4 miles on 41 to 50 percent slopes

The Muleshoe allotment was inventoried in the summer of 1994 using the Ecological Site Inventory procedures of BLM. The above criteria were applied to determine suitable and unsuitable rangelands (Figure 7, Table 5).

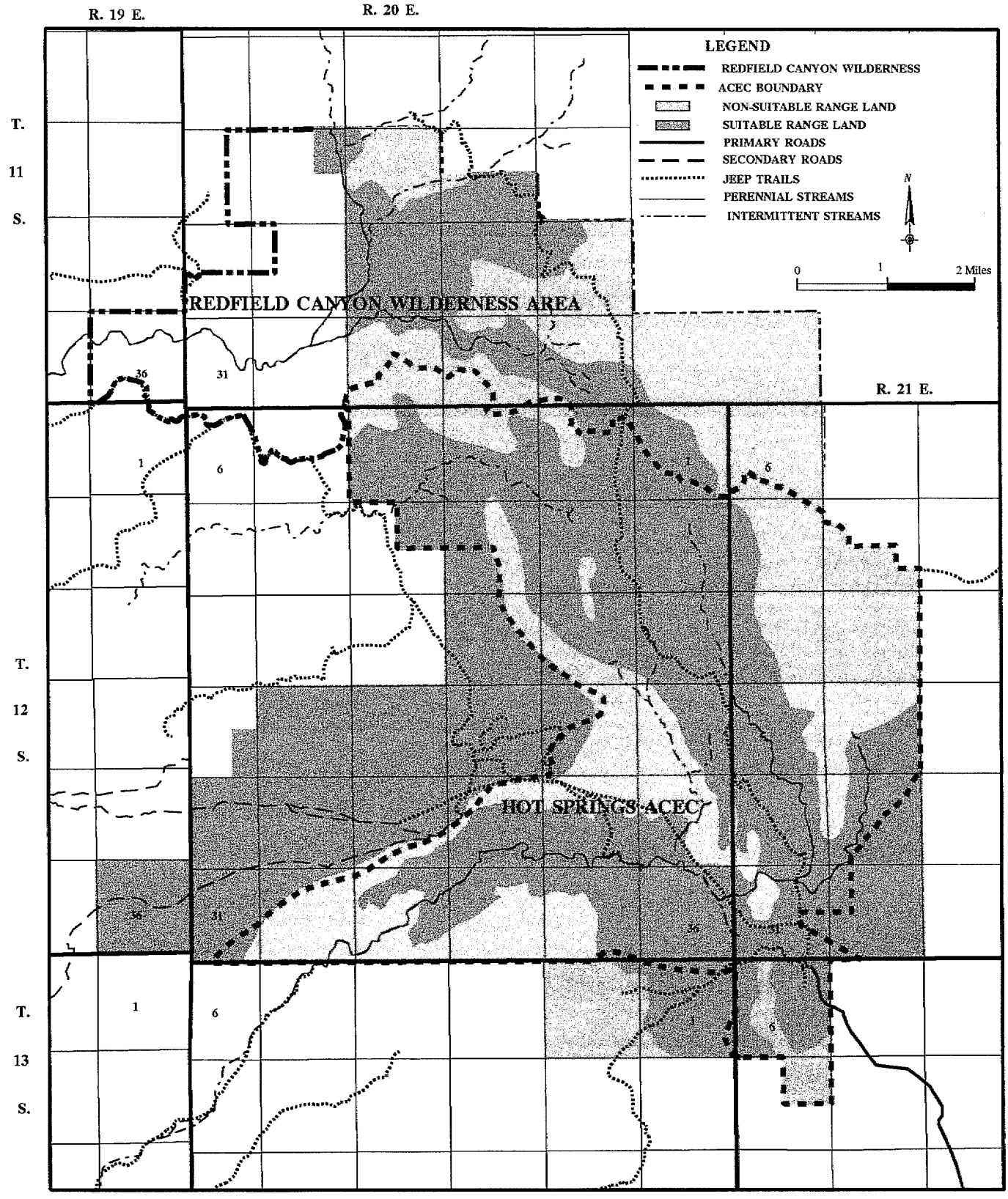
TABLE 5
1994 Transect Data
Muleshoe Portion
Livestock Suitability

Range Site	Condition	Acres	Acres Suitable
Volcanic Hills	PNC	240	0
	High	14,713	9,130
	Mid	9,121	4,248
Loamy Uplands	High	366	366
	Mid	1,296	1,296
Riparian	See Riparian Conditions	624	624
Total		26,360	15,664

Figure 7

MULESHOE ECOSYSTEM MANAGEMENT PLAN

RANGE SUITABILITY



J. Recreation

Current Recreation Use

The Muleshoe Ecosystem is used by a variety of outdoor enthusiasts who enjoy the area for hunting, hiking, horseback riding, birding and other wildlife observation, primitive camping and other related uses. An estimated 1,700-1,800 visitors a year visit the Muleshoe Ranch area for recreation purposes. These are estimates of use derived from visitor sign-in stations at The Nature Conservancy's Muleshoe Ranch headquarters and at the entrance to Jackson Cabin Road. The number is probably conservative considering there are other access points into the area and that many visitors probably do not sign the registers on every visit.

The only developed sites in the Muleshoe Plan area are those associated with The Nature Conservancy's headquarters and at Pride Ranch. The Muleshoe Ranch headquarters' facilities include a campground, casitas, nature trail and hiking trail. The campground is available for organized groups only. Fees are charged for the campground and casitas and advance reservations are required for both. The Hooker's Hot Springs are not open for public use. The Nature Conservancy also maintains a primitive cabin at Pride Ranch. A fee is charged and reservations are required for use of this site. Recreationists also use Jackson Cabin on FS lands. The primitive cabin is available on a first-come basis.

Visual Resource Management

Visual Resource Management (VRM) Classes are categories assigned to public lands based on scenic quality, sensitivity level, and distance zones. There are four classes. Each class has an objective which prescribes the amount of change allowed in the characteristic landscape. The Safford District RMP designated the Muleshoe Ranch public lands (exclusive of wilderness) as a VRM Class II area to preserve scenic quality but to allow some modification of the landscape. The objective of Class II is to retain the existing character of the landscape. The level of change should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape.

Lands within the Redfield Canyon Wilderness are designated as a Class I VRM area. The objective of Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; it does not, however, preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

Access and Off-Highway Vehicle Management

The Muleshoe is located 110 miles by road from Tucson. The Nature Conservancy's Muleshoe Ranch headquarters on the south end of the CMA, is located 29 miles northwest of Willcox, Arizona, in the southern foothills of the Galiuro Mountains.

Currently there is no legal vehicular access for public or administrative use onto public lands within the Muleshoe CMA. However, TNC and other landowners have been providing access through their private lands. Access into Lower Hot Springs Canyon is closed at the Saguaro-Juniper deeded land to motor vehicles, but is accessible by foot. The RMP calls for the BLM to pursue acquisition of legal access for public and/or administrative vehicular use in the following locations within the Muleshoe planning boundary:

Cherry Springs Canyon Road:
T. 12 S., R. 20 E., secs. 4, 9. (public)
Jackson Cabin Road
T. 12 S., R. 20 E., secs. 11, 12, 13. (public)
T. 12 S., R. 21 E., secs. 19, 30, 31. (public)
T. 13 S., R. 21 E., secs. 5, 6. (public)
Muleshoe Pipeline Road
T. 12 S., R. 21 E., sec. 31. (administrative only) (The Muleshoe Pipeline Road is closed to motorized vehicular use by the public.)

The Safford District RMP calls for the preparation of a Transportation Plan which would identify additional access needs and closures, a road and trail numbering system, sign needs, maintenance needs and coordination with other agencies and landowners. Specifically, it calls for the reconstruction of the five and a half miles of Jackson Cabin Road on public land within the Muleshoe Ranch. The Plan allows road closures where needed to manage visitors, protect resources, and to meet other objectives.

The riparian area of Hot Springs Canyon (140 acres) has been designated closed to off-highway vehicle use. In a closed area, off-highway vehicle use is prohibited even if roads or trails exist within the closed area. The remainder of the public land within the Muleshoe CMA has been designated limited to existing roads for off-highway vehicle use. A limited to existing roads designation means motorized vehicles are restricted to existing roads and trails occurring at the time of designation and on any new roads approved for construction during the life of the RMP (Safford District RMP Partial Record of Decision, September 1992). Vehicular travel into unroaded parts of the Muleshoe CMA is not currently a serious problem, probably because of the rugged terrain and remoteness of the area.

Recreation Opportunity Settings

Four different recreation opportunity settings which provide the existing variety of recreational activities were identified in the Muleshoe planning area. The TNC headquarters area falls within the rural setting which includes the Muleshoe Ranch headquarters and the area within a one-half mile radius of the headquarters. The road corridors (60 foot width), including the Jackson Cabin Road, fall within the semi-primitive motorized setting. The remainder of Soza Mesa falls within the semi-primitive, non-motorized setting. The remainder of the planning area falls under the primitive setting. Each of these settings is composed of a resource (physical), social and managerial component as described below.

TNC Headquarters Zone Rural Setting

Resource Setting

TNC headquarters area is developed, providing an urban interface as well as being a gateway to most of the Muleshoe CMA. Buildings include staff residences, casitas for visitors, a visitor center and dormitory, and workshop with storage. A group campground with portable toilets, a nature trail, and corrals are also on site. A visitor information point is located at the beginning of the Jackson Cabin Road.

Social Setting

TNC headquarters serves as a staging point of use within the zone and to other portions of the CMA. Many visitors to the area do not travel beyond the headquarters zone, choosing to stay at the campground or casitas and use the nature trail. The area may be expected to have limited opportunities for solitude due to higher visitor levels.

Managerial Framework

TNC preserve manager and staff live on site. They answer visitor questions and provide information about the CMA. The visitor information point contains a sign-in register, area map, and brochures giving information on the Muleshoe Ecosystem. A four-wheel-drive vehicle is recommended to travel beyond this zone on the Jackson Cabin Road. Management activities are concentrated in this zone.

Road Corridors Zone Semi-Primitive Motorized Setting

Resource Setting

The road corridors have limited development. Structures are limited to the remains of the Browning, Pride and Jackson homesteads along the Jackson Cabin Road. There are also range improvements such as wells and corrals along the road corridors. The roads are dirt jeep trails. There is limited directional and informational signing in place.

Social Setting

The road corridors are the travel routes to points within the Muleshoe and provide vehicular access to the Redfield Canyon and Galiuro wilderness areas. Visitors traveling the road corridors will encounter moderate solitude. Roads are primitive and four-wheel-drive vehicles are recommended. Car-camping can occur along the road corridors. There are no modern conveniences.

Managerial Framework

There is very limited management along the road corridors. TNC or agency staff may be available infrequently in this zone to assist visitors. There is some regulatory signing.

Soza Mesa Zone
Semi-Primitive Non-Motorized Setting

Resource Setting

There is limited development on Soza Mesa outside of the road corridors. Visitors may encounter pipelines and other livestock improvements. Visitors will also encounter active livestock grazing. The riparian resources which attract visitors to the Muleshoe are not present on Soza Mesa.

Social Setting

Most visitors to Soza Mesa are hunting. Other recreation use is infrequent. Soza Mesa is not a destination for most recreationists as it lacks some of the major resource values such as riparian areas which attract them to the remainder of the Muleshoe. Visitors could expect fairly high levels of solitude in this zone.

Managerial Framework

Management is slightly less than along the road corridors. Management consists primarily of livestock grazing activities and law enforcement patrols.

Primitive Zone
(remainder of Muleshoe including wilderness)

Resource Setting

There is little development in this zone. There are a few trails and trail markers and short stretches of fencing. Resource values are high and include visual resources, riparian areas, and wildlife.

Social Setting

This zone has the highest level of solitude. Travel is on foot or by horseback only, and other people are rarely seen, especially in upland areas.

Managerial Framework

There is very little management in this zone.

K. Special Designation Areas

Hot Springs Watershed ACEC

The Safford District RMP designated the 16,763 acre Hot Springs Watershed ACEC for the protection of riparian, cultural, and fish and wildlife values including threatened and endangered species values. The RMP prescribed management guidance for the ACEC, and the Muleshoe EMP serves as the activity plan for the ACEC.

Wild and Scenic Rivers

Segments of Hot Springs and Swamp Springs canyons were determined eligible for inclusion into the National Wild and Scenic River System (NWSRS) in the Safford District RMP (1992). Both segments were tentatively classified as "wild" and were under protective management prescriptions which protected the free-flowing nature, the classification, and the outstandingly remarkable values. In the Arizona Statewide

Legislative Environmental Impact Statement (1995), the State Director recommended to the Secretary of Interior that none of the segments of Hot Springs or Swamp Springs canyons was suitable as components of the NWSRS and that they should not be forwarded to Congress as part of a legislative package for consideration.

Wilderness

The Redfield Canyon Wilderness was designated by Congress as part of the Arizona Desert Wilderness Act of 1990. The wilderness boundaries are not surveyed or signed. Few problems related to wilderness infractions have resulted, however, due mostly to the area's remoteness and ruggedness. No public facilities or designated parking areas are available at this time. Visitor use data has not been gathered, but use of the wilderness is thought to roughly parallel that of the Muleshoe CMA. The Muleshoe EMP will also serve as the wilderness plan for the Redfield Canyon Wilderness.

A portion of Muleshoe grazing allotment (No. 4401) is located within the Redfield Canyon Wilderness. The permitted livestock grazing was in suspension at the time of wilderness designation, and has remained in suspended nonuse since then. Livestock grazing on the adjacent Galiuro Wilderness was retired by the Forest Service in 1986. The range improvements within the Redfield Canyon Wilderness include the boundary fence with the FS lands and two wells located on the Jackson Cabin road.

The Galiuro Wilderness was designated in Congress in 1964 and was enlarged in 1984. There are 76,317 acres of land within the Galiuro Wilderness. The 22,000 acres of the Galiuro Wilderness which comprise the upper Redfield Canyon watershed are included within the CMA and within the Ecosystem planning area boundary. The Safford Ranger District of the FS administers the wilderness and recently completed a Wilderness Implementation Schedule (WIS). The purpose of the WIS is to identify the management actions specified by the Coronado National Forest Plan for the Galiuro Wilderness and lay out how they are to be accomplished. In addition, the WIS plans the process by which management direction, objectives, standards, and guidelines specific to the Galiuro Wilderness which will be incorporated into the revision of the Coronado National Forest Plan.

L. Mineral Development

As discussed in the Geology section, the mineral potential of the Muleshoe Ecosystem is low. The 21,600 acres of state land acquired by the BLM in 1986 were officially opened to mineral entry in February 1988. The Redfield Canyon Wilderness was closed to new mineral entry when it was designated in 1990, and there were no active mining claims in the Wilderness at designation. This means that no mining for locatable minerals will occur in the Redfield Canyon Wilderness. In addition, mineral material sales and oil and gas leases will not be issued for the Redfield Canyon Wilderness. Currently there are no active mining claims on non-wilderness lands within the Muleshoe planning area. The Safford District RMP prohibits surface occupancy for oil and gas leases and prohibits mineral material (sand and gravel) sales within the riparian areas of the Muleshoe public lands. The RMP also requires the submittal of mining plans of operation by the operator and approval by the authorized officer prior to commencement of any mining on public lands within the Hot Springs ACEC.

M. Socio-Economic Resources

Population and Demographics

The lands in the Muleshoe Ecosystem Plan are found in Cochise and Graham Counties. Cochise County is the most populated county of the two. The Arizona Department of Economic Security, Population Statistics Unit projected that more than 116,000 people resided in Cochise County as of the February 1997 Arizona County Population Projection. The county's median household income is $32,600 (HUD) Office of Economic Affairs, Economic

and Market Analysis Division 12/94). Cochise County ranks eighth of Arizona's 15 counties in the number of persons in poverty (Bureau of Census, 1990).

As a percentage of the county population, Hispanics comprise the single largest ethnic minority group in the county at 29.07%. Racial minorities, as a percentage of the county population is African-American 5.2%, Native American 0.8%, and Asian-American or Pacific Islander 2.3% (Arizona Department of Economic Security, 1990).

Graham County's population projection for 1997 is 32,240. Median household income in the county is $25,100 and ranks fourth of Arizona's 15 counties in the number of persons in poverty. As a percentage of the county population, Hispanics comprise the single largest ethnic minority group in the county at 25.17%. Racial minorities, as a percentage of the county population is African-American 1.9%, Native American 14.9%, and Asian-American or Pacific Islander 0.4% (Arizona Department of Economic Security, 1990).

Local Economy

Major industries for Cochise County include Farming, Ranching, Tourism and the Military. Government and Trade are the leading employers with 11,175 and 5,700 respectively. State unemployment rates averaged 4.5% for January through May 1997. Cochise County has an average rate of unemployment of 9.0%. Willcox, the closest city has an average rate of unemployment of 5.6% while Benson has an average unemployment rate of 10.5% (Department of Economic Security).

Graham County's major industries include Farming, Ranching and Tourism. Leading employers are Government and Trade with 2,250 and 1,500 respectively (Arizona Department of Economic Security, 1992). For January through May 1997, Graham County's unemployment rate averaged 9.1%.

Although the Nature Conservancy is a nonprofit organization, the estimated 1700-1800 visitors that visit the Muleshoe Ranch each year contribute more than $43,000 in revenue. The revenue collected is by donations, lodging and retail book sales. The revenue collected by TNC for the Muleshoe is for the maintenance and operation of the ranch. The ranch currently employs four full-time and one-part time workers.

The collection of grazing fees for the Soza Mesa and Soza Wash Allotments totaled $758 in 1997. No fees were collected for the Muleshoe allotment because the permitted use is in suspended non-use and has been since 1988.

State/Regional Economy

Arizona's main economic sectors include services, trade and manufacturing. Mining and agriculture is also significant. The single largest economic sector is services. Services employ more than 500,000 people in the state. Wholesale and retail trades provide almost 450,000 jobs. Tourism directly provides 103,000 jobs and supports an additional 100,000 jobs indirectly and injects almost $7.2 billion into the state's economy each year (Arizona Department of Commerce 3/97).

V. ISSUES

A. Planning Issues

Management of Riparian Areas

Properly functioning riparian areas reduce erosion, improve water quality, stabilize streambanks, improve groundwater recharge and floodwater retention, develop complex aquatic habitat, and support greater biodiversity. Riparian areas on the Muleshoe provide significant habitat for wildlife including many threatened and endangered species. They are also a major focus for recreation activities.

The plan will address the following questions related to riparian areas:

a. How will riparian dependent and aquatic wildlife be protected?

b. What measures can be taken to reduce the impact of roads on sensitive riparian areas?

c. Should special management occur for recreation activities in riparian areas?

d. What is the desired riparian plant community?

e. How will properly functioning condition be achieved and/or maintained for riparian areas?

f. Can perennial stream flow be increased?

Management of Upland Vegetation

The condition of upland areas has a major influence on the condition of riparian areas. Properly functioning uplands with good ground cover of vegetation will increase infiltration and extend base flows while reducing runoff, soil erosion and peak flows. Historic land uses on the Muleshoe have resulted in increased shrub invasion in upland grassland communities and a reduction in larger perennial bunchgrasses (Anderson, Warren & Reichenbacher 1985). Fire no longer plays a natural role. High peak flows from Hot Springs and Redfield Canyons have contributed to road washouts and other flood damage along the San Pedro River. Peak flows in these drainages frequently remove riparian vegetation before it is fully established.

The plan will answer the following questions relating to upland vegetation:

a. What measures can be taken to restore and/or maintain natural disturbance regimes including fire?

b. How will fire be managed?

c. What measures can be taken to minimize soil erosion and peak flows?

d. What are the desired upland plant communities?

e. How will properly functioning condition be achieved and/or maintained for the watershed?

Livestock Grazing

Livestock grazing has not occurred for over 13 years on much of the planning area. The Safford District Resource Management Plan directs that determinations for suitability and compatibility of livestock grazing be made for the Muleshoe allotment in this planning effort. Management practices for the Soza Mesa allotment need to be established. Livestock grazing issues are also related to riparian and upland vegetation issues.

The plan will answer the following questions relating to livestock grazing:

a. Which riparian and/or upland areas are suitable (have potential) for livestock grazing?

b. Which of these suitable areas are compatible with livestock grazing?

c. In areas where livestock grazing can and does occur, what level of vegetation utilization (forage allocation) is appropriate?

Protection of Wilderness Values

Uses of wilderness are managed with the underlying principle to protect wilderness values of naturalness and outstanding opportunities for solitude and primitive recreation. Use of wilderness by visitors in a way that does not degrade wilderness values is required by the Wilderness Act. Special provisions of the Wilderness Act allow other uses to be authorized when managed to protect wilderness values. The Arizona Game and Fish Department has identified the need to reconstruct two bighorn sheep waters, and conduct aerial wildlife surveys and other operations in the wilderness.

The plan will answer the following questions relating to wilderness:

a. Will recreation use levels, including group size limits, be set or permits required for wilderness use?

b. To what extent are visitor facilities, including trails and parking areas needed?

c. How will wilderness boundaries be identified and managed to prevent illegal vehicle use?

d. How will opportunities for solitude be maintained?

e. How will concerns about impacts to naturalness from potential activities on those private and state lands within the Redfield Canyon Wilderness be addressed?

f. How will existing range and wildlife developments be maintained or reconstructed?

g. How will wildlife management operations be conducted?

h. What information about the wilderness will be provided?

Recreation and Vehicle Access

Although there is currently no legal public access into the BLM public lands on the Muleshoe Ecosystem, TNC provides visitor access through their deeded lands. There are demands for vehicle access for hunting and other recreation activities, research, livestock management, and administrative use. Concerns have been expressed about off-road use of vehicles, road maintenance, and management of recreation opportunities.

The plan will address these questions relating to recreation and access:

a.. What types of recreation use are appropriate; where and how much?

b. What types of recreation facilities may be needed and where?

c. How will public recreation opportunities be managed to minimize conflict between recreation users?

d. How much, what type, and where should vehicular access occur?

e. Can the Great Western Trail be accommodated?

f. Which roads should be maintained; by whom and how?

g. How will legal vehicular access to public lands be obtained?

Cultural Resource Management

Knowledge about the cultural resources on the Muleshoe is limited. There is concern that these resources need to be protected in context so that more can be learned about prehistoric and historic human occupation. Historic properties need to be evaluated for possible stabilization and/or restoration. Traditional use areas for Native Americans need to be identified and protected.

The plan will answer the following questions relating to cultural resources:

a. How should we protect, preserve and/or restore cultural properties?

b. What provisions should be made for Native American traditional uses?

Management of Wildlife

The Muleshoe Ecosystem supports diverse fish and wildlife resources. The Muleshoe Ecosystem provides habitat for over 35 special status wildlife species including five native fish species. Healthy populations of game animals, including bighorn sheep, mule deer, javelina and quail, provide hunting opportunities. Potential habitat exists to support reintroductions of several threatened and endangered species and supplemental stockings of other wildlife.

The plan will answer the following questions related to wildlife management:

a. What type of water sources (natural vs. constructed) are needed by wildlife and where?

b. How and where should introductions and reintroductions of native wildlife species, including threatened and endangered species, occur?

c. How should exotic aquatic species be managed so that native species are not adversely affected?

Socio-Economic

There are concerns that management activities on the Muleshoe may affect traditional lifestyles and local economies. Many rural residents in the local area depend on ranching, agricultural activities, and mining for their livelihood.

Ecotourism has also been identified as having the potential to provide economic benefits.

The plan will answer the following question relating to socio-economics:

a. How will resource uses and activities within the planning area affect rural lifestyles?

B. Issues Solved by Laws, Policy, or Planning

The following issues are resolved below and will not be addressed further in the plan:

Minerals Management

Concerns were raised about whether additional closures to mining (mineral withdrawals) should occur on the Muleshoe Ecosystem to protect riparian resources. The Arizona Desert Wilderness Act of 1990 prohibited new mineral entry (for locatable minerals) into the Redfield Canyon Wilderness, and there were no active mining claims in the Wilderness when it was designated. This means that there will be no mining in the Redfield Canyon Wilderness. In addition, no mineral material sales and no oil and gas leases will be issued for the Redfield Canyon Wilderness. The remainder of BLM lands on the Muleshoe are open to mining. However, the Safford District RMP prohibits mineral material sales and surface occupancy for oil and gas leases within areas with riparian vegetation. The RMP also requires the submittal of mining plans of operation by the operator and approval by the authorized officer prior to commencement of any mining activities within the Hot Springs ACEC.

Access for Maintenance of All-American Pipeline

The All American Pipeline is operated with a right-of-way lease which ensures that access will be provided for maintenance.

Animal Damage Control

Concerns were expressed about whether predator control is appropriate for the area and who would have control over it. The Arizona Game and Fish Commission is the legal entity for state wildlife management on all lands in Arizona. Arizona State Laws ARS 17-302 and 17-239 authorize the take of predators when damage is occurring. Animal damage control activities on BLM lands within the planning area are covered under the Animal Damage Control (ADC) Plan for the Safford District and Environmental Assessment (EA No. AZ-040-0-10) dated August 2, 1994. The ADC Plan identifies where, when, and under what restrictions predator control operations can be carried out. The Redfield Canyon Wilderness and Hot Springs ACEC portions of the planning area are identified as restricted control areas in the ADC plan. The Animal Plant Health Inspection Service (APHIS)-ADC will confer with the BLM Area Manager or designee prior to carrying out any requested control in any ACEC and with the BLM State Director for any wilderness area. Animal damage control activities are not anticipated to occur on FS lands within the planning area. Any ADC activities on FS lands require approval of the Regional Forester.

Trapping

Concerns were expressed about the compatibility of trapping on the planning area. Hunting and trapping are regulated by the Arizona Game and Fish Commission. Proposition 201 which was passed in Arizona's November 1994 general election amended Section 17-301 of the Arizona Revised Statutes and makes it unlawful to take wildlife with any leghold trap, any instant kill body gripping design trap, or by a poison or a snare on any public land.

Wolf Reintroduction

Both the BLM and FS have policies to support recovery efforts for threatened and endangered species including reintroductions. Reintroduction of Mexican wolves is being addressed in an Environmental Impact Statement being developed by the U.S. Fish and Wildlife Service. The Galiuros was one of several possible reintroduction sites examined; however it was not selected as a site to pursue for reintroduction. There are no current proposals.

VI. VISION AND GOALS

A. Vision

The vision of the Muleshoe Ecosystem planning team is "to sustain and enhance the natural resources and ecological processes on which they depend, to protect and preserve values of designated wilderness, to protect and preserve cultural resource values, to maintain lifestyles that emphasize living in harmony with the ecosystem, and to achieve these through cooperative effort."

B. Riparian Vegetation Goal

Maintain or improve riparian and aquatic zones in the Muleshoe Ecosystem to achieve properly functioning condition and an ecological state which provides high quality fish and wildlife habitat. The desired ecological state has the following components: a diversity of native riparian vegetation with all age classes of woody riparian vegetation well represented; dense vegetation with structural complexity; a diversity of aquatic habitats including pools, runs, and riffles; natural processes working near optimum.

C. Upland Vegetation Goal

Maintain or improve upland areas in the Muleshoe Ecosystem through the restoration of ecosystem processes. Restore the natural process of periodic fire in the grassland ecological sites of the Muleshoe Ecosystem. The desired ecological states are a variety (mosaic) of transitional grassland and shrub/grassland states dominated by mid- to tall- stature perennial grasses (States I and II in Grassland State - Transition Model) which provide high quality wildlife habitat.

D. Fish and Wildlife Populations Goal

Maintain and enhance the diversity of native fish and wildlife species of the Muleshoe ecosystem.

E. Cultural Resources Goal

Provide for the long-term protection and preservation of the cultural resource values

F. Wilderness Goals

Provide for the long-term protection and preservation of the area's wilderness character under a principle of non-degradation.

Manage the wilderness for the use and enjoyment of visitors in a manner that will leave the area unimpaired for future use and enjoyment as wilderness.

Manage the area using the minimum tool, equipment, or structure necessary to successfully, safely, and economically accomplish the objective.

Manage nonconforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the area's wilderness character.

G. Human Environment Goal

Provide for compatible levels of human uses within the Muleshoe Ecosystem while sustaining ecosystem resources and processes.

VII. OBJECTIVES, MANAGEMENT ACTIONS AND MONITORING

A. Riparian and Aquatic Area Management

Riparian Objectives

Objective 1A

Achieve or maintain proper functioning condition and high seral stage ecological states for the riparian areas in the Muleshoe Ecosystem by 1999 or within five years of a major flood event through:

*Increasing the density of saplings and trees and improving sapling to tree ratios (of all woody riparian species) in key riparian segments on Upper Hot Springs, Lower Hot Springs, and Bass canyons as illustrated in Table 6.

*Maintaining densities and sapling to tree ratios for key riparian segment B in Swamp Springs Canyon, and for the key riparian segment in Redfield Canyon as illustrated in Table 6.

TABLE 6
Existing and Target Tree Densities
Muleshoe Ecosystem Riparian Areas

Stream	1994 density (#/acre)	1994 ratio (saplings: trees)	target density (#/acre)	target ratio (saplings: trees)
Upper Hot Springs Canyon	60	6.5 (52:8)	>200	3.0 (180:60)
Lower Hot Springs Canyon	202	2.2 (138:64)	>450	3.0 (384:128)
Bass Canyon	116	1.6 (71:45)	>425	3.0 (348:116)
Swamp Springs Canyon A)	150	1.5 (89:61)	>600	3.0 (450:150)
B)	760	2.8 (431:154)	>750	3.0
Redfield Canyon	474	3.0 (357:117)	>425	3.0

Note: Swamp Springs segment B was sampled in 1992. Density is the number of saplings and trees per acre of any woody riparian species (ash, sycamore, cottonwood, alder, or willow) present in the drainage. Saplings are defined as greater than six and one-half feet tall or greater than one inch diameter at breast height (dbh). Trees are defined as greater than six inches dbh.

Rationale: Redfield and Swamp Springs Canyons were judged to be in properly functioning riparian condition during 1994 sampling. Redfield Canyon is the larger of the two streams and more closely compares to Hot Springs and Bass canyons. Therefore, Redfield Canyon was used as the target example for density of saplings and trees with a target ratio of three saplings to one tree.

In properly functioning riparian areas, vegetation is present in sufficient density to facilitate bank building, to armor banks, and to dissipate flood energy; the majority of banks are armored by vegetation or rock against flood forces; only a small amount of banks are eroded or broken away; and trees are present in all three age classes at relatively high densities. Density of riparian trees is one of the best indicators to assess properly functioning condition of riparian areas. Riparian trees are a major contributor in bank and terrace development and stabilization.

The ratio of saplings to trees is a good indicator of a structurally diverse community. In addition, a healthy sapling-to-tree ratio indicates continued recruitment of seedlings to saplings and saplings to trees in the community. Recruitment of seedlings to saplings and saplings to trees are significant steps that ensure continued function and replacement of larger trees. These large trees (generally over 20 inches dbh) provide important nesting habitat for neotropical raptors such as gray hawks, black-hawks, and zone-tailed hawks. Tree roots and fallen trees facilitate development of pools, which are important habitat for many of the native fish species including Gila chub and Sonora and desert suckers as well as for leopard frogs. Dense riparian vegetation from ground level to 20 feet adjacent to perennial water provides potential nesting habitat for southwestern willow flycatcher and other neotropical birds. Dense riparian vegetation and a structurally diverse community provide high quality wildlife habitat and contribute to increased biodiversity.

Based on the El Nino cycle and past flood events on streams in this geographic area, a major flood frequency of every 7-10 years for the Muleshoe streams was predicted. A major flood, as defined here, is an event that decreases tree density by at least 1/3 through scouring and removal. Major flood events are naturally occurring in a functioning riparian system and can remove large amounts of vegetation, change channel size and location, create new seed beds for species regeneration, and remove and build terraces. Following a major flood, a five-year cycle to achieve the target densities and ratios of saplings to trees based on 10 years of biannual riparian monitoring data in Redfield and Swamp Springs Canyon was anticipated. In the absence of a major flood, it was assumed that all saplings would be converted to tree age class within five years. Although a portion of the saplings and trees would be lost during the five years to natural thinning, recruitment from seedlings to saplings should also be occurring. After reaching a peak or near peak in density and sapling-to-tree ratio in approximately five years, it is expected that the sapling-to-tree ratio will decrease as will density. These decreases are due to the increased proportion of adult trees that shade out younger trees and natural thinning as the adults develop.

The expectation is that the riparian community will recover from periodic flood disturbance by eventually reaching the target parameters, although only for a brief period, as the riparian forest develops. If the tree community passes through a period in which the parameters are met, then there is a high confidence in the assumption that the processes inherent to mixed broadleaf riparian communities are functioning at or near potential.

If the above objective is met, it is anticipated that habitat will be available to support the following numbers of selected breeding pairs of avian raptor species along Hot Springs, Bass, Double R, Redfield and Swamp Springs canyons:

Species	Current	Projected
Mexican Spotted Owl	1 pair	2-5 pair
Northern Gray Hawk	1 pair	2+ pair
Zone-tailed Hawk	2 pair	3-5 pair
Common Black-Hawk	2 pair	3-5 pair
Peregrine Falcon	1 pair	1-2 pair

Neotropical migratory birds which depend upon riparian vegetation have been shown to be declining in population or distribution throughout the western United States in recent years. Management of riparian breeding habitat is critical to recover populations of listed species or to prevent listing of these and other avian species. The densities of neotropical migratory birds listed below are based on studies of avian population dynamics and their relationship to riparian habitat quality within Bass Canyon from 1992 through 1994. Projected densities below are for Bass Canyon only. Hot Springs, Double R, Redfield, and Swamp Springs Canyons may have small populations of these species presently, but these canyons have not been systematically surveyed to date. With successful implementation of this objective for all riparian habitats within the Cooperative Management Area, as measured by a positive population trend in Bass Canyon, other canyons' riparian obligate avian species are expected to respond in a similar manner. A positive population trend and/or establishment

Species	Current	Projected
Yellow-billed Cuckoo	1 pair	5 pair
SW Willow Flycatcher	--	5 pair
N.Beardless-tyrannulet	1 pair	3 pair
Western Wood-Pewee	0 pair	20 pair
Brn-crested Flycatcher	10 pair	15 pair
Bell's Vireo	5 pair	10 pair
Yellow Warbler	40 pair	50 pair
Common Yellowthroat	--	10 pair
Yellow-breasted Chat	10 pair	15 pair
Song Sparrow	--	15 pair

Objective 1B

Maintain the presence of the following woody riparian species found in 1994 in the riparian plant communities at each key riparian site for the life of the plan:

Hot Springs Canyon:
ash, sycamore, cottonwood, willow
Bass Canyon:
ash, sycamore, cottonwood, willow
Swamp Springs Canyon:
ash, sycamore, alder
Redfield Canyon:
ash, sycamore, cottonwood, alder, willow

Rationale: Maintenance of these woody riparian species is important for maintenance of biodiversity along the streams. These woody species are generally the most susceptible to erosion and loss. When the riparian system is functioning, and these species are healthy and present, then other important riparian species such as hackberry, walnut, and mesquite will be present as well. The intent of this objective was to prevent the loss of tree species to manmade causes. It must be recognized that our understanding of the ecology of these tree communities is incomplete. Therefore, the loss of a species from natural causes such as succession may occur although such an outcome is not anticipated. Introduction of exotic woody riparian species such as salt cedar can result in the loss of native woody riparian species. Salt cedar invasions have occurred in the San Pedro and Gila rivers and in many tributary streams. This species is a particularly successful invader when riparian areas are in a degraded condition. Currently, small numbers of salt cedar are present in most streams on the Muleshoe and could pose a threat to the riparian communities.

Objective 1C

Provide a diversity of aquatic habitats to maintain or enhance the viability of the existing native fish communities within the Muleshoe Ecosystem by meeting or exceeding values for the aquatic habitat parameters shown in Table 7 in key riparian sites by 1999 or within five years of a major flood.

TABLE 7
Existing and Target Aquatic Habitat Parameters
Muleshoe Ecosystem Streams

Habitat Parameter	Redfield Canyon 1994	Redfield Canyon 1999	Bass Canyon 1994	Bass Canyon 1999	Hot Springs Canyon 1994	Hot Springs Canyon 1999
Pools/Mile	44	>49	32	>49	7	>35
Linear Percent of Pool Habitat	27%	>25%	23%	>20%	2.5%	>10%
Percent of Pools with max depth >2 ft.	71%	>70%	14%	>50%	33%	>50%
Woody Cover (ft^2/mile)	1413	>1000	2682	>1000	300	>500
Undercut Bank (ft/mile)	220	>200	0	>100	73	>100
Bank Stability[1]	excel	excel	good	excel	excel	excel
Overstory (%)	50	40-60	41	40-60	8	20-30
Min. monthly flow (cfs)	N/A		0.18 (July)		0.40 (June)	

[1]Methodology from Platts 1983. Bank stability is based on the percentage of stream bank along a line intercept transect covered by vegetation, cobble or larger material. See Appendix 6 for methodologies and full description of habitat parameters

Rationale: Overall aquatic habitat diversity and stability is expected to increase if riparian and aquatic parameters listed above show improvement. Gila chub is the most sensitive of the five fish species that inhabit the area. Habitat parameters that will promote the health of this fish were selected. Since other species are dependant on pools and will benefit from improvement of other parameters as well, all five species are expected to maintain healthy populations.

Lack of pools are often a limiting factor in degraded riparian systems. Excessive sediment loads coupled with a poor differential in scour and deposition may prevent or inhibit pool formation and development. The development of a diversity of habitats which creates a wide array of physical attributes is expected to provide habitat for all life stages of each of the five fish species.

If the above objective is met, then it is anticipated that both juveniles and adult life stages of all five species will be well represented in these three fish communities. In addition, Redfield Canyon is anticipated to maintain a relative proportion of at least 40% chub to all other adult fish and a density of >45 chub per 330-foot seine haul (this is based on data collected in a different reach). In Bass Canyon, it is anticipated that the relative abundance of adult chub will increase from 19%to 30% of all adult fish with a density of greater than 40 chub per 330-foot seine haul. In Hot Springs Canyon, it is anticipated that the proportion of Gila chub will increase from a trace to 10% (adults and/or juveniles) of all fish with a density of greater than 25 chub per 330-foot seine haul. A stable to improving trend for Gila chub will indicate overall success of riparian/aquatic improvement.

NOTE: The data for the fish community and habitat was collected by TNC and BLM. Fish were collected by seining and in some cases, numbers of chub estimated by counting fish in pools too large to sample. Habitats were classified and quantified by TNC where fish collections were made. BLM used a more extensive basin-wide survey method to classify and quantify fish habitat where riparian data (key areas) was collected and is presented in the objective table where as the TNC data is not. Areas where data were collected by TNC did not always correspond to areas chosen by BLM for riparian and aquatic monitoring

Riparian Management Actions

1. Perfect instream flow water rights to obtain certificate on the following waters: Hot Springs (BLM and TNC), Bass (TNC), and Wildcat (BLM). Obtain federal reserve water right for Redfield Canyon (BLM).

Rationale: The BLM and TNC are pursuing instream flow water rights in order to protect riparian/ aquatic habitats and their associated values. This type of water right is non-consumptive since the value of the water is to have it remain flowing down the channel. This will provide water to downstream users and to recharge aquifers. The lack of water resource allocation for fishes (instream flow protection) is the largest threat to fishery resources in the western U.S., where most of the water is allocated for human uses without provision for fishery resources. This means that streams and rivers that support fish are at risk of going dry, becoming fragmented, having altered flow regimes, having altered water chemistry and other detrimental influences of use without mitigation for fishery values.

2. Evaluate feasibility of installation of stream gauges on Redfield Canyon and Hot Springs Canyon and install if feasible.

Rationale: Stream gauges can provide continuous (water level recording) or single event (crest gauge) data that will aid in perfecting water rights, evaluating effects of flooding on riparian function, and evaluating response of the fish community to the hydrologic regime. However, appropriate locations for installation must be found and the costs for installation and maintenance of these gauges must be weighed against the potential benefits.

3. In partnership with other agencies and entities, pursue development of riparian

ecological site guides for Muleshoe riparian areas. Place surveyed cross sections in key riparian segments (geo-referenced).

Rationale: The development of ecological site guides for the riparian area will provide information important for understanding riparian function and potential on the Muleshoe Ecosystem. This information coupled with permanent transects will provide a means for a detailed evaluation of riparian response to management of the Muleshoe CMA.

4. Remove salt cedar along Redfield, Hot Springs, and Bass canyons. In addition, remove additional non-native vegetation species where future monitoring indicates a threat to native species and where control is feasible and will not result in any long-term degradation of riparian function.

Rationale: Non-native species pose one of the most serious threats to native plant and animal communities. In some cases, the problem species is controlled by natural factors on the site. In other cases, the species needs to be controlled or eliminated in order to maintain the native plant or animal community. However, some non-native species, such as red brome, have become so well-established that control is not feasible with currently available methods.

5. Implement the provision in the Safford RMP to close Hot Springs Canyon riparian area to vehicles by posting signs closing the area and by working with Saguaro-Juniper to limit or exclude vehicle traffic in riparian portion of lower Hot Springs Canyon.

Rationale: The Safford District RMP designated that 140 acres of the Hot Springs Canyon riparian area be closed to vehicular travel. Posting and enforcing a closure of this area to vehicles implements the RMP decision. Both the Saguaro-Juniper private lands and BLM public lands in Hot Springs Canyon are closed to vehicular travel. Cooperating on this closure is mutually beneficial.

6. Eliminate livestock use from the riparian areas.

Rationale: If cattle grazed in the riparian areas, they would likely spend an inordinate amount of their time along the creek bottoms because of the narrowness, rugged topography and steep-sided nature of the Muleshoe canyons. This activity pattern is expected to occur regardless of the season of grazing use and would likely result in greater than acceptable levels of utilization on riparian vegetation (>40%) and trampling of banks (>25%).

The literature on grazing indicates that growing season grazing in riparian areas is not likely to meet the above riparian objective (Ames 1977; Behnke 1979; Dahlem 1979; Davis 1977; Kindschy 1987; Szaro 1980; Platts 1991). Regardless of the season, trampling of stream banks by cattle would adversely affect fish habitat (bank stability), riparian habitat, and archaeological sites. Exclusion of grazing should favor the reestablishment of cool-season, native, perennial grasses (such as the *Elymus* species) in the riparian areas, and help displace exotic annuals such as red brome. Removing livestock from these sensitive habitats (where the impacts are unacceptable) and restricting grazing use to the adjacent uplands will provide for continued livestock grazing in the long run through restoration and maintenance of a healthy watershed within the Muleshoe CMA.

7. Construct riparian exclusion fences prior to any initiation of grazing elsewhere on the allotment.

Rationale: The existing fencing is inadequate to control livestock grazing to the level necessary to meet the riparian objective. There is currently no interior fencing to separate riparian and upland areas.

8. Emphasize low-impact camping techniques with signs and printed materials.

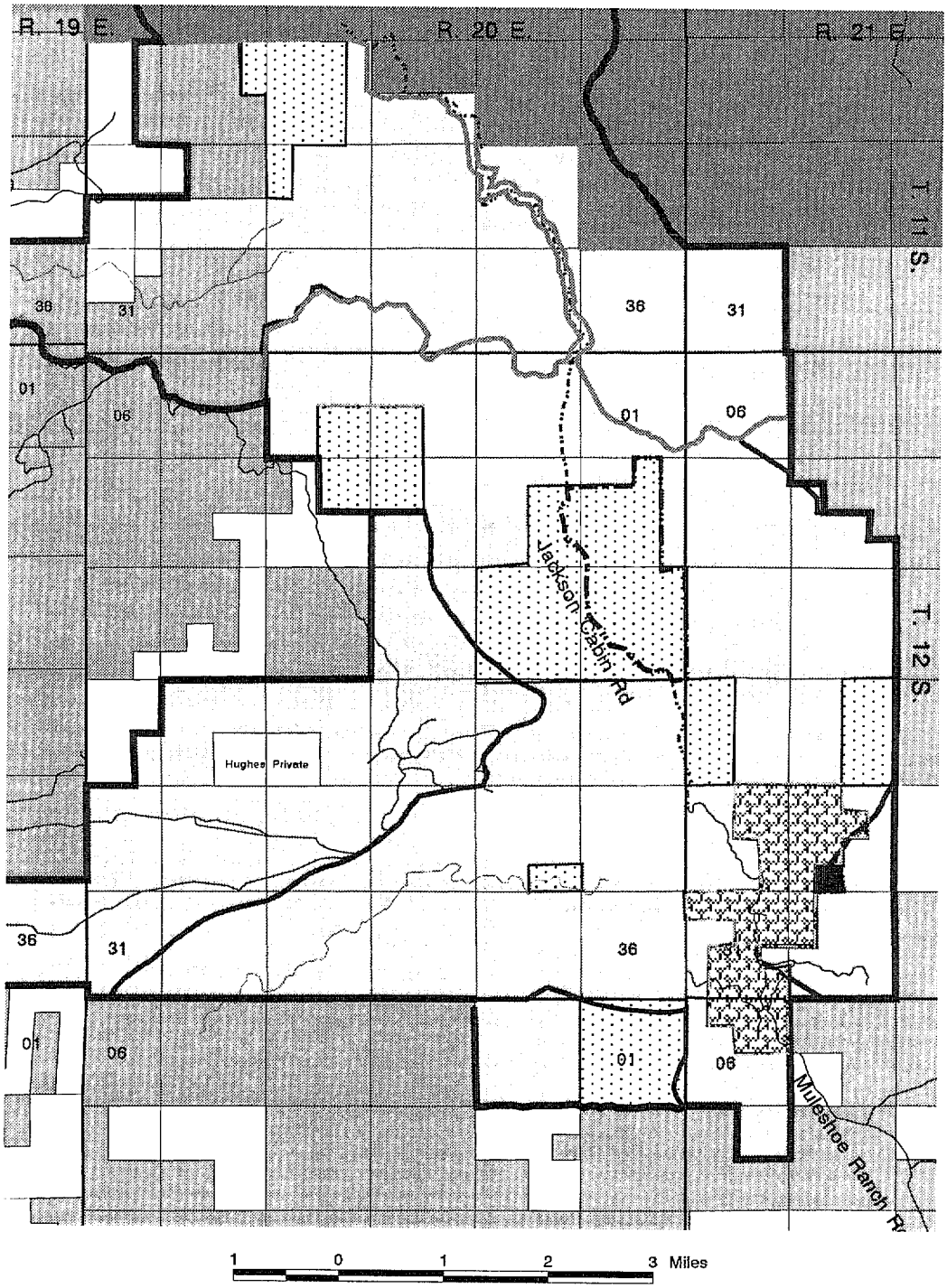
9. Designate Bass Canyon as a day use area only (Figure 8).

10. Ensure that recreation activities in riparian areas do not cause impacts to stream bank stability resulting in bank stability dropping below 75%. Methods to ensure this could include education, restrictions on numbers

Figure 8

MULESHOE ECOSYSTEM MANAGEMENT PLAN

Day Use Only Areas



of users or seasons of use, or restrictions on a specific activity, if needed.

Rationale (8-10): Impacts from recreation can be minimized by promoting dispersed recreation. The Bass Canyon riparian area receives the highest level of recreation use. Making this a day use area will reduce impacts to native riparian wildlife and vegetation. Bank stability is a good indicator of impact from trampling by recreationists. Under the current levels of recreation use and current activities, bank stability is expected to remain in acceptable levels. However, this sets an acceptable level of impact to monitor for and provides solutions if it is exceeded.

11. Prohibit commercial collection of plant materials.

12. Prohibit wood-cutting. Dead and down wood may be collected on public lands for campfires. Collection of dead and down wood is not permitted on TNC deeded lands. Campers will be encouraged through signs and/or printed materials to collect only enough wood for their immediate need.

Rationale (11-12): Casual collection of plants and wood for fire is not likely to conflict with plan objectives. However, some plants are rare and the loss of trees to wood-cutting can become a serious problem. Commercial harvest of plants and trees is likely to affect watershed and wildlife values.

13. Maintain roads across riparian areas on an as-needed basis and in a way which causes the least impact to the riparian areas.

14. Construct waterbars as needed along the pipeline corridor to minimize erosion.

Rationale (13-14): Maintenance of riparian road crossings on the Jackson Cabin Road ensures a minimal level of access to the CMA. Road maintenance has to be completed carefully in riparian areas to avoid impacts to these sensitive areas. Because of the steepness of the pipeline corridor, sections are subject to erosion which may impact downstream riparian areas in the Hot Springs watershed. Waterbars should minimize erosion and reduce maintenance for administrative access.

15. Include small portions of riparian areas in prescribed fire units (both natural and ignited) on an experimental basis. Special considerations of burn units with riparian areas will be factored into the annual burning strategy. Operational burn plans will be designed to minimize the chance of fire damaging riparian areas.

Rationale: The role of fire in riparian areas is not well understood. Since fires historically, occurred naturally without suppression, it is likely that riparian areas adjacent to grasslands maintained by fire were directly impacted on a regular basis. However, the frequency and amount of historical impact are essentially unknown. The impacts from natural ignitions occurring at a localized source are likely to differ from those from management ignitions which usually are more widespread and burn more thoroughly. Only a small fraction of Arizona's original riparian acreage still remains. This is some of the most productive and valuable wildlife habitat, harboring a variety of rare plants and animals. The value of riparian areas must therefore be balanced with the need to learn more about the role of fire in this community. The above management prescription allows more to be learned about fire's role with minimal risk to the riparian areas.

Riparian Objectives Monitoring

1. Collect quarterly instantaneous flow measurements on Upper and Lower Hot Springs, Redfield, Bass, and Wildcat to support instream flow water rights.

2. If stream gauges are installed, collect and download stream gauge data and service gauges each month to support instream flow water rights.

3. Monitor riparian vegetation at key sites a minimum of once every five years during the growing season. In the event of a major flood, the key sites will be sampled during the growing season immediately following the flood event and then a minimum of once every five years. The

riparian vegetation parameters sampled include density of woody riparian trees by age class and species, width and vegetative cover types of riparian ecological sites, and cover of key herbaceous species. The methodology is described in Appendix 6.

4. Photo points within the key riparian sites will be retaken annually.

5. If established, the surveyed cross sections will be measured a minimum of every five years.

6. Low-level aerial photos (false color infrared if available) will be taken every five years.

7. Aquatic habitat monitoring (Level III) will be done in conjunction with the riparian vegetation monitoring and will occur at least once every five years. Methods will follow the draft BLM Handbook 6720-1 modified intensive basin stream survey using the habitat classification of McCain et al. 1989 (Appendix 6).

8. Fish monitoring will continue annually in the fall (Oct-Nov) in association with the AGFD fall fish count. Catch per unit effort (CPUE) will be used to follow population trend. Seining will be the primary method for monitoring and will follow the protocol in Gori (1993).

   In addition, habitat characteristics will be collected for development of a model for fish populations that may be able to predict changes in relative abundances of fish species.

9. Bank stability will be monitored using the methodology in Platts et al 1983 (similar to BLM's Greenline method) at key riparian segments during the riparian vegetation monitoring. Additional monitoring sites for bank stability may be added to assess cultural site stability, recreation impacts, or other uses. This method quantifies the amount of stable and unstable bank in order to determine overall health (Appendix 6).

Rationale: Continuing monthly flow measurements is a requirement to support instream flow water right applications. Monitoring riparian vegetation and aquatic habitat is necessary to determine if progress is being made in achieving the riparian vegetation objectives. Retaking photo points annually provides a relatively quick assessment of the riparian area in years when the more time-consuming vegetation monitoring does not occur. Monitoring fish populations provides information about whether improvements in riparian and aquatic habitats are having the desired positive impact on native fish populations. Monitoring will be completed cooperatively by the partners in the Muleshoe Cooperative Management Area.

10. In order to monitor the avian response to riparian recovery within the Muleshoe Ecosystem, implement the following avian monitoring program:

*Winter stick nest surveys will be conducted in January and February in Bass, Double R, Hot Springs, Redfield, Wildcat and Swamp Springs Canyons. Raptor nests will be counted and recorded on maps. Based upon the previous year's raptor nesting surveys and characteristics of nest size and location within each tree, each nest will be identified to species.

*Raptor surveys will be conducted on the above canyons in May-June to determine nesting success of common black-hawk, northern gray hawk, zone-tailed hawk, red-tailed hawk, Cooper's hawk, and peregrine falcon.

*Surveys for special status avian species such as yellow-billed cuckoo and southwestern willow flycatcher will be conducted in June in all canyons which display suitable habitat for these species. Willow flycatcher surveys will follow the currently accepted standardized protocol. Surveys for yellow-billed cuckoos would be conducted after June 15 to help determine summer residency status.

*Avian transect readings will be continued in Bass Canyon during the months of April through August yearly. Transect method will be Variable Circular Plot (VCP). The Bass Canyon transect will be read twice per month throughout the breeding season for a total of 10 readings per year. This will facilitate interpretation of

data gathered from readings in 1992 through 1994. Increasing or decreasing population trends of neotropical migratory bird species will be noted. Results of avian surveys in Bass Canyon can be used as indicators of overall population status of avifauna in other canyons if similar management actions are implemented in all canyons.

Rationale: If the recommended avian monitoring schedule is implemented, it is anticipated that accurate measurements of avian population dynamics will be noted with respect to management actions. Neotropical migratory bird species have been shown to be indicators of habitat quality. The species which are dependent upon a functioning, stable riparian ecosystem may respond to management actions which will benefit their overall population and distribution. The avian monitoring schedule outlined above is the minimum effort to determine population status through time. Monitoring the neotropical migratory bird population of the Bass Canyon riparian system twice per month is essential to eliminate stochastic events and error in single readings. Monitoring populations of such species of special concern as yellow-billed cuckoo may help provide management information to prevent listing of these and similar species in the future.

B. Upland Vegetation Management

Because of the significant differences in the types, conditions, and potential of ecological sites and the physical separation of the watershed on Soza Mesa from significant riparian areas on the Muleshoe portion of the CMA, separate upland vegetation objectives were developed for the two areas. The Muleshoe portion includes the public lands of the Soza Wash allotment, the Hot Springs Riparian ACEC, the Muleshoe Ranch headquarters and the Redfield Canyon Wilderness. The Soza Mesa portion covers the Soza Mesa allotment encompassing Soza Mesa allotment encompassing Soza Mesa, Poor Canyon, and the western foothills of Wildcat Ridge.

Upland Objectives

Objective 2A

Upland Vegetation - Muleshoe Portion

Manage the vegetation to obtain a minimum of 64% of the total acreage on the Muleshoe portion of the CMA in State I (Grassland - dominated by tall and mid- stature native perennial grasses) and 16% in State II (Shrubby grassland - dominated by tall and mid-stature native perennial grasses) with the remainder in States III, IV, and V (Table 8) within 30 years by:

*Increasing the composition of the native perennial grasses on State IV to greater than 70% of the herbaceous component.

*Increasing the composition of the mid-to-tall stature native perennial grasses on States III, IV, and V to greater than 50% of the herbaceous component.

*Reducing the shrub canopy in States II, III, and IV to less than 20%.

TABLE 8
Existing & Desired Upland Vegetation

Vegetation State	Description Shrub Canopy & Composition	Existing Acres	Percent	Desired Acres	Percent
State - I Grassland Dominated by mid grasses	Shrub Canopy <20% Peren Grass >70% Mid Grasses >50% Annual Plants <30%	400	1	16,471	64
State - II Shrubby Grassland Dominated by mid grasses	Shrub Canopy >20% Peren Grass >70% Mid Grasses >50% Annual Plants <30%	5,900	23	4,118	16
State - III Shrubby Grassland Dominated by short grasses	Shrub Canopy >20% Peren Grass >70% Mid Grasses <50% Annual Plants <30%	10,236	40		<20
State - IV Shrubland with an understory dominated by annual plants	Shrub Canopy >20% Peren Grass <70% Mid Grasses <50% Annual Plants >30%	7,000	27		<20
State - V Grassland Dominated by short grasses	Shrub Canopy <20% Peren Grass >70% Mid Grasses <50% Annual Plants >30%	2,200	9		<20
Total		25,736	100	25,736	100

Rationale: The 1994 ecological site inventory of the CMA identified significant differences both in the types and conditions of the sites on the Muleshoe and Soza Mesa portions. The Muleshoe sites have a greater potential to produce a grassland community, dominated by tall to mid stature perennial grasses.

As described in the Ecological Resources section under grassland processes, a modified Grassland State and Transition Model was used to set ecological objectives on the Muleshoe portion. This model allows us to more easily visualize the effects of fire and livestock grazing on the expression of the vegetation potential. The management goal is not to produce a single idealized state for the whole area, but rather to have a majority of the area (80%) in the most desired states (States I and II) and to restore periodic fires to maintain these states. No single state should dominate to the point of reducing the other desirable states (States III and V) to an undesirable low level. States IV and X should be avoided because the potential

for soil erosion increases as the perennial herbaceous component is removed and replaced by annual vegetation. This mosaic of low shrub canopy with a high percentage of perennial grass understory should provide the greatest stability and protection for the soils in the watershed and offer the greatest diversity of habitats needed for the diverse wildlife species on the Muleshoe.

The present vegetation communities are an expression of the past disturbance regimes and land use practices. The grassland state (State III in the Transition Model) occurs as one of the states toward a shrub- or tree-dominated community (States II, III, and IV).

The past livestock grazing practices (particularly prolonged and continuous heavy use during the spring and summer growing seasons) has reduced the composition of the more desirable native grasses and palatable shrub species in the uplands. The mid-to-tall stature grasses (such as sideoats grama, Arizona cottontop, and plains lovegrass) were replaced by the shorter, more grazing tolerant grasses (such as curly mesquite and blue grama).

This reduction in the availability of the grass as fuel to carry wildfire through the community has reduced the occurrence of fire as an effective factor in stopping the increase in shrub canopy. Although many desert shrubs show a low tolerance and limited reproduction following fires, others such as mesquite and catclaw can be prolific sprouters following fire and can prove to be fairly tolerant to fire. Once established in the community, these species require repeated burns to be reduced or eliminated.

Once altered into shrubland with low growing annual or perennial grasses (Stages III and IV), upland communities change very slowly. With adequate moisture and rest from grazing, the mid-stature grasses may revegetate gradually back into the community. Shrubs will continue to dominate until a drastic disturbance (i.e. fire, intense browsing, or herbicides) is introduced into the system to remove them. If moderate or heavy grazing continues during the growing season without sufficient rest periods, the composition of mid- and short-stature grasses will continue to decline until only shrubs and annual vegetation remains. Once this state is reached, it becomes difficult to get a fire to carry through the community. The perennial grass component must first be increased to restore the natural process of cyclic fire.

Objective 2B

Upland Vegetation-Soza Mesa and Soza Wash Portions

Manage the vegetation on the Soza Mesa and Soza Wash portions of the CMA to obtain 80% of the total acreage at either the Potential Natural Community (PNC), or High ecological condition by:

*Maintaining the current PNC ecological site condition rating on 1,800 acres of limy upland ecological sites in the Soza Mesa allotment.

*Maintaining the current High ecological site condition rating on 2,682 acres of limy slopes ecological sites in the Soza Mesa allotment.

*Improving the Low ecological site condition rating on 350 acres of loamy upland ecological sites in the Soza Mesa allotment to high condition by 2007.

*Maintaining the current High ecological site condition rating on 1,200 acres of volcanic hills ecological sites in the Soza Mesa allotment.

*Maintaining the current high ecological site condition rating on 440 acres on the upland ecological sites in the Soza Wash allotment.

Rationale: The Soza Mesa area is primarily composed of "limy" sites that are in high ecological site condition. Even in high ecological condition, these limy sites have a significant shrub component, and natural fire was less important in maintaining the balance between herbaceous and woody species than on the volcanic and granitic hills, and loamy upland sites which dominate the Muleshoe portion.

The existing ecological site conditions on the Soza Mesa allotment are either at the desired Potential Natural Community, or in High ecological site condition according to 1992

Ecological Site Inventory. These stages are satisfactory to maintain proper functioning condition of the watershed for this portion of the CMA, and are also considered satisfactory to meet livestock forage production and wildlife habitat objectives. The loamy uplands and volcanic hills sites which border the Muleshoe allotment could be included in prescribed management units for actions to increase the perennial grasses and to decrease the shrub component.

The upland rangelands on the BLM portion of the C Spear ranch (Soza Wash Allotment) are very rough and steep, and the topography is broken by steep sided drainages and hills. Almost no livestock grazing use is occurring. Because of this, the ecological condition of the vegetation is high. These conditions are satisfactory to maintain proper functioning condition of this portion of the CMA, and are also compatible with meeting the resource objectives.

Upland Management Actions for Muleshoe, Soza Mesa, and Soza Wash Allotments

1. Implement a prescribed fire program for the grassland ecological sites (Volcanic Hills, Granitic Hills, and Loamy Upland Ecological sites) within the Muleshoe Ecosystem according to the following:

    a. Allow only natural ignition prescribed fires within the wilderness. Implement management-ignited prescribed fires or natural ignition prescribed fires for remainder of burn units outside of wilderness. Management-ignited prescribed fires will be allowed on units which are partially in wilderness as long as the ignition occurs on the portion of the unit outside of wilderness and then burns into wilderness.

    b. The prescription for management ignited fires is:

Acceptable Prescription Range

	Low	High	Desired
Temperature (Fahr.)	70	95	90
Relative Humidity (%)	20	8	10
Wind Speed (MPH)	5	15	10
Wind Direction*	S-SW	S-SW	
Live Fuel Moisture	60	30	30

Narrative Forecast: Mild day with temperatures 70-95 degrees F., 8-20% relative humidity, with good recovery during night hours. In most units, winds steady from south or southwest 5-15 mph. For some units, acceptable wind direction may be difficult due to topography. Gusts above 20 mph should be minimal. No thunderstorm forecast.

    c. The prescription for prescribed fires with natural ignition is:

Acceptable Prescription Range

	Low	High
Temperature (Fahr.)	50	95
Relative Humidity (%)	40*	5
Wind Speed (MPH)	0	20
Wind Direction	Any	Any

*Spread would not occur above 40% relative humidity.

Narrative Forecast: Mild day with temperatures 50-95 degrees F., 5-40% relative humidity, winds steady from any direction at 0-20 mph; gusts above 20 mph should be minimal.

    d. Each fire unit will have an operational site-specific burn plan and a smoke permit in place prior to being burned. These plans will include special considerations to protect riparian areas, fish habitat, habitat of sensitive wildlife species such as desert tortoise, and cultural resources. Precautions will be taken to ensure the safety of structures and other property. As much as possible, natural features and existing roads will be used to confine the fire. Fire control lines which are necessary within wilderness areas will be

constructed with the minimum tools needed to do the job.

e. To ensure protection of cultural resources, all prescribed burn areas will be inventoried for archaeological properties, historic structures, and traditional use plants. Areas surrounding such cultural properties will be pretreated to avoid destruction during a prescribed burn. These requirements are specified by Instruction Memorandum No. AZ-90-52, Requirements for Cultural Resource Inventory of Prescribed Burn Areas.

f. There are currently 15 designated fire units within the planning area (Figure 9). Each unit will be burned on a 5-10 year cycle (based on plant response) until it has reached the desired ecological state. Then less-frequent burns, preferably through prescribed natural fire, will be used to maintain desired states. Three to six units on average will be burned annually. For the first five years, no more than 20% of the total acreage within all burn blocks will be treated with prescribed fire annually. Unit sizes and configurations are intended to be flexible and may change slightly during development of the site specific burn plans.

g. Unit rotation will be based on minimum fire frequency and drought. Fire units will be alternated using sequencing and checkerboard patterning to ensure that burn blocks are spread across different watersheds. If wildfires occur, the acreage lost to wildfire will be considered in determining the amount of area to be treated with prescribed fire for the year.

h. Prescribed fires used to improve upland condition will be ignited by hand or aircraft. Helicopters may be used to ignite larger or more complex units. Naturally ignited fires which fall within prescription (prescribed natural fires) will be managed to meet annual fire objectives.

i. Agreements addressing the use of fire on the Muleshoe CMA that may affect other lands will be pursued with the state of Arizona, adjacent private land owners and the local Natural Resource Conservation District (NRCD). This agreement should be a proactive, multi-year fire agreement with annual review. The opportunity for cooperative efforts to restore grassland vegetative components using fire on other lands in the watershed will be encouraged.

j. Sediment control will be applied to burn units following BLM National guidelines and requirements and will also consider Best Management Practices prescribed by Arizona Department of Environmental Quality. Pre-burn and post-burn treatments will be evaluated in the operational burn plan for each unit or block of units. Treatments may include seeding, construction of physical structures, mechanical treatments, or biological treatments. Seeding will be done with native species or with annual species which are not at risk of establishing on the treatment sites. Units which include Lehmann' s lovegrass (along the pipeline corridor) will be treated to remove lovegrass prior to burning since Lehmann's has been shown to spread as a result of fire.

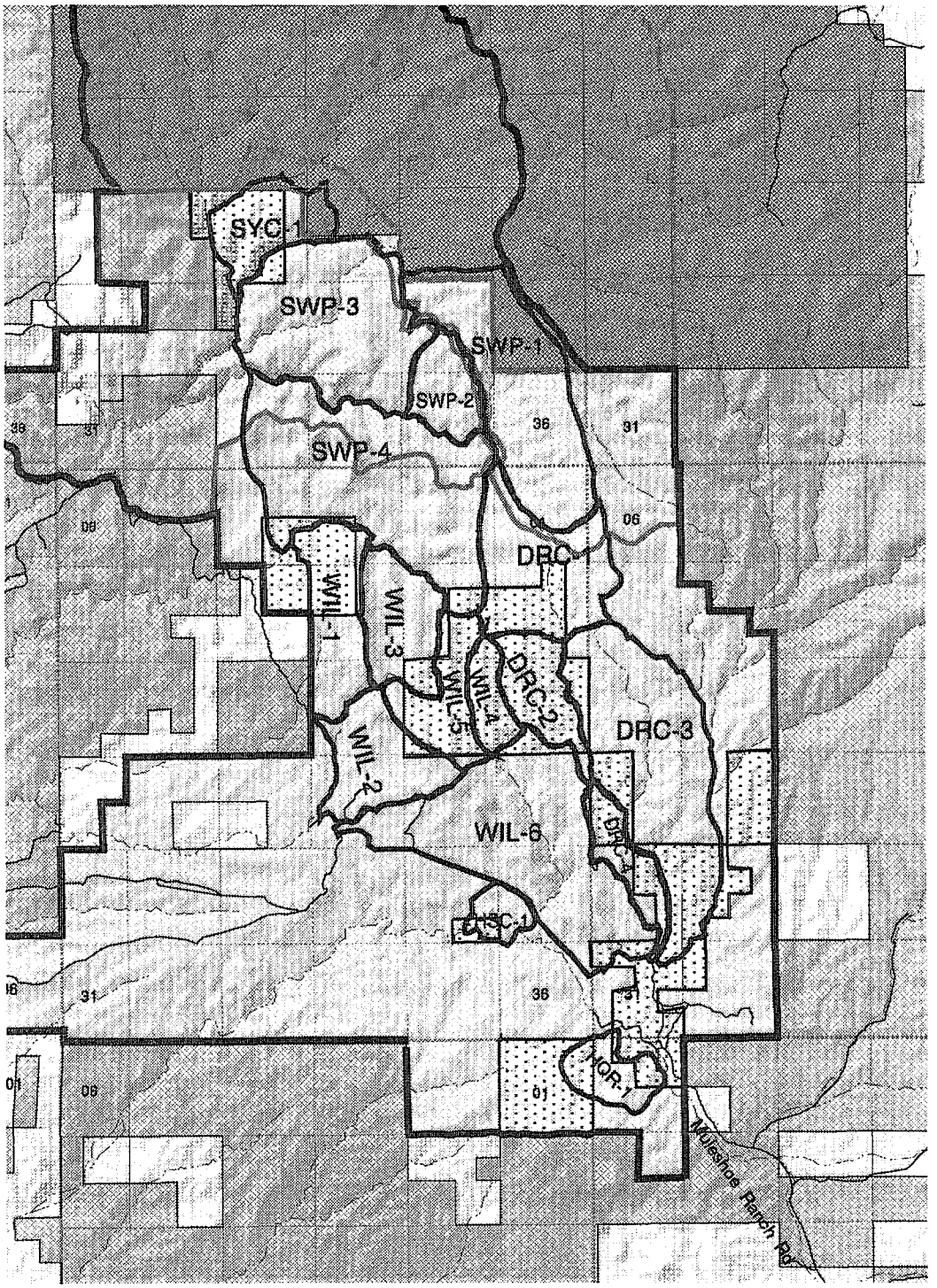
k. Natural fires out of prescription or that threaten to escape the planning area will be suppressed.

Rationale: Fire is a natural process within desert grassland ecological sites. The goal on the Muleshoe is to restore this process and restore and maintain the grassland communities. Because of the degree of shrub invasion on the Muleshoe, prescribed management-ignited fires are necessary in order to burn the areas initially, perhaps for several burn cycles. Prescribed natural ignition fires can also be used to meet upland objectives on the Muleshoe portion of the

Figure 9

MULESHOE ECOSYSTEM MANAGEMENT PLAN

Proposed Prescribed Fire Units



planning area and ultimately will be the preferred method for maintaining grassland communities. In order to meet upland vegetation objectives, fire will be used as a tool to promote vegetative change through decreased shrub cover and increased cover by mid-to-tall stature perennial grasses. Rotation of burn units and carefully planned sequencing will allow for impacts to be distributed to different watersheds annually and will spread burns throughout the watershed. Large burns are generally more cost effective than small burns but can usually be done more effectively with air support. The use of fire as a tool has some inherent risk associated with its use. It is prudent to have a formal agreement with adjacent land owners and to provide opportunity for cooperation and/or protection of property. Use of native species in seeding or planting rehabilitation projects helps maintain the ecosystem and minimizes the chance of establishment of non-native species.

2. Manage livestock grazing on the Muleshoe Allotment (No. 4401) according to the following:

    a. Adjust the boundaries of the Muleshoe allotment (4401) to eliminate riparian areas and include only the Pride basin area (Figure 10). Adjust the grazing preference from 3204 to 346 AUMs on allotment 4401. This would equate to an authorized use of 43 cattle yearlong at 67% public land use = 346 AUMs, or 129 cattle if run seasonally during the non-growing season, November-February.

    b. Continue suspension of active grazing use on allotment 4401 until the upland vegetation objective is achieved (80% of vegetation in States 1 and 2, with 64% in State 1 and 16% in State 2).

    c. Once this objective is met, authorize livestock use under management consistent with achieving the objectives of the plan.

    d. Once livestock grazing is authorized, the following constraints will apply:

        *No more than 40% utilization on key perennial warm-season and cool-season grasses and other key herbaceous species. The key species will be determined prior to permitting active use, and will be dependent on which perennial grass species have reestablished on the sites within the Pride Basin Allotment.

        *Implement a rotational grazing system in Pride Basin which incorporates either development of internal pastures to allow for rest, or allows only seasonal use of Pride Basin during the non-growing season (November through February).

        *Construct approximately four miles of boundary fence to segregate Pride Basin allotment from riparian areas and develop livestock waters (Table 9, Figure 11)

Rationale: Portions of the Hot Springs watershed in the Muleshoe Ecosystem were designated as an Area of Critical Environmental Concern (ACEC) by the BLM to protect the high quality riparian resources found there and to accelerate the recovery of the adjacent upland watershed. The exclusion of livestock grazing in the riparian zones is necessary to promote maximum stability of stream banks by reducing the bank trampling and harvest of vegetation attributed to livestock grazing. It was determined that, even under a grazing strategy that allowed moderate grazing of the adjacent uplands, the soils and vegetation in the riparian zones would be adversely affected. The upland areas around Pride Basin can be rather easily isolated from the riparian zones by the use of natural barriers and the construction of approximately four miles of pasture fencing. This area was determined to be suitable for livestock grazing and, if the livestock operation is conducted properly, would be compatible with the objectives of the Muleshoe CMA. Either a rotational grazing strategy or grazing during the period when the perennial grasses are dormant (November through February) would be sustainable. Initially livestock grazing would continue to be left in suspension to facilitate the prescribed burning in the uplands on the Muleshoe. The continued rest from grazing may allow build up of sufficient fuel to carry a fire through vegetation and meet upland

Figure 10

MULESHOE ECOSYSTEM MANAGEMENT PLAN

Proposed Grazing Allotment Boundaries

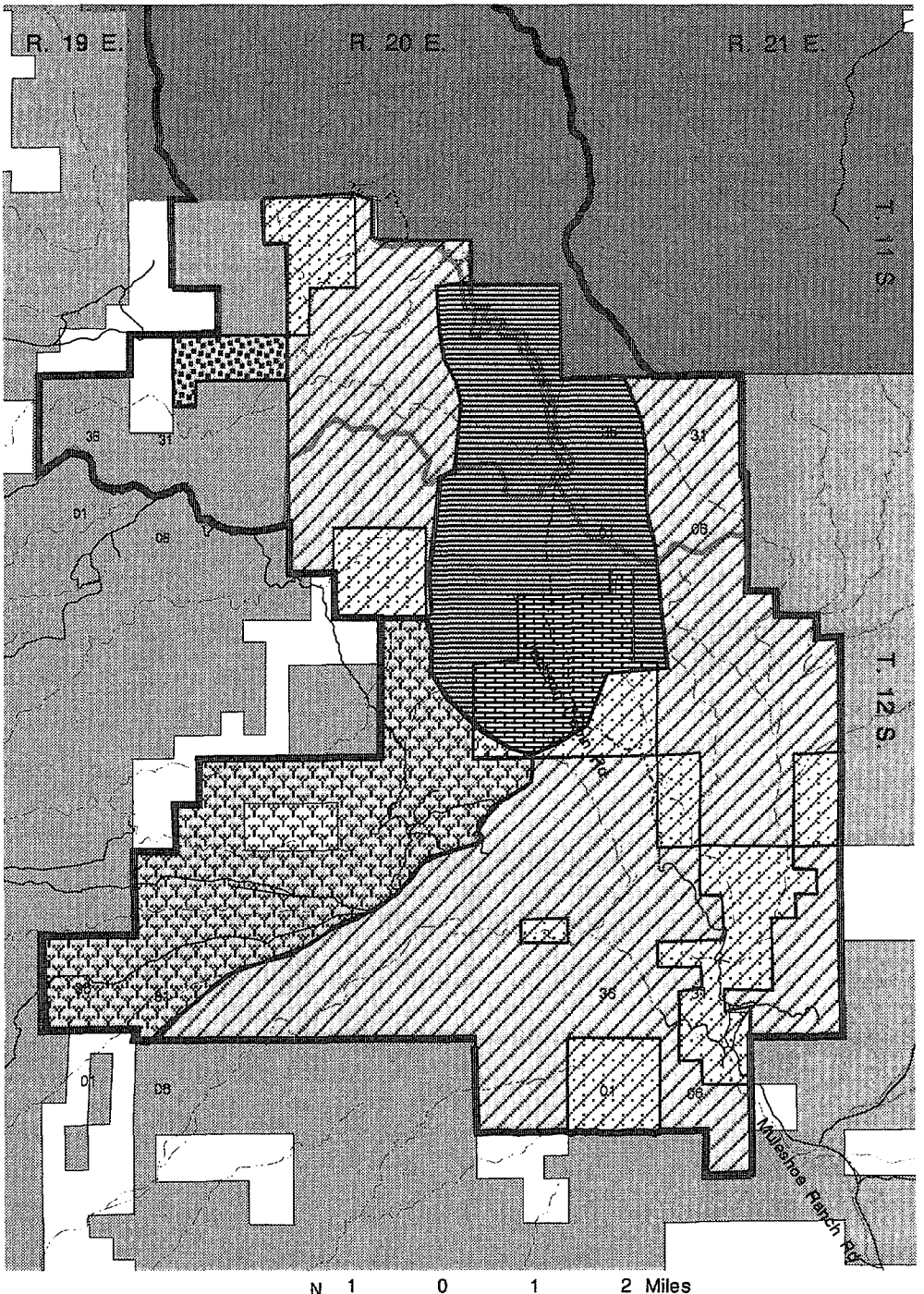


TABLE 9

Proposed Range Improvements — Proposed Pride Basin Allotment

Project Name	Location (Legal Description)	Units
Maintain FS Boundary Fence	T11S, R20E, Section 21, 22, 26, 36	3.5 miles (W)
Maintain FS Boundary Fence	T11S, R21E, Section 30	1.0 mile (W)
Construct Wilderness Gap Fence	T11S, R20E, Section 27	.50 mile (W)
Construct Swamp Springs Gap Fence	T11S, R20E, Section 34	.25 mile (W)
Construct Cherry Peak Gap Fence	T11S, R20E, Section 34	.25 mile (W)
Construct Cherry Springs Gap Fence	T12S, R20E, Section 3	.25 mile
Construct Double R Canyon Fence	T12S, R20E, Sections 7, 12, 13	2.5 miles
Construct Wildcat Gap Fence	T12S, R20E, Section 14	.25 mile
Swamp Springs Canyon Well Re-equip	T11S, R20E, Section 35 SE	
Pride Cabin Well Re-equip	T12S, R20E, Section 11 SE	
SW Boundary Completion Fence	T12S, R21E, Sections 21, 28, 33	3.0 miles

(W) indicates improvement is in designated wilderness.

objectives for shrub reduction. Rest from grazing will also be necessary for units following burning to enhance establishment of new perennial grasses and increase the vigor in those grasses present prior to burning. Rest will also allow accumulation of litter to serve as a mulch and ground cover to protect the soil and enhance the seed bed. Once the desired plant communities have been obtained, livestock grazing will be resumed in the Pride Basin area in accordance with the plan objectives.

3. Manage livestock grazing on the Soza Mesa Allotment (No. 4402) according to the following:

   a. Implement a rotational grazing strategy on the Soza Mesa allotment to provide adequate rest and pasture deferment through development of four pastures by cooperatively developing (through cooperative agreements, grants, and/or cost sharing) the facilities in Table 10.

TABLE 10

Proposed Range Improvements
Soza Mesa Allotment

Project Name	Location (Legal Description)	Units
Pasture 1/4 Division Fence	T12S, R20E, Section 21	1 mile
Pasture 1/2 Division Fence	T12S, R20E, Sections 21, 27, 28	1 mile
Pasture 1/2 Cattleguard	T12S, R20E, Section 27	1
Pasture 2/3 Division Fence	T12S, R20E, Sections 29, 32	1 mile
Pasture 2/3 Cattleguard	T12S, R20E, Section 29	1
Pasture 3 Pipeline	T12S, R20E, Sections 29, 30	1 mile
Pasture 3/4 Division Fence	T12S, R20E, Sections 20, 29	1 mile

   b. The proposed grazing system for the Soza Mesa Allotment is a deferred-rotation management strategy (Table 11). There would be four pastures, two large ones (1 & 3), and two smaller ones (2 & 4) (Figure 11). The two larger pastures would each support the cattle for four months. The smaller pastures would each support the herd for two months. Grazing use and deferments would be alternated between

Figure 11

MULESHOE ECOSYSTEM MANAGEMENT PLAN

Proposed Range Improvements

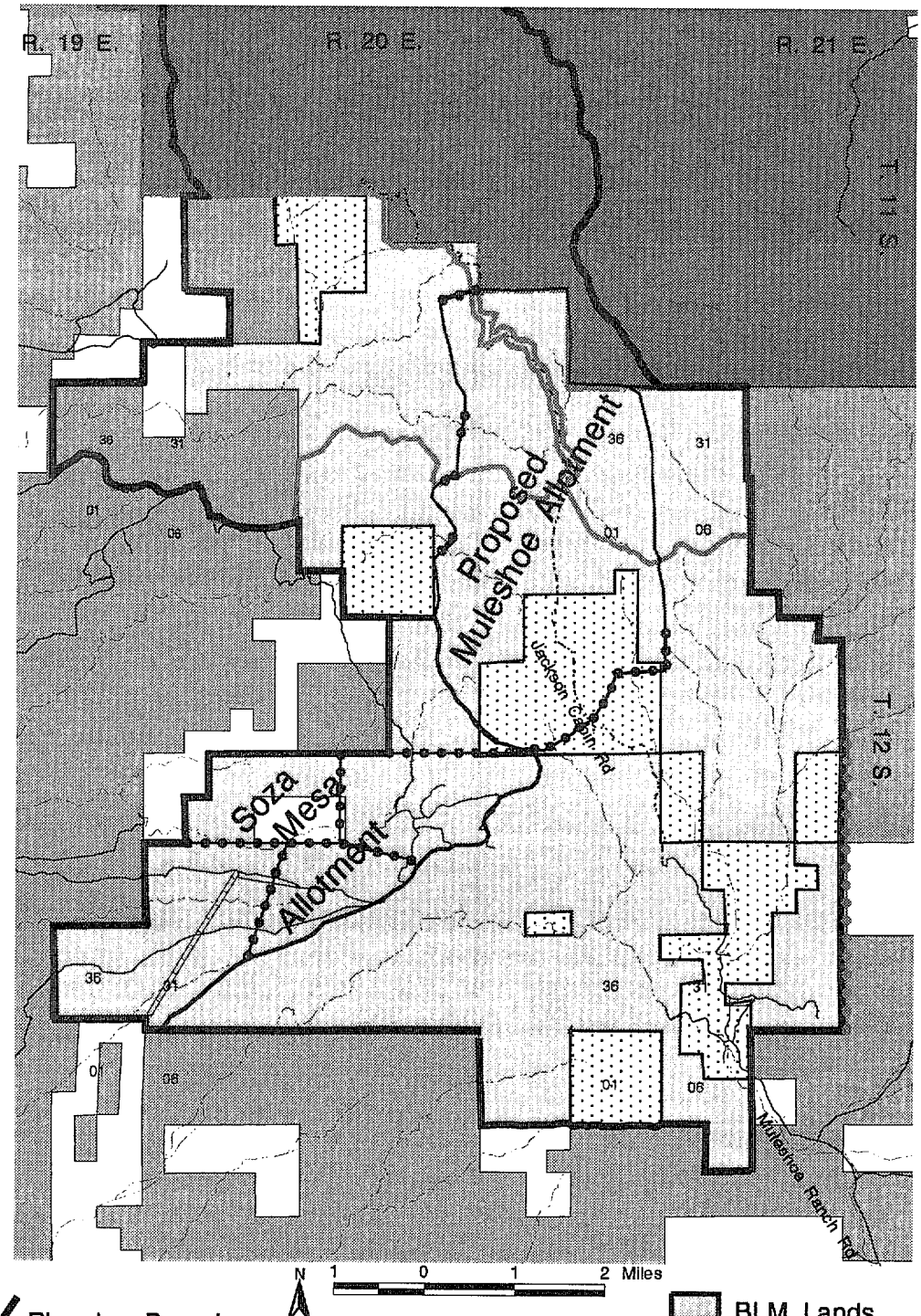


TABLE 11

Soza Mesa Allotment	Proposed Livestock Rotation			
Year 1:				
Season	**Pasture 1**	**Pasture 2**	**Pasture 3**	**Pasture 4**
7/16 to 11/15 Warm-Season Species Growth Period	Rest	Rest	Graze	Rest
11/16 to 1/15 Dormant Winter Period	Rest	Graze	Rest	Rest
1/16 to 5/15 Cool-Season Species Growth Period	Graze	Rest	Rest	Rest
5/16 to 7/15 Dormant Spring-Summer Period	Rest	Rest	Rest	Graze
Year 2:				
Season	**Pasture 1**	**Pasture 2**	**Pasture 3**	**Pasture 4**
7/16 to 11/15 Warm-Season Species Growth Period	Graze	Rest	Rest	Rest
11/16 to 1/15 Dormant Winter Period	Rest	Rest	Rest	Graze
1/16 to 5/15 Cool-Season Species Growth Period	Rest	Rest	Graze	Rest
5/16 to 7/15 Dormant Spring-Summer Period	Rest	Graze	Rest	Rest

pastures as shown in Table 11. After two years the cycle is repeated.

Rationale: Livestock grazing was resumed on Soza Mesa in 1992, through decisions in the Safford RMP. Boundary fencing was constructed to separate the Soza Mesa Allotment from the Muleshoe Allotment, in order to control livestock and protect the sensitive riparian areas. An Ecological Site Inventory was completed and the upland vegetation conditions were determined to be satisfactory. An initial stocking rate for cattle was agreed upon.

Properly managed livestock grazing is consistent with the vision statement for the Muleshoe Ecosystem, which seeks to promote rural lifestyles and activities that can occur in the ecosystem, while achieving the vegetation and watershed of the plan. Currently the Soza Mesa Allotment is grazed yearlong. There are no interior pasture fences and water development is limited to one well with a short pipeline, and two earthen reservoirs. This makes it difficult to move cattle in any planned rotation to provide adequate rest for grazed forage plants, or to defer livestock use of specific wildlife habitats during portions of the year. Development of four pastures and implementation of a rotational grazing program should provide the livestock operator the ability to continue yearlong grazing and achieve the above objectives.

On southwestern ranges grazed yearlong, experimental results and climatic conditions indicate that a deferred-rotation grazing system will be effective (Schmutz, 1977). This system divides the pastures into grazing units and then alternately defers grazing on pastures during periods critical to plant growth and health. The deferments can also be scheduled to avoid livestock use in specific wildlife habitats during periods critical to certain animal species.

The critical periods for perennial grasses in the Muleshoe Ecosystem are the spring and summer growing seasons (March through June and July through October). Critical events during these periods are root growth and formation of basal buds, initiation of and rapid vegetative growth, formation and production of seed, and storage of food reserves in the roots. The critical periods of the year identified for sensitive wildlife on the Soza Mesa Allotment are in June and July during the deer fawning period in pastures 1 and 4, and the period of July through September when the desert tortoise is most active in pasture 1.

4. Manage livestock grazing on the Soza Wash allotment (No. 4409) according to the following:

   a. Continue the current livestock management which is a deferred rotation strategy at the existing level of 60 AUMs (5 cattle yearlong on the 440 acres of BLM administered lands in the allotment).

   b. Maintain the existing gap fencing in Redfield Canyon along approximately one-quarter mile of the eastern section line of Section 28, T.11 S., R 20 E. to prevent livestock from straying onto the Muleshoe portion of the CMA.

Rationale: Properly managed livestock grazing is consistent with the vision statement for the Muleshoe Ecosystem, which seeks to promote rural lifestyles and activities that can occur in the ecosystem, while achieving the vegetation and watershed objectives of the plan. If the state and private lands identified for federal acquisition within the Redfield Wilderness Area are acquired, the Bureau will work cooperatively with the C-Spear Ranch to ensure the management of these lands is consistent with livestock grazing in designated wilderness areas.

5. Remove non-native upland vegetation species where future monitoring indicates a threat to native species and where control is feasible and will not result in any long-term degradation of ecosystem function.

Rationale: Non-native species pose one of the most serious threats to native plant and animal communities. In some cases, the problem species is controlled by natural factors on the site. In other cases, the species needs to be controlled or eliminated in order to maintain the native plant or animal community. However, some non-native species have become so well-established that control is not feasible with currently available methods.

Upland Objectives Monitoring

For the Muleshoe portion, upland vegetation monitoring will be conducted to determine the success of the management actions in achieving the plan objectives of producing a mosaic of Vegetative States I and II. Baseline data was obtained in 1994. Transects will be repeated as necessary following fires or over time as trend studies indicate that significant vegetative changes are occurring. Trend studies will be conducted at least every five years. Trend studies will consist of measuring changes in the relative occurrence of plant species. The categorizing of the vegetative states will require vegetative production, composition, and cover data. Utilization of forage plants will be measured in grazed pastures before and after a grazing treatment.

For the Soza Mesa portion, upland vegetation monitoring will be conducted to determine the success of the management actions in achieving the plan objectives of achieving PNC or High ecological site condition on 80% of the total acreage in the Soza Mesa Allotment. Baseline data was obtained in 1992. Transects will be repeated as necessary following fires or over time as trend studies indicate that significant vegetative changes are occurring. Trend studies will be conducted at least every five years. Trend studies will consist of

measuring changes in the relative occurrence of plant species. When trend studies indicate significant changes have occurred, BLM's Ecological Site Inventory procedures will used to determine the new ecological site condition ratings. This will require collecting plant composition and current species production.

Ground cover measurements will also be collected during the trend studies to help determine watershed condition. Utilization of forage plants will be measured in pastures after a grazing treatment.

The following parameters will be measured to determine the success of management actions (Refer to Appendix 6 for studies protocol) on both the Muleshoe and Soza Mesa portions of the planning area :

Trend - Pace frequency transects (100 plots per transect - 40 cm X 40 cm plots)

Ground Cover - Point intercept (100 points per transect) - Measure shrubs (canopy and basal), grasses (canopy and basal), litter, bare ground,gravel, and rock. Plant Composition - Dry weight rank method (100, 40 cm by 40 cm plots)

Plant Production - clipping and/or comparative yield methods

Grazing Utilization of Vegetation - Grazed class photo guides (perennial grasses), key forage plant method (shrubs), grazed or not grazed - apical meristem (tree seedlings)

Rationale: Upland vegetation monitoring will provide scientific data on changes in the vegetation in the Muleshoe Ecosystem which are occurring naturally, and as prescribed by this plan. It will be necessary to evaluate these changes to determine if the results of our actions are moving us towards or away from the desired future vegetation and watershed conditions we seek. If the results are not being achieved, the proposed management actions will have to be assessed to see why the expected outcome was not achieved. The actions can then be modified or dropped in favor of other strategies which look promising.

C. Fish and Wildlife Population Management

Fish and Wildlife Objective

Objective 3

Maintain and enhance the diversity of native fish and wildlife species of the Muleshoe Ecosystem by re-establishing extirpated native species to the Muleshoe and by removing threats to, supplementing populations of, or extending the ranges of existing native species on the Muleshoe over the life of the plan.

Fish and Wildlife Population Management Actions

1a. By 2005, evaluate habitat conditions in order to assess the feasibility of re-establishing, extending the range of, or supplementing populations of the following wildlife species on the Muleshoe planning area:

Desert bighorn sheep (*Ovis canadensis mexicana*)
Turkey (*Meleagris gallopavo mexicana*)
Gila topminnow (*Poeciliopsis occidentalis*)
Desert pupfish (*Cyprinodon macularius*)
Loach minnow (*Rhinichthys cobitis*)
Spikedace (*Meda fulgida*)
Gila chub (*Gila intermedia*)

Note: The list of species above is not necessarily complete, but merely represents those species identified for possible action at this time.

1b. Determine the population status and resources available to those wildlife species proposed for re-establishment, range extension, or supplementation.

1c. Where habitat conditions have been determined to be suitable for the survival of any of the above species, the appropriate action (re-establishment, range extension, supplementation) will be coordinated through established procedures and coordination with the appropriate

combination of agencies and landowners: Arizona Game and Fish Department, U.S. Fish and Wildlife Service, Bureau of Land Management, Forest Service, The Nature Conservancy, Arizona State Land Department and various affected private landowner(s).

Rationale: Recovery plans for four of the fish species identify the need to increase the number of self-sustaining populations in order to downlist or delist the species. Increased security will result from the introduction of fish into areas that can support self-sustaining populations. Gila chub are found in only 24 locations worldwide. Of these 24 populations, nine are of unknown status, six are considered unstable and threatened, eight are considered stable but threatened, and only one is considered stable and secure (Weedman et al. 1996.) By creating new populations of Gila chub (range extension) or supplementing/re-establishing those populations that are at risk of being lost (Bass Canyon) to random natural events (flood, fire, drought etc.), the security of the species will increase, which may negate the need for formal listing as threatened or endangered. Supplementation of existing populations of bighorn sheep could become necessary in the future to improve herd viability. Management action #1a provides for this contingency. Management action #1b will allow agencies to determine the potential for success of any of the above population actions based on biological as well as logistical/monetary constraints. Data concerning important habitat parameters will be obtained based on known requirements for individual species. In some cases, habitat improvements such as water catchments or removal of an exotic species may be needed before the population action can be carried out. Action item #1c allows the agencies and private partners to proceed with required administrative procedures followed by the appropriate on-site actions needed for re-establishment, range extension or supplementation of a species or population. Each agency has established protocols for accomplishing re-establishments, range extensions, and supplementations. A high degree of coordination among all partners will be required to accomplish these actions.

2. Inventory stock tanks in Redfield, Hot Springs, and Cherry Springs canyons for exotic fishes and amphibians to ascertain threats to native fish and amphibians. Coordinate with AGFD concerning the need to renovate waters that pose a threat to any of the native fisheries.

Rationale: The inventory for and control of non-native fish and amphibian species introduced to the area will have a large positive impact to the native fish community through increased security from foreign diseases carried by or displacement by aggressive, competitors and predators.

3. Coordinate with AGFD to control other non-native species where monitoring indicates a threat to native species.

Rationale: Control of non-natives may also be beneficial in managing special status bird, reptile, and mammalian species.

4. Inventory all natural and developed water sources within the planning area to determine their reliability as a wildlife water source and the need for any additional waters.

Rationale: Determining the location and permanence of all water sources, natural and artificial, in an area is the logical first step in assessing water needs for wildlife in that area. Many upland animal species use livestock waters or artificial waters developed for wildlife in otherwise inhospitable environments for watering during the dry months of the year. Mule deer, javelina, mountain lion, bighorn sheep, upland game birds and many nongame species all use wildlife waters at some portion of the year within the Muleshoe Ecosystem. To ensure that adequate water is available to animal populations particularly during dry seasons or drought conditions, both the natural and developed water sources within the planning area need to be inventoried to determine their locations and permanence. In addition, the inventory helps identify the need for artificial waters (both existing and any new proposals), as well as the scheduled maintenance requirements for artificial waters. This knowledge will also help in habitat

assessments for re-establishing, extending the range of, or supplementing wildlife populations. If it is determined that additional waters are needed, separate, site-specific NEPA documents will be completed.

5. Annually review wildlife survey results at the Muleshoe coordination meeting to determine if there are any management changes needed.

6. Record incidental observations of special status species or species of concern and provide to the AGFD Heritage Data Management System.

Monitoring for Fish and Wildlife Objectives

1. In the past, aerial surveys have facilitated the collection of population trend data on deer, javelina, and bighorn sheep in and around the Muleshoe planning area. AGFD will, as annual funding and priority schedules allow, continue collecting information on these species. Data will be shared with the land management agencies. Overflight days will be coordinated with the appropriate land management agency.

2. AGFD will establish ground survey routes within the Muleshoe Ecosystem planning area to collect data on wildlife population trends. Unless otherwise dictated by resource and personnel limitations, AGFD will annually perform these surveys to collect data on deer and javelina.

D. Cultural Resource Management

Cultural Objective

Objective 4

Protect and preserve the cultural resources within the planning area, making them available for scientific, public, and socio-cultural uses over the life of the plan. This will be accomplished by:

*Developing a site data base containing detailed information describing protection, stabilization, and preservation needs for the planning area's prehistoric and historic properties. This will include an assessment of the Jackson and Browning cabins for eligibility for listing on the National Register of Historic Places.

*Using information from the data base to identify and allocate certain sites for research, educational and interpretive use.

*Accumulating ethnographic and historic information about the planning area and using it for management, scientific and educational purposes.

*Accommodating traditional uses which have been identified by members of the San Carlos Apache Tribe.

*Preventing impacts which will diminish the cultural resource values caused by people, livestock and, as much as is possible, nature.

Rationale: The planning area has never been intensively inventoried for cultural resources. Therefore, knowledge about both prehistoric and historic cultural resources is limited. The known prehistoric sites span a time period of almost 7,000 years and have produced valuable information about the earliest human occupation of the area. Additional information will likely be recovered from other, yet to be discovered properties. The historic resources in the planning area represent an important era in the Euroamerican settlement of Arizona, as well as development of the state's economic and political systems.

Little is known about the ethnoecology of the area as it relates to the prehistoric and protohistoric Western Apache Indians, or the Euroamericans who inhabited the planning area during the late 19th and early 20th centuries. Following an invitation from the BLM, Apache herbalists from the San Carlos reservation visited the planning area and identified a number of plants that they would like to have protected. Protecting these plants is important

because they are needed for traditional uses by the San Carlos Apaches. Preventing impacts to traditional use areas is necessary to prevent their destruction and preserve them for future use.

Cultural Resource Management Actions

1. Conduct Class III intensive field surveys for cultural resources on a project-by-project basis.

2. Conduct a combined Class II survey for cultural resources and an ethnoecological study of the planning area by the end of 2002, if cooperative or matching funds are available.

Rationale (1-2): In order to develop the data base necessary to protect, study and interpret the planning area's cultural resources, field surveys must be conducted. Since the planning area has not been intensively surveyed, the locations of only a few cultural properties are known at this time.

Class III intensive field surveys will provide thorough pedestrian surveys of specific project areas and will ensure avoidance or mitigation of impacts associated with specific, planned projects and actions. A Class III survey is most useful when it is necessary to know precisely what cultural properties exist in a given area or when information sufficient for later evaluation and treatment decisions is needed on individual properties. Intensive survey describes the distribution of properties in an area; determines the number, location and condition of properties; determines the types of properties actually present within the area; permits classification of individual properties; and records the physical extent of specific properties.

A Class II survey combined with an ethnoecological study of the planning area will provide a sample of information about cultural property type, location, size, and possibly cultural affiliation, augmented with information useful in developing a broader scientific understanding about the interactions between humans and the planning area's environment. Because Federal funds are limited, funding to pay for a Class II survey and an ethnoecological study will be sought through cooperative or matching sources.

3. Post signs at entrances to the planning area, and at allocated properties, which explain to visitors the scientific and social values of the area's cultural resources, the need to protect them and the laws under which they are protected.

Rationale: Providing educational information enhances public benefit and appreciation of cultural resources and enlists the aid of some of the public in the BLM's efforts to protect cultural resources. Additionally, posting areas where cultural properties are located contributes in prosecuting violators.

4. Identify traditional use plant species and locations where they are growing.

5. Create a partnership education program with the University of Arizona, Arizona State University, Northern Arizona University, and/or other accredited institutions to facilitate archaeological and anthropological research in the planning area.

Rationale: This program will include BLM support for research activities including providing maps and permits, and assistance in securing grants for data collection and research. Educational partnerships provide an opportunity for university and college students to participate in formal research projects, interact with the U.S. government and gain valuable knowledge that they can use after they graduate.

6. In livestock grazing areas, erect fences around specified cultural properties and areas where traditional use plants are growing.

Rationale: It is believed that a majority of the cultural properties in the planning area are located in the riparian areas along stream terraces. Most traditional use plants are located within the riparian areas as well. These properties will be protected from trampling and grazing as cattle will not be allowed within the riparian areas. Potentially, some significant properties may be found in upland areas.

Fences will prevent livestock from trampling properties and disturbing surface provenience, breaking surface artifacts, and compacting subsurface materials. Fences will also prevent traditional use plants from being eaten or trampled by livestock. Fencing will be a standard mitigation measure for livestock development projects in areas where significant cultural properties are located.

7. Protect known cultural properties from fire damage utilizing strategies such as black-lining around properties, flagging areas around properties, or having an archaeologist present during prescribed burns and wildland fires to identify cultural properties for firefighters.

Monitoring for Cultural Objectives

1. Information collected by both Class III and Class II surveys will be used to develop a cultural property monitoring program and update the plan.

Rationale: A systematic monitoring program will provide an ongoing assessment of cultural property status and impacts, and permit a timely response to reducing or stopping most impacts. Possible exceptions would include natural phenomena such as floods, droughts or fires which are beyond human control. This program will also include placing signs that explain the social and scientific values of the planning area's cultural resources, the laws under which they are protected, and also encourage visitors to cooperate in their preservation.

E. Wilderness Management

Wilderness Objective

Objective 5

Maintain and improve wilderness values of naturalness and outstanding opportunities for solitude and primitive, non-motorized types of recreation in the Galiuro Wilderness and Redfield Canyon Wilderness by:

*Ensuring unauthorized vehicle use remains at zero intrusions annually.

*Minimizing impacts to wilderness values from potential uses of inholdings.

*Providing for wildlife operations and maintenance activities while minimizing low-level aircraft use (below 2,000 feet above ground level) and impacts to wilderness values.

Rationale: Uses of wilderness are managed with the underlying principle to protect wilderness values of naturalness and outstanding opportunities for solitude and primitive recreation. Coordination with the Forest Service will ensure consistent management in relation to the adjacent Galiuro Wilderness.

Wilderness Management Actions

1. Post signs along the boundary of the Redfield Canyon Wilderness as follows: one sign (carsonite post) per 1/4 mile along the Jackson Cabin Road corridor, one sign (carsonite post) on each side of the Redfield Canyon bottom at the wilderness boundary and carsonite signs in other locations along the boundary which are used as access points. Place one larger wilderness sign at the southern Redfield Canyon Wilderness boundary where it first intersects the Jackson Cabin Road.

Rationale: The wilderness boundary is currently not signed. Placing signs will allow visitors to know when they are entering wilderness.

2. No group larger than 15 persons will be allowed within the Redfield Canyon Wilderness.

Rationale: The FS currently recommends a group size of 15 persons within the Galiuro Wilderness. This restriction for the Redfield

Canyon Wilderness provides consistency in these adjoining wilderness areas and helps maintain solitude for wilderness visitors.

3. In accordance with the Master MOU between BLM and AGFD, provide for the following wildlife operations and maintenance activities:

   *Conduct annual low-level big game species monitoring over flights.

Rationale: These flights usually average 1-3 days per year during mid-September through the end of October for bighorn sheep, and for 1-3 days per year during the beginning of January to mid-February for javelina. Dates are approximate, as flexibility is required due to weather conditions, aircraft availability, etc. The altitude of the flights will normally be 100-200 feet above ground level. The flight may lower to twenty-five feet to classify an animal. These surveys are flown following the landscape contours. The Arizona Game and Fish Department will notify the BLM in advance of scheduled flights and will coordinate flight days to minimize potential conflicts with visitors. Providing for the wildlife surveys as outlined will ensure that necessary wildlife data is gathered to ensure proper management with the least impact to the naturalness of the wilderness.

   *Bring the two wildlife water developments, Coati (T11S., R20E., Sect. 30, NE1/4, SE1/4.) and Two-holer (T11S., R20E., Sect. 29, SE1/4, SW1/4.), within the Redfield Canyon wilderness up to design capacity. The redevelopment activities would be accomplished using the minimum tool or equipment necessary to successfully, safely, and economically accomplish the objective.

   *Perform routine maintenance and inspection on the two wildlife water developments, Coati and Two-holer, within the Redfield Canyon wilderness. The maintenance and inspection activities would be accomplished using the minimum tool or equipment necessary to successfully, safely, and economically accomplish the objective.

Rationale: Use of motorized equipment and aircraft can be approved by the Field Manager for redevelopment and/or maintenance activities provided they are the minimum tool to accomplish the tasks. An example of such an activity would be the replacement of a fiber-glass storage tank utilizing a helicopter. Maintaining the current facilities protects the investment made in these developments and ensures that adequate water will be available for bighorn sheep and other wildlife.

4. Provide for construction or maintenance of the following developments in wilderness:

   *Coordinate with the Forest Service and lessee to maintain the existing forest boundary fence in T. 11 S., R. 20 E., Section 26 (approximately one-half mile) as necessary to contain livestock within the Pride basin area.

   *Coordinate with the lessee to construct the additional one-half mile of fencing in T. 11 S., R. 20 E. Section 27 and the two gap fences (one-quarter mile each) at Swamp Springs Canyon and Cherry Springs Peak necessary to contain livestock within the Pride basin area.

   *Redevelop the Swamp Springs Canyon well to provide water for livestock, wildlife, and special recreational uses.

   *Redevelop the Sycamore Canyon well to provide water for wildlife and special recreation use (eg. equestrian).

   *Coordinate with the lessee on the Soza Wash allotment to maintain the one-quarter mile gap fence (along the eastern section line of Section 28, T.11 S., R 20 E.) in Redfield Canyon as necessary.

   To minimize wilderness impacts, the following special construction and maintenance stipulations would be placed on the above actions:

   The materials for fence construction would be driven to the project site up the Jackson Cabin Road. The construction of the fence would be done manually, with any needed

materials moved by pack animals from the road. Clearing of the brush along the line would also be done manually, with as little vegetation removed as possible. The fence posts would be green without white tops, to blend in with the vegetation. The gate in the road would be wooden and designed to have a rustic appearance (rather using a steel or aluminum gate) to be more aesthetic. A cattleguard is not planned, but could be used if determined necessary by the BLM based on visitor use levels. The fence would be constructed to BLM standards for safe passage of wildlife. The grazing lessee would be responsible for construction and maintenance of the fence. The BLM would provide the materials. The project would be authorized under a cooperative agreement. Any maintenance would be done using the same methods and materials as above and would be on foot or horseback.

The redevelopment of the two wells along the Jackson Cabin Road would be done to minimize the visual impact of these facilities. The windmills would be replaced with solar electric pumps. The solar panels, storage and drinking troughs, and any other structures would be located to reduce their visibility.

Rationale: Most of these developments are range improvements which were identified under the upland objective and listed in Table 9 as necessary to implement livestock grazing in the Pride Basin area. A portion of the existing boundary fence with the Forest Service will be needed in Section 26, as well as construction of an additional mile of fence in wilderness necessary to enclose the proposed Pride Basin Allotment where livestock grazing will be authorized.

The two wells along the Jackson Cabin Road are not currently functional, but are proposed for redevelopment. The Sycamore Canyon well could provide dependable water for wildlife and special recreational uses (such as for domestic horses or mules). The Swamp Springs Canyon well would be necessary to implement livestock grazing, but could also provide a dependable water source for wildlife and special recreational uses. The need for either well as a wildlife water source would be determined following the water source inventory (Fish and Wildlife Management Action #4). The physical presence of these watering facilities would have little impact on the wilderness values as they will be redeveloped to minimize visual impacts. The increase in wildlife presence in the area resulting from the availability of reliable water would be a positive impact.

5. Continue efforts to acquire private and state land inholdings within the Redfield Canyon Wilderness as identified in the Safford District RMP.

Rationale: The Safford District RMP identifies private and state inholdings within wilderness for acquisition. Obtaining these inholdings eliminates potential negative impacts from non-wilderness inholdings on wilderness values. It also allows these areas to be added to wilderness. Further, it helps solve some access issues at the western Redfield Canyon Wilderness boundary.

6. Prescribed fires within wilderness will be from natural ignition sources only unless ignition occurs outside wilderness boundaries. Natural ignition fires will be permitted to burn if they meet the prescription specified under the upland objective. Otherwise, they will be suppressed with the appropriate suppression response. Fire suppression activities in the Redfield Canyon Wilderness will adhere to the following general guidelines.

   *All wildfire will be suppressed with the appropriate suppression response. These responses would be based on the resources at risk, location of the fire, fuel conditions, weather, and time of year.

   Appropriate suppression responses usually range from the use of hand tools to helicopters, air tankers, water pumps and chain saws.

   *Suppression actions will be executed to minimize surface disturbance and

alterations of the natural landscape and will be consistent with management objectives and constraints.

*Suppression facilities and improvements will be located outside wilderness boundaries.

*Fire-line construction with motorized equipment will only be used as a last resort.

*Surface disturbance from suppression actions will be rehabilitated to as natural a state as possible.

*Aerial retardant applied in wilderness will be the fugitive type that fades quickly.

Rationale: This management action permits lightning-caused fires to play, as nearly as possible, their natural ecological role within the Redfield Canyon Wilderness. Allowing only natural ignition within the wilderness minimizes impacts to wilderness values of naturalness and solitude. This action also ensures that appropriate suppression activities occur for wilderness which are sensitive to wilderness values.

Monitoring for Wilderness Objectives

1. Evaluate use by monthly analysis of visitor sign-in sheets (same as for social environment). Enter monthly data in BLM's Recreation Management Information System Data Base for the Muleshoe Planning Area.

2. Conduct monthly patrols to evaluate impacts to wilderness values and to gather information from visitors. Utilize a visitor response card which asks about the quality of the experience, parties encountered, and other pertinent information. Make these available at kiosk or other visitor contact points. They can be dropped off there or mailed after trip.

F. Management of Social Environment

Social Environment Objective

Objective 6

Maintain or improve the current range of open-space recreation opportunity settings (rural, semi-primitive motorized, semi-primitive non-motorized, and primitive) that provide existing recreational activities (as described in the Ecosystem Resources section) in the Muleshoe Ecosystem for the next ten years by:

*Determining recreation use levels which can be maintained in each setting to maintain natural and social environment.

*Limiting motorized vehicle use to the Jackson Cabin Road and the Soza Mesa Road Complex.

*Providing additional facilities (signs, camp areas, pull-outs, trails) which will enhance recreational experiences in zones 1 and 2.

*Providing legal access.

*Eliminate (rip and seed if necessary) all unauthorized roads.

Rationale: The area's remoteness, rugged topography and moderate to light public use dictates development for semi-primitive recreation. Public comment supports this conclusion. Facilities would be limited to development of parking and camping areas removed from biologically or culturally sensitive resources. Signs would be limited to marking trailheads, interpreting important features, and providing direction.

Social Environment Management Actions

1. Identify the Jackson Cabin Road and the Soza Mesa Road complex as a limited use area where motorized vehicle use is limited to travel on existing roads.

2. Sign the Hot Springs Canyon Road as closed to motorized vehicle use thereby implementing the Safford RMP decision (Figure 12).

3. Sign the Pipeline Road as open to administrative use only and closed to public use thereby implementing the Safford RMP decision. Locked gates and public walk-throughs will be established to identify the closed portion (east end at Jackson Cabin Road and west end at Soza Mesa boundary fence).

4. Develop pull-outs for parking and vehicle turn-around along the Jackson Cabin Road at (Figure 12):

   - Pipeline crossing
   - Bass Canyon
   - Between Bass Canyon and Browning Turn-off
   - High Lonesome Trailhead near Pride Ranch and Browning Homestead
   - Southern Wilderness boundary
   - Swamp Springs Canyon
   - Sycamore Canyon
   - The saddle above Jackson Cabin

Rationale: Developing pull-outs provides small parking sites at visitor access points and locations for vehicles to turn around or allow another vehicle to pass. Developing the vehicle pull-outs limits environmental damage from vehicles driving off road to turn around or to park while improving safety for visitors.

5. Develop informational brochures and maps detailing resource values; recreation opportunities including locations of roads and trails, trailheads, pull-outs, closed roads, ACEC and wilderness boundaries, day-use areas, and open hunting areas; restrictions and precautions including permit requirements, wilderness regulations, and low-impact camping techniques. Products will be designed to meet specifications of the Americans With Disabilities Act of 1990.

6. Place an informational kiosk at the beginning of the Jackson Cabin Road (Figure 12 which includes resource, recreation, and wilderness information and regulations). Maintain visitor sign-in station at kiosk. Kiosk will be designed to meet specifications of the Americans With Disabilities Act of 1990.

7. Develop visitor sign-in station on Soza Mesa to gather information on visitor numbers and activities.

8. Maintain hunting opportunities on public lands and provide improved hunting opportunities on TNC deeded lands (Figure 13):

   All public lands remain open to hunting.

   The following TNC deeded lands are open for hunting: Cherry Springs Section (T12S, R20E, Section 3 SW 1/4, Section 4 SE 1/4, Section 9 NE 1/4, Section 10 NW 1/4. Pride Ranch (T12S, R20E, Section 14 (all), Section 13 (w of Jackson Cabin Road only), Section 11 (w of Jackson Cabin road except within 1/4 mile of Pride cabin). Sierra Blanca T.13S., R.20E., Section 1 (all).

9. Pursue legal access over the following existing roads through acquisition of rights-of-way or easements by cooperative agreement, purchase, or donation thereby implementing the Safford RMP decision:

   Jackson Cabin Road (public)
   T. 12 S., R. 20 E., Secs. 11, 12, 13; T. 12 S., R. 21 E., Secs. 19, 30, 31; T. 13 S., R. 21 E., Secs. 5, 6.

   Muleshoe Pipeline Road (administrative use only) T. 12 S., R. 21 E., Sec. 31.

   Cherry Springs Canyon Road (public)
   T. 12 S., R. 20 E., Secs. 4,9.

The following roads will be examined as alternate routes to pursue legal access on by the above methods, if legal access cannot be obtained over the above routes.

Redfield Mesa Road
Soza Mesa Road
Redfield South Rim Road
Deer Creek
High Creek

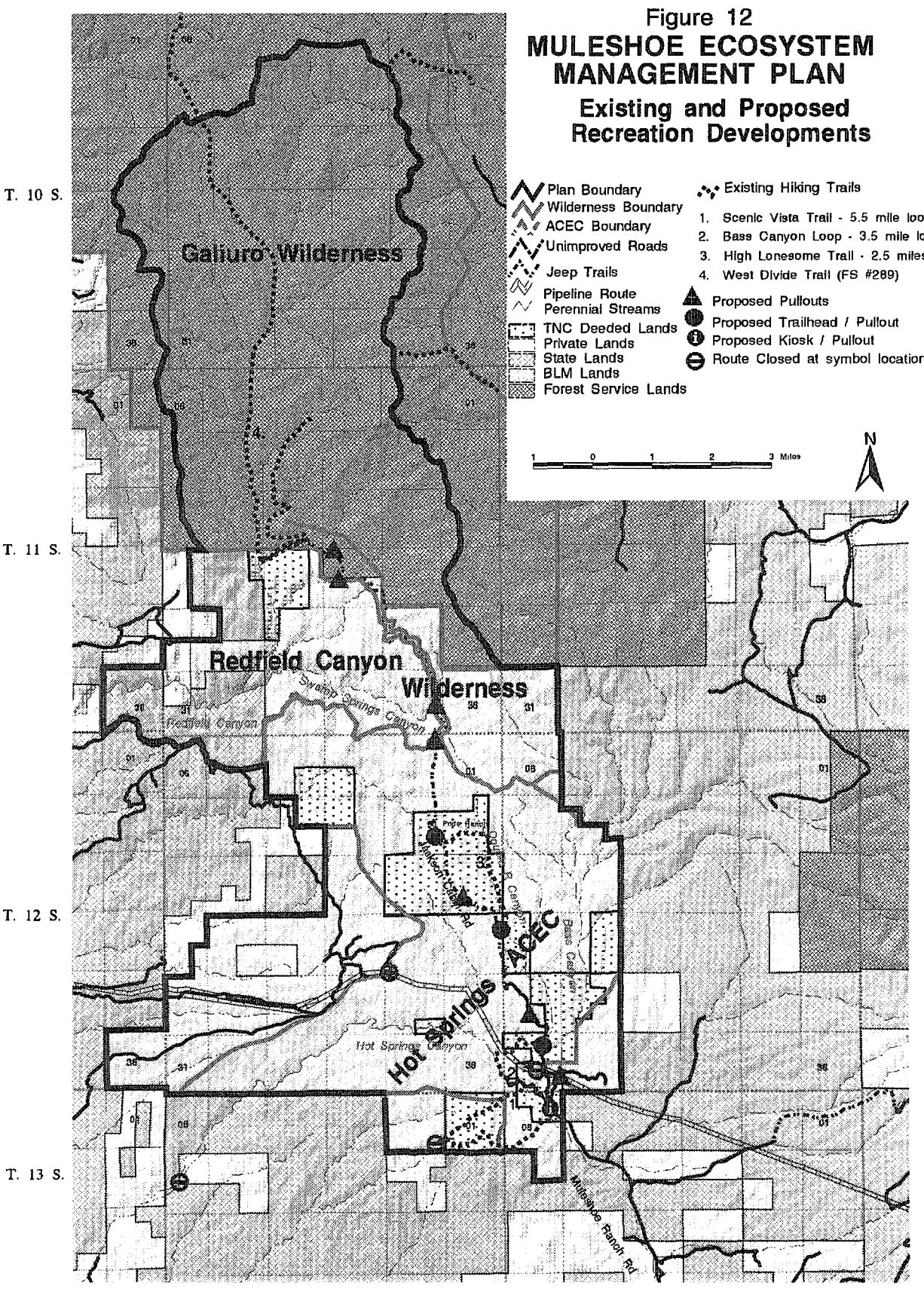
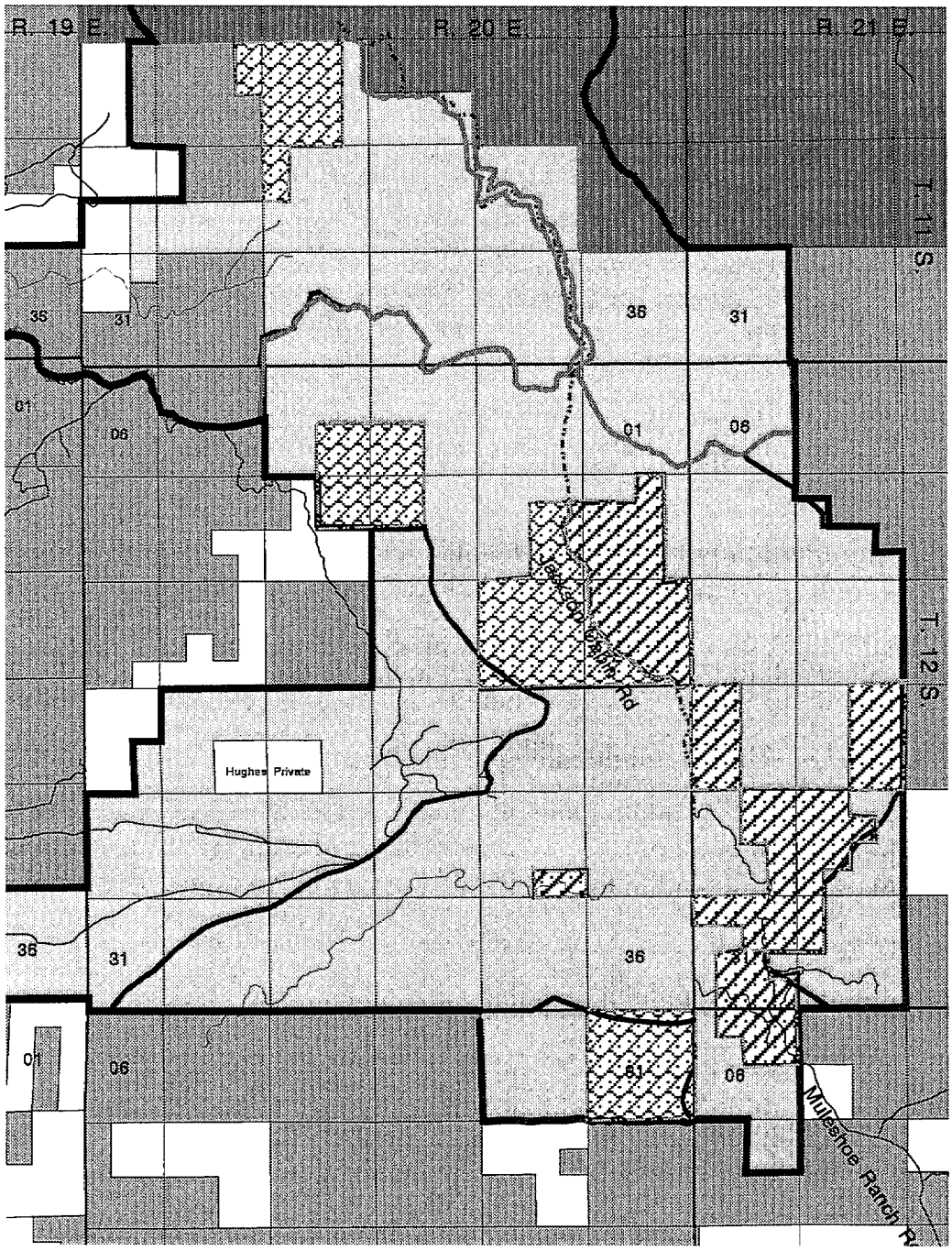


Figure 12
MULESHOE ECOSYSTEM MANAGEMENT PLAN
Existing and Proposed Recreation Developments

Figure 13

MULESHOE ECOSYSTEM MANAGEMENT PLAN

Open and Closed Areas to Hunting on TNC Deeded Lands



10. Maintain Jackson Cabin Road and Soza Mesa Road to four-wheel-drive standard with minimal maintenance on an as-needed basis. Work with interested volunteer groups to provide low-cost road maintenance while continuing to provide access.

Rationale: Actions #1-3 and 10 are implementing decisions made in the Safford District RMP. The actions represent the minimum necessary to satisfy public need and to meet budget and personnel constraints. Future needs, within the limits of the social environment objective, will be evaluated through monitoring and visitor survey information.

Monitoring for Social Environment Objectives

1. Gather and categorize visitor use information from sign-in stations monthly. Enter monthly data in BLM's Recreation Management Information System Data Base for the Muleshoe Planning Area.

2. Conduct monthly patrols to contact visitors personally to assess the quality of their visit and to monitor off-road vehicle use and potential environmental impacts. Utilize a visitor response card which asks about the quality of experience, parties encountered and other relevant data. Make these available at kiosk or other visitor contact points. They can be dropped off there or mailed after trip.

VIII. PLAN EVALUATION

The BLM, FS, TNC and AGFD will conduct informal evaluations of monitoring data and resource conditions on an annual basis during the coordination meeting for the Muleshoe CMA. They will report significant findings to the Muleshoe Ecosystem Management Team and any other interested agency or public. At a minimum, a formal evaluation will be completed every five years. This evaluation will be conducted by the Muleshoe Ecosystem Management Team and will include the actions below:

1. Document management actions that have been completed. (This will also accomplish implementation monitoring of Best Management Practices).

2. Identify and prioritize management actions for future implementation.

3. Analyze monitoring data to determine if plan objectives are being met.

4. Propose new management actions if objectives are not being met.

5. Identify new issues or concerns that may have arisen for the Muleshoe Ecosystem and determine whether modifications to the plan are necessary to address them.

New issues or proposals not contained in this plan will be analyzed to determine if they are consistent with the objectives. If they are, an environmental analysis will be conducted and the actions implemented.

Newly developed actions identified for implementation will become plan revisions or amendments. Plan amendments will be available for public review for 45 days before being implemented.

IX. PLAN IMPLEMENTATION AND COST ESTIMATES

This section outlines timeframes and cost estimates for implementing the planned management actions and monitoring. Cost estimates are in 1997 dollars. Implementation depends on availability of funds and personnel which can vary from year to year. Target dates and relative priorities are tentative and may change depending on available funding and personnel and agency needs. Projects must compete for funding statewide within both BLM and AGFD based upon established criterion. Projects considered high priority within the EMP may rank low on a statewide basis and may be adjusted accordingly. Listing of a project in the EMP does not commit an agency to its implementation. A workday is one person working for an 8 hour day. A workmonth is one person working for 20 days.

Muleshoe Ecosystem Management Plan

Implementation Table

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Perfect instream flow water rights to obtain certificate: Hot Springs (BLM and TNC) Bass (TNC) Wildcat (BLM). Obtain Federal Reserve Water Right for Redfield Canyon (Riparian Action #1)	BLM/TNC BLM	small filing fees (see monitoring for workdays)	Medium	1998
Evaluate feasibility of installation of stream gauges on Redfield Canyon and Hot Springs Canyon and install if feasible. (Riparian Action #2)	BLM/TNC	unknown cost for installation until feasibility assessment completed	Low	2000
In partnership with other agencies and entities, pursue development of riparian ecological site guides for Muleshoe riparian areas. Place surveyed cross sections in key riparian segments (geo-referenced). (Riparian Action #3)	BLM/TNC	unknown	Low	N/A--as opportunity arises
Remove Salt Cedar in Riparian Areas Remove other exotics threatening native species (Riparian Action #4)	BLM/TNC	2 workdays and small cost for herbicide unknown	High	1999 As needed
Post signs closing Hot Springs Canyon riparian area (Riparian Action #5 and Social Env. Action #2)	BLM	$200 (includes replacement costs)	High	1999

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Issue a federal register notice which: a. Designates Bass Canyon as a day use area only and prohibits overnight camping (Riparian Action #9) b. Prohibits commercial collection of plant materials. (Riparian Action #11) c. Prohibits wood-cutting. Dead and down wood may be collected on public lands for campfires. Collection of dead and downed wood is not permitted on TNC deeded lands. Campers will be encouraged through signs and/or printed materials to collect only enough wood for their immediate need. (Riparian Action #12) d. Implements a 15-person group size limit for Redfield Canyon Wilderness. (Wilderness Action #2).	BLM	$300.00 and 2 workdays	Medium	1999
Construct waterbars as needed along the pipeline corridor to minimize erosion. (Riparian Action #14)	BLM (through modification of ROW agreement)	Do as part of other pipeline maintenance work.	Medium	1999

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Implement a prescribed fire program: Year #1 ~2200 acres in Double R Year #2 ~2200 acres in Hot Springs, burn unit Year #3 ~2200 acres in Wildcat burn unit Subsequent Years (~2000 acres/year) (Riparian Action #15, Upland Action #1, and Wilderness Action #6)	BLM/TNC	 $19,000 ($8.60/acre) $19,000 $19,000 ($8.60/acre)	 High " " "	 1998 1999 2000 2000+
Issue grazing decision notice to: a. Eliminate livestock grazing use in riparian areas on the Muleshoe allotment No. 4401. (Riparian Action #6 and Upland Action #2) b. Reduce the grazing allotment boundary to include only the Pride Basin Area. (Upland Action #2) c. Establish an initial grazing preference of 346 AUMs on the public lands in the Pride Basin allotment. (Upland Action #2) d. Suspend active grazing use in Pride Basin until the upland vegetation objective is achieved. (Upland Action #2)	BLM	2 workdays	High	1998

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Implement a grazing system and construct or redevelop the following grazing improvements for Pride Basin:	BLM/lessee cost share 50/50 on these projects			Projects will be completed after burn plan is implemented and prior to initiation of livestock grazing
Wilderness Gap Fence--0.50 mile (T11S, R20E, Sec. 27)	"	$2250	Low	
Swamp Spring Gap Fence--0.25 mile (T11S, R20E, Sec. 34)	"	$ 750	"	
Cherry Peak Gap Fence--0.25 mile (T11S, R20E, Sec. 34)	"	$ 750	"	
Cherry Spring Gap Fence--0.25 mile (T12S, R20E, Sec. 3)	"	$ 750	"	
Double R Canyon Fence--2.5 mile (T12S, R20E, Sections 1, 12, 13)	"	$7500	"	
Wildcat Gap Fence--0.25 mile (T12S, R20E, Sec. 14)	"	$ 750	"	
Swamp Spring Canyon Well Re-equip (T.11S., R.20E. Sec.35 SE)	"	$2000	"	
Pride Cabin Well Re-equip (T12S, R20E, Sec.11 SE)	lessee 100% on this project as on deeded land	$2000	"	
SW Boundary Completion Fence--2.25 miles (T12S, R21 E, Sections 21, 28, 33) (Upland Action #2 & Riparian Action #7 & Wilderness Action #4)	BLM/lessee cost share 50/50 on this project	$6750	High	2000

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Implement a rotational grazing system and construct the following grazing improvements for Soza Mesa:	BLM/lessee cost share 50/50 on the following projects			
Pasture 1/4 Division Fence--1 mile (T12S, R20E, Sec 21)		$3000	High	
Pasture 1/2 Division Fence--1 mile (T12S, R20E, Sections 21, 27, 28)		$3000		
Pasture 1/2 Cattleguard (T12S, R20E, Sec. 27)		$2000		
Pasture 2/3 Division Fence--1 mile (T12S, R20E, Sections 29, 32)		$3000		
Pasture 2/3 Cattleguard (T12S, R20E, Sec. 29)		$2000		
Pasture 3 Pipeline--1 mile (T12S, R20E, Sections 29, 30)		$3000		1998
Pasture 3/4 Division Fence--1 mile (T12S, R20E, Sections 20, 29)		$3000	High	1998
(Upland Action #3)				
Continue rotational grazing system on Soza Wash allotment and continue maintenance of Redfield Canyon gap fence:	BLM/lessee	N/A		
(Upland Action #4)				
Remove non-native lovegrass along pipeline road (five acres)	BLM/TNC	unknown	High	1999
Remove other exotics threatening native species				
(Upland Action #5)				
Determine the population status and resources available to those wildlife species proposed for re-establishment, range extension, or supplementation.	AGFD, BLM, FS, TNC	unknown	Med	2010
(Fish and Wildlife Action #1)				

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Inventory stock tanks in Redfield, Hot Springs, and Cherry Springs canyons for exotic fishes and amphibians (Fish and Wildlife Action #2)	AGFD, BLM	1 workmonth	Med-High	2000
Coordinate with AGFD to control other non-native species which threatens native wildlife. (Fish and Wildlife Action #3)	AGFD, BLM	unknown	High	As needed
Inventory all natural and developed water sources within the planning area for wildlife (Fish and Wildlife Action #4)	AGFD, BLM, FS, TNC	4-8 workmonths	High	2002
Annually review wildlife survey results at the Muleshoe coordination meeting to determine if there are any management changes needed. (Fish and Wildlife Action #5)	BLM/TNC/FS/ AGFD	1 workday annually	High	at annual coordination meeting each year.
Record incidental observations of special status species or species of concern and provide to the AGFD Heritage Data Management System. (Fish and Wildlife Action #6)	All	N/A	High.	N/A
Conduct Class III intensive field surveys for cultural resources on a project-by-project basis. (Cultural Action #1)	BLM	variable depending on project	High	as needed
Conduct a combined Class II survey for cultural resources and an ethnoecological study of the planning area if cooperative or matching funds are available. (Cultural Action #2)	BLM (contract)	$50,000	Medium	2002

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Post signs at entrances to the planning area, and at allocated properties, which explain to visitors the scientific and social values of the cultural properties, the need to protect them, and the laws under which they are protected. (Cultural Action #3)	BLM	$1000	High	2000
Identify traditional use plant species and locations. (Cultural Action #4)	BLM	1 workmonth	Medium	2000
Create a partnership education program with the University of Arizona, Arizona State University, Northern Arizona University, and/or other accredited institutions, to facilitate archaeological and anthropological research in the planning area. *(This is BLM support for research activities including providing maps, permits, and assisting in securing grants for data collection and research)* (Cultural Action #5)	BLM/participating institutions	1-2 workmonths	Medium	2002
Erect fences around specified cultural properties within areas grazed by livestock to keep livestock from degrading the property by trampling and/or consuming traditional use plants. (Cultural Action #6).	Note: Cultural Actions 6 and 7 are mitigation for grazing and burning activities.			As needed
Protect known cultural properties from fire damage by pre-treatment such as black-lining around the property. (Cultural Action #7).				As needed

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Post signs along the boundary of the Redfield Canyon Wilderness as follows: one sign (carsonite post) per 1/4 mile along the Jackson Cabin Road corridor, one sign (carsonite post) on each side of the Redfield Canyon bottom at the wilderness boundary and carsonite post signs in other locations along the boundary which are used as access points. Place one larger wilderness sign at the southern Redfield Canyon Wilderness boundary where it first intersects the Jackson Cabin Road. (Wilderness Action #1)	BLM	$200 includes cost of replacements	High	1999
Redevelop and maintain the upper and lower Redfield Canyon (Coati and Two-holer) wildlife catchments as necessary. (Wilderness Action #3)	BLM/AZGFD	Unknown	Low	As needed
Maintain the following fences in wilderness: Coordinate with the Forest Service to maintain the existing forest boundary fence in T11S, R20E, Section 26, one-half mile	FS, BLM, TNC			As needed
Attempt to acquire private and state land inholdings within wilderness as identified in the Safford District RMP. (Wilderness Action #5)	BLM	unknown	Medium	N/A--do as opportunities arise
Post signs on the Jackson Cabin Road and the Soza Mesa Road Complex identifying them as limited use areas where motorized vehicles must stay on existing roads. (Social Env. Action #1)	BLM	$200 (includes replacement)	Medium	2000

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Post signs on the Pipeline Road identifying it as open to administrative use only and closed to public use. Place locked gates and public walk-throughs on the closed portion (east end at Jackson Cabin Road and west end at Soza Mesa boundary fence). (Social Env. Action #3)	BLM	$1000	High	2000
Develop pull-outs for parking and vehicle turn-around along the Jackson Cabin Road at: Pipeline crossing Bass Canyon Between Bass Canyon and Browning turn-off Scenic Vista Trailhead near Pride Ranch Southern Wilderness boundary Swamp Springs Canyon Sycamore Canyon the Saddle above Jackson Cabin (Social Env. Action #4)	BLM	Do in conjunction with next road maintenance so cost would be included with road maintenance.	Low	2002
Develop informational brochures and maps (include emphasis on low-impact camping techniques) (Riparian Action #8 & Social Env. Action #5)	TNC/BLM/FS	$2000	Medium	2000
Place an informational kiosk at the beginning of the Jackson Cabin Road (Social Env. Action #6)	BLM/TNC/FS	$1500	Medium	2002

Management Action	Organizational Contribution	Total Cost Estimate	Priority	Estimated Completion Date
Develop visitor sign-in station on Soza Mesa to gather information on visitor numbers and activities. (Social Env. Action #7)	BLM	$400	Low	2007
Maintain hunting opportunities on public lands and provide improved hunting opportunities on TNC deeded land (Social Env. Action #8)	AGFD/BLM/ TNC	N/A	High	N/A
Pursue legal access over the following existing roads through acquisition of rights-of-way or easements by cooperative agreement, purchase, or donation: Jackson Cabin Road (public) T. 12 S., R. 20 E., Secs. 11, 12, 13; T. 12 S., R. 21 E., Secs. 19, 30, 31; T. 13 S., R. 21 E., Secs. 5, 6. Muleshoe Pipeline Road (administrative use only) T. 12 S., R. 21 E., Sec. 31. Cherry Springs Canyon Road (public) T. 12 S., R. 20 E., Secs. 4, 9. (Social Env. Action #9)	BLM	unknown	Medium	N/A--as opportunities arise.
Maintain Jackson Cabin Road and Soza Mesa Road to four-wheel drive standard with minimal maintenance on an as-needed basis. Ensure that road maintenance activities in riparian areas are designed to minimize impacts to riparian areas. (Riparian Action #13 and Social Env. Action #10)	BLM	$350/mile	Medium	N/A--as needed.

Muleshoe Ecosystem Management Plan

Monitoring Schedule

Monitoring Task	Organizational Contribution	Timeframe	Workdays
Measure stream flows at Upper Hot Springs Lower Hot Springs Bass Canyon Wildcat Canyon Redfield Canyon (Riparian Monitoring #1)	 TNC BLM TNC TNC BLM	quarterly, more often if conditions warrant.	1
If stream gauges are installed, collect and download stream gauge data and service gauges each month to support instream flow water rights. (Riparian Monitoring #2)	BLM TNC	monthly	2
Monitor riparian vegetation(include density of woody riparian trees by age class and species, width and vegetation cover types of riparian ecological sites, bank stability, and cover of key herbaceous species.) (Riparian Monitoring #3 and #9)	BLM/TNC	minimum of once every 5 years during Apr-Jun. More frequent monitoring will occur if indicated by photo points or following major flood events or fires.	10
Retake photopoints within the key riparian sites (Riparian Monitoring #4)	BLM/TNC	annually.	3
If established, the surveyed cross sections will be measured a minimum of every five years. (Riparian Monitoring #5)			
Retake low-level aerial photos (Riparian Monitoring #6)	BLM	every 5 years.	

Monitoring Task	Organizational Contribution	Timeframe	Workdays
Monitor aquatic habitat (level III) (Riparian Monitoring #7)	TNC/BLM	Minimum of once every five years, more often if indicated by field review	10
Monitor fish (Riparian Monitoring #8)	TNC/BLM/ AGFD	annually (Oct-Nov)	12-15
Conduct winter stick nest surveys (Bass, Double R, Hot Springs, Redfield, Wildcat and Swamp Springs canyons). (Riparian Monitoring #10)	BLM (volunteers)	One time during Jan-Feb to establish baseline data. Then every 5 years for trend.	5
Conduct raptor nest surveys (Bass, Double R, Hot Springs, Redfield, Wildcat and Swamp Springs canyons). (Riparian Monitoring #10)	BLM (volunteers)	One time during mid-May and again in late June of the same year to establish baseline data. Then every 5 years for trend.	10
Conduct special status avian species surveys (such as yellow-billed cuckoo and southwestern willow flycatcher) (Riparian Monitoring #10)	BLM	annually (June)	5
Read avian transects in Bass Canyon (Riparian Monitoring #10)	BLM	twice per month from Apr-Aug annually for 2 years to establish baseline data. Then every 5 years for trend	15
Upland Vegetation Monitoring Livestock Monitoring: Trend studies Utilization (Key Areas) Fire Monitoring Transects (Upland Monitoring #1)	 BLM/lessees TNC/BLM	 every 5 years After grazing as needed 2 years pre-burn, 1st year after burn and then every 5 years	 Variable Variable Variable

Monitoring Task	Organizational Contribution	Timeframe	Workdays
Obtain annual trend data(deer, javelina and bighorn sheep) (Fish and Wildlife Monitoring #1)	AGFD	annually	Variable
Conduct ground surveys for wildlife(deer and javelina) (Fish and Wildlife Monitoring #2)	AGFD	annually	Variable
Evaluate wilderness/recreation use by analysis of visitor sign-in sheets (Wilderness and Social Env. Monitoring #1)	CMA partners	at annual coordination meeting	2
Conduct road patrols (Wilderness and Social Env. Monitoring #1)	BLM	Variable, as staff are in area.	Variable

X. COMMENT LETTERS AND RESPONSES

Due to the current interpretation of The Privacy Act of 1974, 5 U.S.C. sec. 552a (1994) (amended 1996, 5 U.S.C.A. section 552a), the personal identifiers (names and addresses) of private citizens have not been published in this document.

1

November 24, 1995

United States Department of the Interior
Bureau of Land Management
Tucson Resource Area Office
12661 E. Broadway Blvd.
Tucson, Arizona 85748

Attention: Karen Simms

Dear Ms. Simms:

The following comments refer to the Redfield watershed portion of the Muleshoe Ecosystem Management Plan and Environmental Assessment. (Ben Pride Ranch area) Original

1-1 names should be used to preserve historical accuracy. This is not being done.

On page seven the statement "the amount of bare soil subject to erosion is rather small" is erroneous. In recent years shrub species have invaded the upper Redfield watershed.

1-2 Under the shrub canopy there is little to no ground cover of grass and forb species. The existing grasses are becoming decadent due to lack of harvesting by animals. Also, there is a large amount of snake weed which does little to improve water holding capacity of soil and competes with desirable plant species.

There is virtually no organic material being incorporated into the soil by hooved animals such as deer, javalina, domes-

1-3 tic livestock, etc. With the lack of hoof action and organic incorporation an impermeable seal forms in the top portion of the soil. Any decaying plant material on the soil is washed away on this steeply sloped watershed. Thus, ribbon erosion quickly starts and accelerates into mass erosion and floodings during heavy rainstorms. Stream beds are scoured by the fast runoff. There is virtually little water left for perennial stream flow and for fish and wildlife.

Page 13 states that the suspension of livestock use has

1-4 restored proper riparian function. The planning team members who took the horseback tour of the upper Redfield Canyon observed no perennial water and agreed that the stream bed is continuing to erode and has poor bank stability. Now most of the Redfield Canyon is dry through much of the year.

Historically the upper Redfield Canyon was a continuous perennial stream and during cool and wet seasons it continuously flowed by Redington into the San Pedro River. In 1906 the Bayless and Berkalew Co. dug a small ditch to maintain excess flow of water that was not being used for irrigation and direct it in a straight line to the San Pedro River. In recent times this ditch has turned into a huge dry flood channel that becomes more enlarged during each rainy season.

1-5 On page eight there is no mention of turbidity in peak flood seasons nor sediment deposits and flood damage to downstream property and the liability this creates for the upper watershed landowners and managers.

1-6 Other than creating a few waters there are no plans to manage the wildlife in this management area. The large herds of deer and javalina are now nonexistent. The numbers are

1-7 low because of change of habitat, short supply of water, heavy hunting pressure and large amounts of predator depredation. The predator balance is totally out of control. When the food chain is diminished the larger carnivores subsist on livestock and other animals outside the management area. Also, there are only a fraction of the number of birds that once inhabited the canyon.

The upper Redfield watershed could be a national treasure if managed properly, but as of now it is a national disgrace.

1-8 Without the help of animal hoof action to break up the soil crust and terrace steep slopes, fire management as a single tool will certainly increase erosion and reduce water quality and perennial stream flow.

The technology is there. Throughout the southwest there are hundreds of examples of returning small watersheds similar to pre 1880 conditions through hard work and simple management practices. One should look at some of the neighboring ranches to see what they have done. Studies are important, but experience is the best teacher.

I have observed the upper Redfield Canyon watershed since 1951 and hold a degree in Watershed/Range Management from the University of Arizona.

Sincerely,

2

October 27, 1996

RECEIVED

OCT 3 0 1996

BLM - TUCSON R.A.
TUCSON, ARIZONA

Jesse Juen
BLM Tucson Field Office
12661 E. Broadway Road
Tucson, AZ 85748

Dear Mr. Juen,

I am writing to submit comments on your draft management plan and accompanying environmental assessment (EA) for the Muleshoe Ecosystem.

In general, I am pleased by the document's reliance on science and the absence of

2-1 HRM type nonsense. I like the lengthy list of literature cited too. (However, on page 100 of the draft you cite a 1963 article by Rich and Reynolds but it's not on the list. Can you please identify it further?)

I support your proposal to prohibit livestock grazing in the Muleshoe's riparian areas.

2-2 (I especially appreciate your admission that the tactic of limiting grazing in riparian areas to the cool season is insufficient to protect them from livestock damage.) I also support your plan to prohibit the resumption of grazing on areas adjacent to the riparian areas until the fencing necessary to separate them is constructed.

All too often federal land managers have permitted livestock grazing without adequate livestock management. On page 96 of the draft it's explained that a cool season only grazing system for the Soza Mesa grazing allotment was dropped from consideration because the lessee is currently running a year long grazing operation. Why was year long

2-3 grazing allowed when grazing was permitted to resume on this allotment in 1992? Also, on page 55 of the draft the inadequacy of the Soza Mesa allotment's current grazing system is documented, while on page 54, a plan to improve livestock management on the allotment is outlined. Why was grazing allowed to resume without, at least, a management plan adequate for a year long grazing scheme? I support your proposal to implement improved livestock management on the Soza Mesa allotment but I don't understand why the cattle were permitted to return before one was in place.

This brings me to the issue of your proposal to allow grazing to eventually resume

2-4 on a portion of the Muleshoe allotment, an area you have dubbed the Pride Basin grazing allotment. On page 26 of the draft you explain the lands in the Pride Basin were determined to be suitable for grazing based upon Safford District Instruction Memorandum #AZ-040-93-07, *Rangeland Suitability for Livestock Grazing*. But it appears the only criteria used were whether or not a cow is able to access a particular plot of land. Your legal obligation to assess the suitability of the land for livestock grazing means you should determine "if" the land should be grazed, not just "can" it be grazed. There should be more factors included in the decision process than the accessibility of the land to livestock. (Please send me a copy of the memorandum.)

2-5 The plan's accompanying EA only analyzes two management alternatives. I think NEPA demands more. You could add another alternative and more fully address the issue of grazing suitability if you include a no grazing alternative in the EA.

2-6 You propose that grazing will not be allowed to resume on the Pride Basin allotment until the fences and watering sites necessary to adequately manage cattle there are constructed. What priority will the funding for these things have with your agency? Will you spend money on them when there are other allotments, already being grazed, with resource problems that need attention?

2-7 Additionally, the draft says grazing will not be allowed to resume in Pride Basin until the upland vegetation objective is achieved. How will this be decided and who will make the decision?

2-8 Furthermore, many of the range "improvements" proposed for the Pride Basin allotment would be constructed within federally designated wilderness. I believe this would violate the Wilderness Act and the subsequent Congressional Grazing Guidelines (House Report 96-617) relating to the construction of livestock management devices, such as fences and watering sites, in wilderness areas. These guidelines state "the construction of new improvements should be primarily for the purpose of resource protection and the more effective management of these resources rather than to accommodate increased numbers of livestock."

In the case of the proposed Pride Basin allotment, 2600 acres of the allotment, according to the EA, are within the Redfield Canyon Wilderness. There is currently no grazing permitted there, nor are there any functioning livestock fences or watering sites. The construction of the proposed livestock management devices in the wilderness would be for the purpose of accommodating increased livestock numbers there, which would be a violation of the guidelines cited above.

2-9 Finally, I would like to know if your agency has complied with the Clean Water Act and procured the Section 401 permit required for you to be able to authorize livestock grazing in this area?

2-10 I support your proposal to restore the natural fire regime to the Muleshoe. But I have a question about livestock management in recently burned areas. How long will cattle be prohibited from entering burned areas?

2-11 I also support your proposals to introduce more wildlife species to the area, to remove disruptive non-native species, to fence livestock out of sensitive cultural sites, and to try and acquire private and state inholdings.

Thank you for this opportunity to participate and please keep me updated on the status of this project. Thank you.

Sincerely,

3

November 4, 1996

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BLM - TUCSON F.A.
TUCSON, ARIZONA

Jesse J. Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, AZ 85748

Re: The Draft Muleshoe Ecosystem management Plan and Environmental Assessment

Dear Mr. Juen:

I compliment the interdisciplinary team of resource specialists that put this draft together. Obviously much thought and effort went into it. I have a few concerns with the plan and/or some of the options as follows:

3-1 1. Due to the criticality of the Muleshoe ecosystem as special habitat, is totally inappropriate to consider routing the Great Western Trail through the Muleshoe ecosystem. Negative impacts from OHV's to the types of wildlife in this ecosystem is well documented. There has to be a route for this trail through other lands with far less impact to special species and habitat.

3-2 2. All public lands on the Muleshoe ecosystem should be closed to mineral entry. Again this ecosystem is just too important to allow mining which can only be detrimental to this special area. The time to stop this potential damage is now at this planning cycle. A considerable investment of public and private dollars will be spent to implement this plan. There is absolutely no justification to sacrifice this investment for a mining venture.

3-3 3. I would suggest exchanging some conservation easements on BLM land (that precludes grazing) in exchange for public access across private TNC lands.

4. I do not have a problem with the grazing plans for the Soza Wash and Soza Mesa Allotments (except for the fact that it will cost the public far more for range improvements than ever will be recovered in grazing fees.)

3-4 5. I do have a problem with resuming grazing on the Pride Allotment where a think fire should be the planning tool of choice. I suspect the resumption of grazing on this allotment is a political choice, not a best biology choice. This suspicion is substantiated by your document (pg. 102, par. 4) which states "direct physical destruction of avian nests due to cattle use would be eliminated until grazing resumed (Tibbets et al. 1994.)" I see no reason why you should resume the destruction of avian nests on this allotment with grazing again. This would be a good allotment to exchange a non-grazing conservation easement with TNC for public access on through their private roads to public lands. 3-5

Thanks for your consideration of the above.

Sincerely,

4

9 Nov 96

Dear Mr. Juen,

Thank you for the opportunity to review your very fine Muleshoe Ecosystem Management Plan. I have visited the area and consider it one of the jewels of Cochise County. Also, please thank Karan Simms for explaining some aspects of the plan to me over the phone.

My review and analysis methodology:

I found the core of the plan showing objectives, management actions to address the objectives, and the monitoring framework to insure objectives are met. I then matched each objective with the appropriate management actions and monitoring schemes to judge the effectiveness and completeness of the plan elements. I then drew mental conclusions (not reported here) and made written suggestions for improvement (reported below).

General comments:

I read but did not study the Environmental Assessment. I concluded early on that it should be intuitively obvious to any casual reader that your plan will result in an enhancement of the environment. Therefore, I agree with you in your "Finding of No Significant Impact". I scanned Sections I, II, III, IX, Appendices, Literature Cited, and the Lists of Figures and Tables.

4-1 I was unable to use the Table of Contents since the page numbers were incorrect. Sections V (Issues) and VI (Vision and Goals) did not seem to cover all aspects of the six objectives; however, the Executive Summary was succinct and complete. Of course, the most valuable portions of the Plan were Sections IV, VII, and VIII which were the principal targets of my analysis. I referred frequently to the Glossary.

Specific Comments:

Objectives 1a and 1b:

The following management actions appear to directly address the subobjectives 1a and 1b: 4, 6, 11, and 12. Since the subobjectives are "to increase tree densities; maintain sapling to tree ratios, and to maintain specific woody species," removing non-native vegetation, eliminating livestock and prohibiting commercial plant collection and wood cutting may not be enough.

4-2 Suggest: A management action be added: Plant new trees and replant specific desired species.

Objective 1c: The following management actions appear to directly address the subobjective: 1, 2, and 14. Since the subobjective is to "provide a diversity of aquatic habitats", 1, 2, and 14 may not be enough. Suggest: A management action

4-3 be added: Construct retention dams where soil permits to create pools which can be stocked with new native fish species.

4-4 Objective 2: The proposed management actions and monitoring scheme appear to adequately address the objective. The proposed "grazing treatment" in the monitoring plan is a wise move.

4-5 Objective 3: This objective appears to be open ended and insufficiently definitive. No matter what species are currently present, the ultimate restoration of water and vegetation under objectives 1 and 2 will determine the extent to which species can be re-established, extended or supplemented. For me, the management action sequence should be: Inventory the expected critical habitats after much of objectives 1 and 2 are underway; determine candidate species for those habitats; and, then inventory existing species and recommend which can be feasibly re-established extended, and/or supplemented. Suggest: Those management actions cited above be added to the plan; omit any list of species (and "incomplete list" is suspect); and, rewrite management actions 1a, 1b, and 1c to reflect the suggested sequence. Finally, include a reference to Appendix 6 in the Fish and Wildlife objective monitoring plan (page 58).

4-6 Objective 4: Proposed management actions and monitoring scheme appear to adequately address the objective. The partnership education program is particularly noteworthy.

Objective 5: Proposed management actions and monitoring scheme appear to adequately address the objective. The use of solar electric pumps on the wells and the continued efforts to acquire wilderness inholdings are desireable highlights of the management actions cited.

4-7 Objective 6. Proposed management actions and monitoring scheme appear to adequately address the objective. In Figure 11 (page 64), it is not apparent where Zones 1 & 2 are located (reference upper left corner of text on page 63, "...recreational experience in zones 1 and 2"). Finally, suggest the aerial surveys described in objective 3 also include data gathering for objective 6. In this way, monthly patrols will be supplemented by monitoring off-road vehicle use from the air.

I shall keep a copy of this letter should anyone of your staff wishes to consult with me on my comments. Telephone: 520-378-3650.

Sincerely,

5

SOCIETY FOR ENVIRONMENTAL TRUTH

5535 E. Rosewood St.
Tucson, AZ 85711

Phone: 520/519-0430
Fax: 520/519-0433

December 2, 1996

Mr. Jesse Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 East Broadway
Tucson, AZ 85748

Dear Mr. Juen,

Thank you for sending to us for review and comments a copy of the draft Muleshoe Ecosystem Management Plan and Environmental Assessment. It is obvious that a great deal of work has been put into preparing the report.

There are a great many comments regarding the report but we will limit that portion of this letter to just a few. Most striking to us are these:

5-1 • There is no clear indication by way of a map of the boundaries of the "Ecosystem" you are defining; nor is there a map showing the areas by ownership. We are particularly interested in the area on which you have issued a "non-use" lease to TNC.

5-2 • There is no description of how you intend to restore the wells on the BLM leased land which have been neglected by the lessees.

5-3 • There is no description of the condition and population of wildlife on the leased land in comparison with surrounding ranch lands.

5-4 • In your discussion of density of woody species in riparian areas (see Tables 3-5 to 3-7), the assumption is made that a greater density of saplings is desirable. That assumption is highly debatable. These data do not really reveal any great improvement in the woody vegetation from the exclusion of livestock.

5-5 • There is no discussion of the economics involved. For example, what are you being paid for your non-use leased land? What income can be expected from grazing? What are plans for recreational facilities and what are the costs?

These are just a few of many similar observations that could be made concerning the deficiencies of the draft. Hopefully, they will be corrected as you progress through the draft stage.

Dedicated To Responsible Resource Management

5-6 There is, however, one part of your report which must be cause for considerable concern. It is that part at the end of the report that states that the implementation of the plan will have no significant impact on the environment and that an Environmental Impact Statement is not required. On this point, we strongly disagree. If the plan has no significant impact on the environment on the Muleshoe, why in the world have you gone to all of the work, time, trouble and expense of preparing the plan and this document? To say it has no significant impact requires a gigantic stretch of the imagination to beyond credibility.

This is a matter about which we feel very strongly. As you well know the National Environmental Policy Act requires you to prepare an EIS. With an area of this magnitude and the complexity of what you propose, this is, we consider, an absolute necessity.

To emphasize the point, this letter will serve to formally notify you that unless you advise us prior to the end of the year, that you will be preparing a formal Environmental Impact Statement for the plan, we will be filing in federal district court for a restraining order prohibiting you from implementing the plan until such time as the EIS is prepared and it has gone through the formal hearing process.

If you care to discuss this further, I can be reached at the numbers on the letterhead.

Sincerely,

R. S. Bennett
Executive Director

cc: Ed Kahn
Attorney-at-Law

6

December 1, 1996

Jesse Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, AZ 85748

Dear Jesse:

I would like to congratulate the Tucson Field Office for producing an excellent plan for the Muleshoe. It does what, in my opinion, ecosystem management is meant to do: rather than analyze projects separately, as they are proposed for an area, "ecosystem management" broadens the scope of analysis, looking first at the geographic area as a whole and its ecological condition (the consequence, as the plan points out, of past disturbances and human activities), postulates what is required to restore (or maintain) proper functioning and biodiversity, and only then authorizes appropriate human uses. The Muleshoe plan seems to rest on the belief, which I share, that the health of the system must come before the interests of people (that the two are actually the same we often, in our pursuit of short term goals, forget). I'd like to believe this philosophy is a trend in natural resource management.

6-1 Nowhere is this guiding assumption more evident than in the handling of livestock grazing. The Plan eliminates grazing in all riparian areas and anticipates criticisms in its reasoned rejection of winter grazing and riparian pastures. Although the Field Office believes grazing in the uplands is compatible with a healthy landscape, the Plan withholds authorization of grazing there until upland health has been restored (as shown, I hope, by rigorous monitoring). These are bold decisions that are well justified. Unlike many "ecosystem management" plans I have seen, this is not a grazing plan in disguise.

The analysis of upland vegetation dynamics utilizes the latest science. The prescribed fire plan, along with the suspension of grazing, should allow native grasses to become established once again. Restoration will be abetted by closing roads and limiting recreational use where necessary. I trust the prescriptions will be flexible enough to allow for modifications in strategy should changes in vegetation not occur as hoped.

I can find little to quibble about. Just a few points.

6-2 Although the plan is touted as a joint effort with the Forest Service, there is no ecological data for the Galiuro Wilderness comparable to that which is offered by the BLM for the Muleshoe. One gets no sense from this document that the BLM and Forest Service worked together on this plan. Are the two areas of jurisdiction comparable in terms of biotic communities and wildlife? Do the respective areas differ in vegetation composition and abundance and ground cover (ie. watershed condition)? Are certain wildlife species more or less abundant in one of the jurisdictions? Is the connection between Forest and BLM land seamless, so that the movements of animals from north to south are not impeded in any way? Are there any issues which the two agencies must work together to resolve?

****

6-3 The Pride Basin Allotment has apparently been created as a result of a Suitability study (1994), a study that assesses areas "unsuitable" for grazing. Unsuitable areas are defined as those that are inaccessible to cattle, areas with slopes over 50% or where "usable forage is less than two cattle yearlong per section". The Pride Basin allotment was formed because the land that comprises it was not found "unsuitable" for grazing. Is this sufficient reason to initiate grazing? Surely not every place that can be grazed, should be.

In assessing the possibility of grazing the uplands, the Field Office used not only "Suitability" but what it called "compatability" criteria, defined as "limitations on livestock to meet the various objectives for the area". How was "compatability" measured?

6-4 Has the Field Office analyzed whether grazing this area might interfere with the objective of "maintain[ing] amd enhanc[ing] the diversity of native fish and wildlife species of the Muleshoe ecosystem?" The Plan acknowledges that the flat, open upland terrain of the Pride Basin is uncommon in the planning area. Is this region of special value to non-riparian wildlife species (rodents, herps, ground-nesting birds, mammalian and avian predators, etc.)? If so, how will the resumption of cattle grazing effect these species? Will the movements of animals between the riparian areas, say between Bass and Redfield Canyons, be hindered by livestock and/or livestock developments?

****

6-5 What I like about this plan is its attempt to restore natural processes (such as fire and flooding) to the area, and its willingness to limit human activities that threaten these processes. In this regard one activity sanctioned by the plan seems out of place: artificial waters for wildlife.

The Plan mentions no loss of historical watering sites for wildlife over the years. No fragmentation of habitat has

prevented animals from reaching natural seeps, springs or streams. No statistics are provided on bighorn populations to indicate their populations are down or, if they are down, that it has anything to do with water. In any case, local extinction and recolonization of populations are natural processes as much as fire. Are bighorn populations in the Galiuros so isolated that if one group died out, the site would not be recolonized by another group? Is there any indication that the bighorn herd is not viable and requires our help?

6-5

It looks to me like the construction of artificial waters is intended, not to ensure the viability of the bighorn population, but to increase bighorn numbers for human recreation. Why else would money be spent to artificially bolster populations of game animals? This is acknowledged on page 102:

> "Augmentation of existing populations or establishment of new populations of game species will expand hunting opportunities and/or help prevent local extirpation of less stable populations. Many of these species represent elements of the ecosystem that are underrepresented or missing."

6-6

This paragraph requires some explanation. Which populations, of which species, are considered "less stable"? Is there any evidence that bighorn (or turkey!) numbers are plummeting? Are there other species that are "underrepresented or missing"?

I would like to quote from a Forest Service document that I consider one of the best on Ecosystem Management.

> "Ecosystem management is intended to allow normal fluctuations in populations that could have occurred naturally. It should promote biological diversity and provide for habitat complexity and functions necessary for diversity to prosper. It should not be a goal to maintain all present levels of animal populations or to maximize biodiversity."
> (An Ecological Approach to Ecosystem Management, General Technical Report RM-246)

6-7

The Plan rationalizes the upkeep of artificial waters by declaring that the

> "Maintenance of livestock and wildlife waters will benefit wildlife populations, especially those now dependent upon availability of developed waters for their continued survival." 102

Artificial waters, it is claimed, will "benefit" wildlife: does "benefit" mean increasing their populations beyond the natural carrying capacity? Is this really a benefit for the species? Or for the system? Might there be ramifications through the

6-7

community which we fail to notice? One other point: do we have the right to create dependencies which future generations may fail to honor?

6-8

I understand that enhancement of certain wildlife populations to increase hunting opportunities is considered a legitimate activity. Perhaps the regulation of it is beyond the scope of the BLM's authority in any case. Still, I am disappointed that such traditional management, with humans as the primary beneficiaries, made it into a plan that is attempting to restore natural processes to an ecosystem. Especially in Wilderness, such manipulations have no place.

I hasten to add that these are relatively minor criticisms. Overall, I think this plan retains the right balance of intervention and letting be.

I thank you for the opportunity to participate in the planning process.

Sincerely,

7

The Phoenix Zoo

455 North Galvin Parkway in Papago Park
Phoenix, Arizona 85008-3431
Phone 602.273.1341
Facsimile 602.273.7078

November 27, 1996

Mr. Jesse J. Juen
BLM Tucson Resource Area
12661 E. Broadway
Tucson, AZ 85643

Dear Mr. Juen & Involved Staff:

I have reviewed scores of management plans and environmental assessments over the years and find your September 1996 Draft for the Muleshoe to be one of the most ecologically thoughtful and comprehensive I have ever read.

7-1 In particular, I would like to compliment you on orientation. It is evident that your intention is to preserve natural process and thus conserve self-sustaining biotic systems that are diverse in complexion. The health of the land and the ecology residing there are treated as a necessary foundation that must be secured to support other uses dependent upon a healthy environment, Your organization, which considers abiotic as well as biotic resources at the watershed level, is to be complimented.

7-2 In most instances, you indicate a plan for biotic restoration and you subordinate human, social, and economic use to the health of the land. It is not always evident how you will monitor and determine system functioning, nor it is clear as to how you will set priorities and limits on environmental loads, whether consumptive or recreational.

7-3 With regard to mineral resources, is it the plan's intention to insist that mineral exploitation, when and if it occurs, will be subject to lifecycle accountability? No mining operation should be allowed where it adversely affects aquatic resources, or where it is not evident when, how, and at what cost to whom, complete landscape restoration will occur. Landscape restoration should include the support systems for a fully functioning and healthy ecosystem that mirrors the one present in the absence of the mineral extraction.

7-4 In fact, you are encouraged to consider as a fundamental principle the subordination of all exotic activity and/or elimination of activities that do not complement bonafied ecological processes.

7-5 In your comments on reintroductions, and in particular the wolf, you defer to the EIS process. Without regard to that stipulation, would it not advance the ecological health of the Muleshoe and ultimately add value to the resource to encourage the reintroduction of extirpated species? Please consider creating conditions conducive to program functioning of native systems by both aggressively seeking and restoring species diversity in part by displacing exotics that might inhibit or negatively compete with historic members of the biotic community.

7-6 A minor observation is that your index does not conform to your page numbers and heading references.

These are a variety of minor points that can be discussed, but in large this is an excellent effort to manage to system health, and thus protect the public asset.

Thank you for placing the health of the land in priority during your evaluation and for considering how to manage our activity to preserve that health.

Sincerely,

Jeff Williamson
Executive Director

JW/an

8

ARIZONA DESERT BIGHORN SHEEP SOCIETY, INC.

P.O. Drawer 7545 • Phoenix, Arizona 85011

(602) 912-5300 • FAX (602) 957-4828

November 25, 1996

Mr. Jesse J. Juen, Field Manager
Tucson Field Office
Bureau of Land Management
12661 E. Broadway
Tucson, AZ 85748

RE: Draft Muleshoe Ecosystem Management Plan and Environmental Assessment

Dear Mr. Juen:

The Arizona Desert Bighorn Sheep Society, Inc. (ADBSS) reviewed the above referenced document and wishes to provide our views and comments. Please include these comments as part of the official public record.

The ADBSS is a wildlife conservation organization dedicated to promoting the well being of bighorn sheep and bighorn sheep habitat in Arizona. As such, we have been involved in bighorn sheep transplants and waterhole developments statewide including the Muleshoe Cooperative Management Area.

The ADBSS feels three of the OBJECTIVES/MANAGEMENT ACTIONS identified in the draft plan have the ability to affect our interests the most. Those are Fish and Wildlife Population Management, Wilderness Management, and Management of Social Environment.

8-1 Under Fish and Wildlife Population Management Objective 3, proposed management actions 1.a, 1.b, and 1.c all relate to assessing habitat needs, population status, and supplementation for bighorn sheep and other species. Since the ADBSS was involved in the first bighorn sheep transplant into the Muleshoe Cooperative Management Area, even before there was such a designation, we would support any efforts to maintain a viable bighorn sheep population in that area should a need arise. We believe the coordination protocol outlined in your management action will serve the needs for successful supplement efforts if and when they are needed.

8-2 Proposed management action 4 under the Fish and Wildlife Population Management Actions addresses an inventory of wildlife water sources. The ADBSS supports the rationale for inventory, maintenance scheduling, and additional water determination for this action.

8-2 Under Wilderness Management Objective 3, proposed management action 3 relates to wildlife monitoring flights, wildlife water needs assessment, and redevelopment of the two Coati wildlife waters using aircraft.

8-3 The ADBSS recommends the addition of wildlife surveys using aircrafts to wildlife monitoring using aircraft. Monitoring connotes locating marked or collared animals as part of a research project. Surveying connotes locating all animals, marked or unmarked, for gathering information such as population numbers, age class, and sex ratios for management and harvest purposes. Both surveying and monitoring are important to wildlife management activities. We feel strongly that surveys by aircraft need to be identified as a stand alone management action in the final plan.

8-4 The ADBSS recommends that in addition to the use of helicopters for inspection, redevelopment, maintenance, and new construction of wildlife waters, motor powered tools be added as equipment needed to successfully, safely, and economically accomplish the objective. Our rationale for this addition is that motor powered tools have been allowed for these purposes in other BLM wilderness Management Plans in Arizona, and we feel they will pass the minimum tool test in the Muleshoe Cooperative Management Area.

8-5 Under Management of Social Environment Objective 6 management action 8 relates to maintaining hunting opportunities on public lands. The ADBSS strongly supports this management action and feels it will not conflict with any of the plan's resource-based management actions. It is important that hunting be identified as a legitimate use of public lands.

8-6 We feel the draft plan was incomplete because no information was presented in Chapter IX regarding plan implementation and cost estimates. You have outlined a very detailed and comprehensive monitoring component in the draft plan. We appreciate the importance of monitoring in assessing if goals are attained. However, we question in today's world of government downsizing if the joint managers of the Muleshoe Cooperative Management Area will be able to achieve plan goals in the timelines indicated in the draft plan. Information in Chapter IX would help the public assess the agencies' commitment to achieving the plan goals.

8-7 The maps contained in the draft plan, such as figure 1, were of such poor quality it was difficult to determine land status. A better quality map would be more helpful.

Thank you for the opportunity to comment.

Sincerely,

Warren Leek

Warren Leek, President
Arizona Desert Bighorn Sheep Society, Inc.

9

Jesse Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, Arizona 85748

November 29, 1996

Dear Jesse:

I would like to thank you for the opportunity to comment on the Muleshoe Ecosystem Management Plan (the Plan) and Environmental Assessment. My comments will be presented from two perspectives: *one as the former preserve manager* for the Muleshoe Ranch with an intimate knowledge of the resources and intrisic values of the area in addition to an early role in the development of the Plan, *and two, as a permanent* downstream resident in the community of Cascabel concerned with water quality and the protection of the upper Hot Springs watershed.

First, I would like to commend the BLM as well as TNC and the other participants for the amount of background, inventorying, *research and cooperation evident* in this plan. A lot of attention was paid to detail and a large amount of information was synthesized in the Plan - no small task given the land area and diverse values *under consideration.*

9-1 The use of prescribed burning to restore grassland conditions from past abuses is a positive *idea I hope the BLM is committed* to implementing on the ground. The results from prescribed burning activities by TNC and BLM thusfar have proven to have a beneficial effect on this landscape. *This* activity is compatible with the State and Transition Grassland model developed by Dr. Rick Young.

9-2 I *am impressed* by the criteria applied to the allotment on page 26 to assess the suitability of livestock grazing. However, given the relatively small amount of land that does *meet the criteria for* suitability, I question the practicality of re-instituting livestock grazing at all on the Pride allotment, despite range conditions/potential and suitability for several reasons. First, prescribed burning is described in the Plan as the tool to be used to restore the uplands, not cattle. The rationale and focus of the grazing program on page 51 and 53 for grazing the *Pride allotment centers on the resting and* rotation of pastures in order for there to be enough litter build-up and herbaceous fuel to carry a fire. Therefore, the success of the fire program will depend on the *success of the* rest/rotation grazing system. Why add another component, i.e. grazing, to the system that may jeopardize the success of the fire program to restore these grasslands *to their natural or pre-grazing* condition? Overgrazing and fire suppression are the reasons why this landscape was reduced to shrubs and bare soils in the first place. From an *ecological standpoint, it* makes *no sense to institute* a token number of cows to such a fragile area for the sake of appeasing pro-consumptive interests. In addition, cattle would displace bighorn sheep, mule deer and *whitetailed deer from their prime forage* areas. Fire and precipation alone can achieve all of your ecological goals. There is no paleontological evidence whatsoever for this area that these grasslands *evolved under large herds* of herbivores, such as bison. The past 16 years of no grazing and prescribed burns have demonstrated that there is a high potential for recovery. Cattle were removed from the Muleshoe allotment in 1980, two years before TNC purchased it.

9-2

9-3

9-4 *From an economic* standpoint, it makes even less sense. It doesn't seem to be cost-effective when improvements, management and inaccessibility are all factored in. Moving cattle from *the headquarters to the* backcountry and vice versa will be no easy undertaking given the condition of Jackson Cabin Road.

9-5 Although grazing will have little or no impact on the riparian areas in the Pride allotment, it will greatly affect the enjoyment of the Muleshoe's *wilderness qualities by other users, namely* bird and wildlife watchers, hunters and backpackers. These users and their interests are far less impacting on the landscape than cattle grazing. *As a former preserve manager, I know* firsthand that the primary reason many people ventured into and enjoyed the backcountry was because of its wilderness-like values, i.e. no presence of livestock. One need only to speak to a few hunters or backpackers to confirm this.

9-6 Most importantly, grazing is being *proposed* in the Redfield Wilderness Area administered by the BLM. When this area was designated as wilderness in 1990, no grazing was occurring. Therefore, to allow grazing *in a wilderness area* would be contrary to the law since it was not occurring at the time of designation, nor was it an active allotment, but rather under suspended use for ecological reasons.

9-7 Active, well-managed grazing is already occurring on the Muleshoe ecosystem. They are well-suited to grazing management as per the criteria stated on page 26 of the Plan. There is no need to plug in grazing in suitable "pockets" just to adhere to a multiple-use ethic, if the

ecosystem is functioning fine without it - especially if it makes no economical sense to do so. In addition, in accordance with the multiple-use issue, no one use is to occur to the detriment of others, i.e. recreational and ecological considerations. Grazing would greatly impact the enjoyment of the backcountry by other users. These values, along with riparian and special species considerations far outnumber the sole issue of grazing a token number of cattle on a relatively small, yet important, component of the entire ecosystem. Permanent retirement of grazing on the Pride allotment would be an appropriate action given all of the other values that must, by law, be given equal, if not higher, consideration.

9-7

9-8

As a resident of Cascabel living along Hot Springs Wash, I care deeply about how the upper watershed is managed. Management actions taken on the Muleshoe *directly* affect my water quality, quantity and the severity of periodic flooding of Hot Springs Wash. The success of our riparian restoration efforts here in Hot Springs depend on the success of your riparian/ecological goals upstream.

9-9

Thank you again for the opportunity to comment on this Plan. I hope my comments are helpful. Again, I commend everyone on taking this monumental task this far. Congratulations and good luck.

Sincerely,

cc Tom Collins TNC

10

December 2, 1996

Jesse J. Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, Arizona 85748

Dear Mr. Juen:

10-1 Having just finished reading the Draft Muleshoe Ecosystem Management Plan and Environmental Assessment, I would like to congratulate the Tucson Field Office on a thorough and complete plan. I heartily endorse the plan and, for the record, wish to express my strong objection to all the alternatives considered. My primary concern is the natural ecosystem, and I believe the plan provides for its protection and recovery.

I do not feel the plan could be improved significantly, but I would like to make the following comments:

10-2 1. Although there is little likelihood that mineral resources will be found and developed, I believe mining in all forms should be specifically prohibited.

10-3 2. Seeding is a management action which may be necessary to prevent erosion, but the plan does not specify that only native species will be used. I am aware that native seeds are sometimes difficult to obtain and also that the U.S. Forest Service has used mixtures containing non-native seeds, including *Pennesetum ciliare* (buffle grass) and *Rhynchelytrum repens* (rose grass).

10-4 3. The plan calls for the removal of non-native plant (and animal) species if they threaten native species. The elimination of salt cedar should be undertaken as soon as possible before it becomes a serious problem. The plan does not indicate other non-native plant species of concern, and I believe they should

10-5 be identified and an assessment made of the necessity and efficacy of their removal. Red brome, for example, is highly detrimental to native species but probably could not be eliminated.

Again, I would like to say that the plan is outstanding and I strongly support its objectives.

Cordially,

Typographical Comments

It is always easier to proof some one else's work, and the editor in me couldn't resist looking at the plan with a writer's eye. I made no attempt to do a thorough job, but I noted the following:

10-6 1. Several common plant names not referenced in Appendix 5 are included. I found the following: false mesquite (*Calliandra eriophylla*), agave or, better yet, century plant (*Agave* spp.), fluff grass (*Erioneuron puchellum*), desert zinnia (*Zinnia acerosa*), sedges (*Carex/Cyperus* spp.), and rushes (*Juncus* spp.).

10-7 2. There are too many hyphens! It looks as if a lot of "hard hyphens" were inserted during an earlier draft. (See, for example, ¶2 of the "Upland Management" section on p. 93. Also, "bird of prey" (p. 103) is not hyphenate.

10-8 3. The lists in Appendix 5 would be easier to reference if they were alphabetical by common name.

10-9 4. In Table 8 (p. 47), under State-IV, "and" should be "an."

10-10 5. On p. 54, reference is made to the pasture alternation cycle for the Soza Mesa allotment but Table 11 is not mentioned.

10-11 6. The last item in the glossary, Accelerated Erosion, should, of course, be eliminated.

10-12 7. The page numbers in the Table of Contents do not correspond with the text.

I know, picky, picky, picky!

11

COCHISE COUNTY PLANNING DEPARTMENT
1415 W. MELODY LANE, BISBEE, ARIZONA 85603-3090
(520) 432-9450 / 9451
FAX 432-9429

RECEIVED
DEC 05 1996
BLM - TUCSON R.A.
TUCSON, ARIZONA

December 3, 1996

Mr. Jesse J. Juen
Field Manager
Bureau of Land Management
Tucson Field Office
12661 East Broadway
Tucson, Arizona 85748

Re: Draft Muleshoe Ecosystem Management Plan and Environmental Assessment

Dear Mr. Juen:

I would first like to thank you for soliciting our comments in the above regard. Before providing you with specific comments on the draft Plan, I will summarize the main issues evaluated in the document for those copied by this letter.

Background

The Executive Summary indicated that the Muleshoe Ecosystem is located in the Galiuro Mountains in southeastern Arizona within northern Cochise County and southern Graham County. The Ecosystem planning area encompasses the Muleshoe Cooperative Management Area (CMA) which is jointly managed by the Bureau of Land Management (BLM), Forest Service (FS) and The Nature Conservancy (TNC). The 57,500 acres comprise major portions of the Redfield, Hot Springs, and Cherry Springs watersheds. Included within the planning boundary are the Redfield Area of Critical Environmental Concern (ACEC) administered by the BLM, and a portion of the Galiuro Wilderness, administered by the FS.

The BLM brought together an interdisciplinary team of resource specialists from the BLM, Arizona Game and Fish Department, FS, TNC, Soza Mesa Ranch, Saguaro-Juniper Association, and Bayless and Berkalew Company to prepare a plan for the Muleshoe Ecosystem. The team members owned or managed land or resources within or adjacent to the Muleshoe Ecosystem and shared the common goal of restoring and enhancing the resources and ecological processes of the Muleshoe Ecosystem through cooperative effort.

Additional public participation came from an open house, scoping mailing, and several field trips.

If adopted, the Muleshoe Ecosystem Management Plan (EMP) will become the primary guide for management of all BLM administered public lands (including wilderness) within the Muleshoe Ecosystem. This plan also provides management guidance for TNC private lands within the CMA. Although the FS had already developed plans for the Galiuro Wilderness, their participation was important for achieving consistency in management of the two adjoining wilderness areas. The Muleshoe EMP includes interdisciplinary activity planning for the Redfield Canyon Wilderness, Hot Springs ACEC, Soza Mesa and Muleshoe Allotments, wildlife habitat, recreation and cultural resources.

Proposed Plan

The proposed plan action provides for the protection and enhancement of ecosystem resources, processes and function including riparian and upland vegetation, wildlife, wilderness, cultural and social environment values while allowing for compatible levels of use. Six resource objectives were developed by the planning team and management actions were prescribed to achieve them. A monitoring schedule was developed to track progress in achieving the objectives. Informal evaluations of the plan will be conducted annually and formal evaluations will be conducted at least every five years.

Comments

11-1 Planning Department staff has reviewed pertinent issues within the draft Plan and applauds the efforts of the BLM in bringing adjacent land owners and resource agency managers together in a cooperative effort to prepare this document. The Plan, through an ecosystem management approach, attempts to balance the needs of all of the users of the Muleshoe Ecosystem to ensure its overall sustainability into the foreseeable future. We therefore support the adoption of the draft Plan.

Again, thank you for soliciting our comments in this regard. If you have any questions on our comments, please contact me at 432-9450.

Sincerely,

James E. Vlahovich
Planning Director

cc: Board of Supervisors
Comprehensive Plan Update Committee

12

THE STATE OF ARIZONA

GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000

December 4, 1996

Mr. Jesse J. Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, AZ 85748

Re: Draft Muleshoe Ecosystem Management Plan and Environmental Assessment

Dear Mr. Juen:

The Arizona Game and Fish Department (Department) has reviewed the Draft Muleshoe Ecosystem Management Plan (EMP) and Environmental Assessment (EA), and the following page-specific comments are provided for your consideration during preparation of the final Muleshoe EMP.

12-1 **Pages i-iii, Table of Contents.** The page numbering for many sections of the EMP needs to be corrected.

12-2 **Page 22, Table 3.** This table displays outdated status designations. Recent changes by both the Department and the U.S. Fish and Wildlife Service are described in footnotes to the table. These important changes need to be more prominent, preferably by providing the current designations within the table and adding explanatory text to the first paragraph of Section G.

12-3 **Page 22, 1st Paragraph.** The bolded portion below was omitted from the EMP text. It should be added to complete the sentence.

> *In the western portion of the Muleshoe Ecosystem, the desert grasslands typical of most of the Muleshoe transitions into a Sonoran desertscrub community. **Wildlife species common to desert grasslands and desertscrub** (Mule deer, javelina, Gambel's quail, nectar-feeding bats) occur in this transition, or ecotone, area.*

12-4 **Page 37, Part VI. Vision and Goals.** The goals for Wilderness, Riparian, and Upland resources are included in the EMP. If it is not a planned omission, parallel goal statements for the other resources identified in Section VII of the EMP should be included.

12-5 **Page 45, #10, 3rd paragraph.** The EMP states that raptor surveys will be conducted in June to determine nesting success. Some species listed (i.e., red-tailed hawk, peregrine falcon) have often

fledged their young by June in Arizona. Mid- to late May surveys would be better for these species.

12-5 **Page 45, #10, 4th paragraph.** The EMP should state that willow flycatcher surveys will follow the revised standardized protocol (Marshal et al. in prep.). Also, yellow-billed cuckoos migrate through Arizona in early to mid-June. All surveys for this species should be conducted after 15 June to help determine summer residency status.

Page 46, 1st paragraph, last sentence. The EMP states that monitoring populations of cuckoos and willow flycatchers may help provide management information to prevent listing of these and similar species in the future. The Southwestern willow flycatcher is already listed as Endangered, under the Endangered Species Act.

12-6 **Page 57, Part VII, Section C, #1a.** In previous conversations, BLM personnel indicated the appropriate date was 2010.

12-7 **Page 57, Part VII, Section C, Rationale.** The reference to the status of Gila chub populations should be updated to reflect information in Weedman et al. (1996). A total of 24 populations of Gila chubs exist. Of these, nine are of unknown status (two were recently established), six are considered unstable and threatened, eight are considered stable but threatened, and one is considered stable and secure.

12-8 **Page 58, #3.** The parenthetical phrase (vegetation or wildlife) should be omitted. Additionally, the Rationale statement should not be limited to amphibians and fish. Removal of non-natives can, in some circumstances, be a beneficial action in the management of special status bird, reptile, and mammalian species.

12-9 **Page 60, Part VII, Section E, #3.** The text should be changed to reflect the potential for unplanned flights due to weather, equipment problems or emergency situations. The following revision is recommended:

> *The Arizona Game and Fish Department will notify the BLM in advance of scheduled flights and will coordinate flight days to minimize potential conflicts with visitors.*

12-10 **Page 73, Part IX.** This text appears to have captured only part of the Department's concern. The following should be included to fully address the concern.

> *Listing of a project in this Plan does not commit an agency to expend funds or manpower.*

12-11 **Page 70, Appendix 1.** Mike Holloran's name is misspelled.

The Department appreciates the opportunity to work closely with the Bureau throughout the development of the Muleshoe EMP. Many of our comments on earlier versions of the document have been incorporated into the draft EMP and we look forward to continued coordination and cooperation as a full resource management partner in development of the Final EMP.

If you have any questions regarding these comments or need any additional information, please do not hesitate to contact me at (602) 789-3604.

Sincerely,

David L. Walker
Project Evaluation Program Supervisor
Habitat Branch

DLW:dw

Literature Cited

Weedman, D.A., A.L. Girmendonk, and K.L. Young. 1996. Status of Gila Chub, *Gila intermidia*, in the United States and Mexico. Nongame and Endangered Wildlife Program technical Report 91. Arizona Game and Fish Department, Phoenix, Arizona.

13

FOREST GUARDIANS

Mr. Jesse Juen
Tucson Field Office
Bureau of Land Management
12661 East Broadway
Tucson, AZ 85748-4289

December 4, 1996

RE: Comments on the Muleshoe EA

Dear Mr. Juen:

I am writing to submit comments on your Muleshoe Ecosystem Management Plan and Environmental Assessment.

13-1 NEPA Concerns
The EA fails to comply with your legal obligation under the National Environmental Policy Act (NEPA) to consider a reasonable range of alternatives. Two alternatives does not constitute an adequate range of alternatives.

13-2 Suitability Issues
The suitability analysis that was completed as a part of the EA is a step in the right direction and deserves support. However the EA fails to fully comply with your legal obligation to assess the suitability of the land for livestock grazing. A true suitability assessment would disclose the environmental and economic costs and benefits of the proposal and determine not just if the area can be grazed, but whether it should be grazed in light of the other public values. As the EA indicates numerous riparian dependent species are associated with the perennial streams Assessing whether livestock grazing is an appropriate multiple use in light of your obligation to preserve the rare riparian-obligate species in these areas is critical.

13-3 Wilderness Act Concerns
Based on our review of the EA it appears that new "range improvements" on the proposed Pride allotment are within the Redfield Canyon Wilderness Area. Construction of new range improvements within the wilderness constitutes a violation of the Wilderness Act. Rather than re-open this area to

13-4 livestock grazing, the best solution seems to be to permanently retire the area from grazing and not allow for any new range improvements.

Clean Water Concerns
The decision to approve the permit in question also must also comply with the Clean Water Act by addressing point source water pollution issues in the allotment area and by seeking and obtaining certification from the Arizona Department of Environmental Quality under section 401.

13-5 Section 401(a)(1) of the Clean Water Act, 33 U.S.C. 1341(a)1, provides, in pertinent part: "Any applicant for a Federal license or permit to conduct any activity...which may result in any discharge into the navigable water, shall provide the licensing or permitting agency a certification from the State...that any such discharge will comply with the CWA...No license or permit shall be granted until the certification required by this section has been obtained..."

Although the Clean Water Act refers to discharges into "navigable waters", this term is defined to encompass all "waters of the United States". This phrase has been construed to include virtually all surface waters and has nothing to do with traditional concepts of navigability. Even "normally dry arroyos" have been held to fall within the scope of Clean Water Act regulation. Continued livestock grazing in the permitted areas will continue to result in point source water pollution through soil

1413 Second Street, Suite One ▼ Santa Fe, New Mexico 87505 ▼ 505-988-9126 ▼ Facsimile 505-989-8623

13-5 erosion channeled through gullies and wastes emitted directly into the perennial streams on the allotments. Further ground trampling in shaded areas, easily accessible areas and around water developments, leads to compaction, decreased infiltration, which in turn lead to increased runoff.

The Forest Service must seek and obtain certification from the State of New Mexico under section 401 of the Clean Water Act before granting a permit to extend grazing on the affected allotment and before permitting water developments which concentrate grazing in or near riparian, wetland, or other ecologically sensitive water resource areas.

If you have any questions about our comments, do not hesitate to contact me at 505/ 988-9126.

Sincerely,

John C. Horning
Watershed Protection Program
Forest Guardians

14

12/04/1996 21:38 6029624175 NOEL KROLL PAGE 01

Great Western Trail Association
Arizona Chapter
Gary Keller, Coordinator
531 N. Los Alamos
Mesa, Arizona 85213
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December 2, 1996

Jesse J. Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, AZ 85748

Dear Jesse:

I appreciate the opportunity to comment on the Draft Muleshoe Ecosystem Management Plan and Environmental Assessment. On behalf of the Great Western Trail, (GWT), and the Arizona State Association of 4-Wheel Drive Clubs, (ASA4WDC), I would like to offer the following comments.

The vision of the GWT is to provide a north/south back country corridor of trails, including motorized, from Utah To Mexico. This vision and goal is difficult at best trying to connecting existing roads through the San Pedro Valley. After reviewing the Muleshoe Management Plan's road closures, the only route left will be the Cascabel road. One of our main motorized resources for access through an area is the utility corridors. If these corridors are not accessible and barriers like Hot Springs Canyon and the Muleshoe ranch are off limits then interfacing with other user groups and the back country experience fails. If the Muleshoe pipeline can be left open for administrative use then it should also left open on a permit bases to gain access through the Muleshoe ranch area. The only west to east and north to south access through this area is the pipeline road the Teran wash road through section 1 from the south.

14-1

If funding sources are available for pullouts, kiosks, and trailheads on Jackson Cabin road, then funds also can be obtained to make non-sensitive bypasses around the Muleshoe ranch. A real opportunity will be lost in the exchange of information, opportunity for education, and build understanding between user groups if the GWT is not allowed to pass through the Muleshoe.

14-2

Consider using an OHV grant to bring the pipeline road up to minimal back country road standards and add cattleguards where applicable. If the pipeline road is not suitable for public travel, then it's not suitable for agency personnel, ranchers, or pipeline administrative use either. If funds for the GWT are used to fix the road then everyone benefits. Trailhead signs, kiosks, road signs, and maintenance costs could be shared by all users through partnerships and a grant process.

14-3

The Hot Springs Canyon is not a high density road area. The cost of obliterating roads and lost backcountry opportunities should not be part of this plan. BLM should be a provider of recreation opportunities not removing opportunities that already exist.

If the roads in question fall within non-access or do not have legal easements, then alternatives should be looked at and provisions made for access within the plan. Access through the Muleshoe should not be ruled out, but should be tried on an experimental or temporary or permit system. A permit could be applied for and a combination or a key obtained and left at the ranch when passing

14-4

through. This way travelers could be monitored, educated, and minimize conflicts to ensure a quality recreation experience consistent with the ACEC.

The Muleshoe Management Plan needs to reflect the Recreation 2000 Implementation Plan Assessment from the director of BLM in 1994. Under the BLM vision for the future,

"Vision"
The BLM will be viewed as:
* Being a leader in providing for quality wildland resource based outdoor recreation opportunities that encourage freedom with responsibility.

Freedom to pursue unstructured recreation opportunities.

Responsibility to use the lands wisely; to respect other visitors and local residents; and to protect ecological values and future use opportunities.

14-5

Overriding Parameters

2. BLM's recreation niche as a recreation provider

We will emphasize resource-dependent recreation opportunities that are characterized by wide open spaces reminiscent of the Old West--- Maintaining the spirit of the Western Frontier. We will actively manage our lands under a philosophy that gives the public freedom to choose how to spend leisure time on BLM managed lands within the constraints of sound ecosystem management.

Most of my comments provided to Dorathy Morgan on the San Pedro Riparian Natural Conservation Area (RNCA) San Pedro Trails report apply to this plan.

Thanks for the opportunity to comment on the input to the Muleshoe Ecosystem Management plan. On behalf of the GWT and the ASA4WDC, we hope you will give careful consideration to our proposal during your trails development and consider all users and would give the less physically motivated people a chance to visit this area.

Sincerely,

Gary Keller
GWT Arizona Section Coordinator
ASA4WDC Land Use Chairman

Enclosures - 7

15

The Nature Conservancy
Arizona Chapter

The Muleshoe Ranch Headquarters
4 R.R. #1 Box 1542 Willcox, Arizona 85643 (602) 586-7072

12-3-96

Mr. Jesse Juen
Tucson Field Manager
Bureau of Land Management
12661 E. Broadway
Tucson, AZ 85748

RE: Muleshoe Ecosystem Management Plan

Dear Mr. Juen:

The purpose of this letter is to comment on the September, 1996 draft of the **Muleshoe Ecosystem Management Plan and Environmental Assessment.**

When the Bureau of Land Management initiated the planning effort for the Muleshoe Ecosystem The Nature Conservancy welcomed the opportunity to participate in the process. As a property owner and manager, we believe that ecosystem wide management approaches like this are the most appropriate way to address complex resource management issues on a landscape scale.

This plan is based on an ecosystem management approach which we strongly support. The important natural resources contained in and around the Muleshoe CMA do not recognize property boundaries but rather are delineated by natural features. Thus, planning efforts should also recognize these natural features, something that we feel this plan does as much as is possible. We feel that the BLM has done a good job in identifying resource management needs and developing strategies to meet those needs. We also feel that it is significant that this plan is based on natural processes as well as the use of natural resources.

15-1

The resource objectives in the plan are well developed and to the extent possible are measurable. This will allow for modification of the plan if, over time monitoring shows that to be necessary. This flexibility will allow this plan to be a dynamic document that should not need to be re-written in a few years.

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The intent of this plan concurs with the cooperative management approach that the BLM, USFS and TNC adopted several years ago when the Muleshoe Cooperative Management Area was established. Strategies detailed in this plan will not only apply to BLM managed land, but will also serve as guidelines for TNC deeded property within the CMA.

The Nature Conservancy looks forward to working with the Bureau of Land Management in the implementation of this plan. Wise and farsighted management of the Muleshoe ecosystem is necessary to not only meet resource management needs on the ground but also to provide a healthy ecosystem for future generations.

Thank you for the opportunity to comment on the Muleshoe Ecosystem Management Plan.

Sincerely,

Ed Brunson

Preserve Manager,
The Nature Conservancy, Arizona Chapter

16

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DEC 04 1996

BLM - TUCSON F.A.

Dec 2, 96 TUCSON ARIZONA

Dear Mr. Jones:

Regarding the Muleshoe Ecosystem Management Plan:

While it is a rather well documented plan, I would like to offer several considerations.

16-1 Because of the unique nature of ownership of Muleshoe, I would like to see all grazing abolished in both riparian and upland areas. To see the results.

16-2 Also, more emphasis should be placed on reintroducing bighorn sheep to the area (but not for hunting purposes.

Keep me apprised of further developments.

Thank you

17

December 2, 1996

533 Suffolk Drive
Sierra Vista, AZ 85635

Jesse J. Juen, Field Manager
Bureau of Land Management
Tucson Field Office
12661 E. Broadway
Tucson, AZ 85748

Dear Jesse:

This is in response to your letter which forwarded the Draft Muleshoe Ecosystem Management Plan and Environmental Assessment for public review and comment. The public lands in the Muleshoe Ranch area are a significant and important resource for recreation. The Huachuca Hiking Club has over the years conducted many hikes, backpacks, and car camps in the area, including visits to Jackson Cabin and Redfield, Swamp Springs, and Bass Canyons. Unfortunately, we were unaware of your planning effort, and would have offered input to the early development of the plan. Thus, the following comments are intended to influence the plan and EA from a recreational perspective.

17-1 Chapter VI, page 37. The vision and goals statements do not specifically address recreation. Since the multiple use mandate of the Federal Land Policy and Management Act includes recreation, suggest the vision and goals be expanded to recognize the importance of the Muleshoe Ecosystem (both wilderness and non-wilderness) for recreation, and to give the plan better balance.

17-2 Chapter V, paragraph 5, page 34. Suggest the issue on recreation and access also address the following questions:

- What lands should BLM acquire through purchase or exchange to improve resource management and recreational access? I mention this because the Redfield Canyon Wilderness includes some non-Federal lands (northwest corner) that currently provide an important access point to Redfield Canyon. Hikers and backpackers use a trail that traverses these lands to access Redfield Canyon from the west.

- What trails currently exist and where are additional trails needed to support and channel recreational use? I mention this because a good trail system can enhance recreational activities, while helping to minimize resource damage in

17-2 sensitive areas by channeling the use. Possibly, establishing a trail in the Bass Canyon area could help alleviate recreational impacts to stream bank stability mentioned in the plan, by channeling visitors along a designated corridor.

17-3 Chapter VII, Riparian Management Actions, paragraph 9, page 42. The plan would designate Bass Canyon as day use only in order to reduce impacts to native riparian wildlife and vegetation. I recommend BLM implement lesser measures, such as establishing designated camping sites, before restricting the area to day use only. The lesser measures could be monitored for effectiveness and revised later as needed. Due to the remoteness of the area and long travel time to get there, visitors will likely want to stay overnight to make the trip worthwhile. This proposal would presumably restrict backpackers from camping overnight and accessing this important water source.

17-4 Chapter IV, Livestock Grazing, page 25. The paragraph on the Soza Wash Allotment mentions that it contains public and State lands within the Redfield Canyon Wilderness that need to be addressed. However, the plan does not address the issue. Since these lands are near the confluence of Redfield and Swamp Springs Canyons, it appears grazing may need to be restricted and the plan should address that.

Chapter VII, Management of Social Environment, pages 62-66.

17-5 - This objective in my view should be titled as Recreation and Access. As currently worded, the proposed objective would limit motorized vehicle use to the Jackson Cabin Road and Soza Mesa Road Complex, and eliminate (rip and seed) all unnecessary roads. I suggest that this wording is too restrictive, and recommend that vehicle use be authorized on existing roads and trails unless specifically signed as closed. (This is consistent with the Safford District Resource Management Plan and Environmental Impact Statement, paragraph 4 under Issue 3, page 32.) I would also recommend the plan specifically identify what may be considered unnecessary roads, and make provision for public input before taking action to eliminate them. In many cases, existing roads may have other benefits such as trail corridors for mountain biking, and should not be eliminated without public review and input.

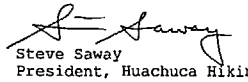
17-6 - Suggest a management action be included to address the need for acquiring non-Federal lands within the Wilderness to provide an access point from the west. (This is consistent with the Safford District RMP and EIS, paragraphs 3 and 7 under Issue 1, page 27.) Also, suggest a management action that addresses the need to improve/maintain existing trails and develop additional trails to better manage and enhance recreational use.

17-7 - The map on page 64 appears to designate road closures not mentioned under Management Actions. I think any proposed road closure should be specifically mentioned under Management Actions for public review and comment.

17-8 Environmental Assessment, Alternative Action for OHV Management, page 97. The plan and EA does not allow use of a segment of the pipeline road for the Great Western Trail (GWT). Since the plan would close the roads in Hot Springs Canyon, the pipeline road is the only motorized access to the Jackson Cabin Road from the west. I recommend BLM accommodate the GWT along the pipeline road, as it provides a significant and important linkage for GWT enthusiasts to access that area without having to make a lengthy and time-consuming detour on non-GWT roads. The highly scenic and rugged beauty of the Muleshoe area is the type of primitive setting envisioned by the GWT. Although the pipeline road is described as rough and steep, typically GWT users are accustomed to negotiating difficult terrain and will use appropriate safety measures. Other than constructing water bars as already planned, I don't envision a need for major modifications to the pipeline road for GWT use. Signing and education measures should alleviate the concern about vehicle access to riparian areas, not to mention the fact that travel to unroaded areas is restricted by the rugged terrain. Due to the remote and difficult terrain, I think the number of GWT users will be manageable and not present a problem.

In summary, I believe the draft plan and EA is a very good and positive step forward, particularly with regard to resource management and conservation. I appreciate the opportunity to present these comments, and hope they are helpful in further strengthening the recreation and access portion of the plan.

Sincerely,



Steve Saway
President, Huachuca Hiking Club

BLM Responses to Comment Letters

Private Citizen (Letter 1)

1-1 Names in current usage were used to provide a frame of reference for the general public reviewing this plan.

1-2 References to ground cover data on page 10 (page 7 in an earlier draft) and Appendix 3 are to BLM and TNC land. The upper Redfield watershed is within the Galiuro Wilderness managed by the Forest Service, and we did not have data from the Forest Service for the upper part of the watershed to include in our discussion.

1-3 I believe you are still referring to the Upper Redfield Watershed, which was not analyzed in this plan. However, this may also apply to the rest of the watershed. As you state this is a "steeply sloped watershed" with much of the area having slopes greater than 50% and much of the area is dominated by rock outcrops.. As a result, this watershed is always going to produce a lot of runoff following large precipitation events. Because of the large amount of rock present the soils that develop will usually be protected by a cover of cobbles, gravels and stone. These sites should also be dominated by perennial grass species, but due to past grazing and lack of fire, shrubby vegetation has invaded. The use of prescribed fire is proposed in the Muleshoe plan to reduce the shrub cover and increase the amount of perennial grass. The team believes that this is a necessary first step prior to initiating any active livestock grazing.

1-4 On the tour of upper Redfield Canyon, we did see evidence of active erosion and instability of the stream channel. It may be that portions of Redfield Canyon have not yet reached equilibrium with the channel gradient of the San Pedro River. These adjustments to changes that may have occurred at the turn of the century could be resulting in channel widening and downcutting in Redfield Canyon, or it may, as you indicate, be a result of poor upland watershed condition. On the tour we were not able to visit much of the upland watershed nor did we have any data to refer to on watershed conditions for this area.

The restoration of proper riparian function refers to perennial stream reaches on BLM and TNC lands. The Muleshoe Ecosystem Management Plan does not propose any new management actions for the upper Redfield Canyon Watershed. As noted above, upper Redfield Canyon is within the Galiuro Wilderness managed by the Forest Service. The Galiuro Wilderness is managed under existing Forest Service plans. The Forest Service could best address your concerns regarding upper Redfield Watershed.

1-5 Data described in the water quality section was not gathered during peak flows Watersheds dominated by bare ground or that have been impacted in such a way that ground cover is reduced foster flash flooding which can destabilize riparian areas in associated drainages. However, distinguishing natural effects from impacts of management activities can be difficult or impossible.

1-6 Refer to the Management Actions section under the Fish and Wildlife Objective for additional wildlife management actions. The scoping process raised only a few wildlife management issues so the proposed actions for wildlife were limited.

1-7 Your comments were noted.

1-8 See response to comment 1-4

Private Citizen (Letter 2)

2-1 Reference has been added

2-2 Thank you for your comment.

2-3 The decision to allow livestock use and the livestock forage allocation for the Soza Mesa allotment was made in the Safford

RMP. The RMP permits grazing at a stocking rate not to exceed an average of 40 % utilization over a full grazing cycle. The Soza Mesa allotment was separated off from the original Muleshoe allotment and Hot Springs ACEC because it didn't have critical riparian or aquatic habitats. Fencing necessary to separate the Soza Mesa allotment from the ACEC portion of Muleshoe was constructed in 1993 prior to initiating grazing. The ecological site inventory conducted in 1992 showed high condition and it was felt that the low initial stocking rate (44 cattle yearlong) would allow for ecological conditions to be improved and maintained. The 5300 acres of public land were acquired by the BLM from the State of Arizona through a land exchange in 1988. The State Land Department grazing lease had an established carrying capacity of 9 cattle per section, which equated to 79 cattle yearlong for what is now the Soza Mesa allotment. The current stocking rate on Soza Mesa amounts to a reduction of 44% over the stocking rate that would have occurred under administration of the State Land Department.

2-4 The preparation of the Muleshoe Ecosystem Management Plan began with development of a series of objectives, including an objective for Upland Vegetation. All proposed actions were required to be compatible with achieving all the resource objectives. See also response to comment 9-3.

We agree with you that the determination of rangeland suitability for livestock grazing is not sufficient in its scope to use to make decisions as to whether livestock grazing is appropriate on certain parcels of public lands. This "suitability" study was required in the Safford RMP Record of Decision II (July 1994). We viewed it as a starting point. The first step in the assessment of livestock grazing on the Muleshoe was to determine how much of the land is accessible to livestock. This is where we used the suitability criteria as outlined in the Safford Instruction Memo. Instruction Memorandum AZ-040-93-07, Rangeland Suitability for Livestock Grazing, provides guidance in the Safford District to identify lands that are suitable for grazing based on accessibility, slope and usable forage. While this criteria establishes areas where cattle are able to graze, the Instruction Memo is only a portion of the analysis that was used to develop the plan to allow grazing in Pride Basin. This only told us what lands were not suitable (accessible) to cattle, and thus no forage could be allocated for grazing use on those lands. The next step was to determine the compatibility of livestock grazing (on those accessible lands) in achieving the resource objectives. Livestock grazing was not determined to be compatible with achieving the objectives for management of the riparian areas on the Muleshoe, but could be in the area around Pride Basin, if the riparian areas were excluded, the uplands have been restored to satisfactory condition, and proper grazing management practices are implemented to provide sufficient rest and deferment to provide for the physiological needs of the plants.

2-5 The Muleshoe Ecosystem Management Plan was developed using a collaborative planning process to identify the range of alternatives to be considered for uses of available resources. Please refer to section II of the Environmental Analysis (EA) associated with this Plan. It includes a complete description of all alternatives that were addressed by the team during the planning process. Many of the alternatives fell under section II, part C of the EA (Description of other Alternatives Considered). These alternatives were considered but eliminated from detailed study when the team determined that the alternative was not compatible with meeting plan objectives or for other reasons. The rationale for not studying each of these alternatives in detail is also presented in section II, part C of the EA. This is specifically allowed in CEQ Regulations (40 CFR 1502.14(a)).

The CEQ regulations for implementing the procedural portions of NEPA (40 CFR 1501.2 (c)) states that an agency must

"study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources as provided by Section 102(2)(E) of NEPA". With the use of an interdisciplinary team and collaborative planning among affected agencies, the Muleshoe Ecosystem Management Plan does not identify any unresolved resource conflicts that have not been adequately analyzed in the attached environmental assessment. You suggest the need to consider a no-grazing alternative. The no action alternative is essentially accomplishing this as it analyzes the impacts of leaving the Muleshoe allotment in suspended non-use.

2-6 As stated in the proposed action, grazing would not resume in Pride basin until the upland objective has been met. Projects are prioritized through the BLM budget process on an annual basis depending on a variety of factors including available dollars, resource conflicts, and workload. The budget process is also driven by national and state-level priorities and directives. Generally these type of projects are funded with dollars which are returned to the field offices from grazing fees received. The policy is usually to cost share projects with the lessee and would depend on their budget as well. If the BLM and lessee's priorities did not match, the lessee could fund the entire project.

2-7 The monitoring data will be used to determine when the vegetation objective has been achieved. BLM will make the decision that it has been achieved in coordination with the lessee and the Muleshoe planning team members.

2-8 A lease for grazing was in effect at the time of wilderness designation and the lease remains in effect although suspended non-use of the grazing privilege is currently being exercised to promote recovery of the resource. The recognized grazing preference that existed at the time the Redfield Canyon Wilderness was designated was 4032 AUMs = 336 cattle yearlong. The proposed action would eliminate grazing on approximately 3800 of the 6600 acres of public lands in the Redfield Wilderness, and result in a reduction in the grazing preference from 752 AUMs to 350 AUMs on the public lands in the wilderness. The proposed gap fences would be the only new range improvements in the wilderness area (also addressed in response to comment 13-3). The gap fences would be necessary to exclude grazing in the riparian areas and to ensure grazing in the wilderness is done properly to protect the resources present. The two water developments, though currently non-functioning, are existing facilities. The Congressional Grazing Guidelines provide for maintenance of supporting facilities existing prior to designation of the area as wilderness. Replacement of deteriorated facilities is permissible if in accordance with management plans for the area.

2-9 Whether the Clean Water Act requires that BLM grazing permittees receive a 401 water quality certification has not been determined at this time. BLM management practices are designed to maintain water quality that meets Arizona State Standards.

We share your concern that we ensure clean water is produced from the watersheds on the Muleshoe CMA and that our actions do not result in any increase in discharges of sediments or other pollutants. The primary objective of the Muleshoe Plan is to restore proper function to the watershed for the protection and enhancement of ecosystem resources. Multiple uses allowed will be authorized to the extent they are compatible with achieving the stated resources objectives. A monitoring schedule was developed to track progress in achieving objectives and periodic evaluations of the monitoring data will be conducted as outlined in the plan.

2-10 Following a fire, the resource conditions would be assessed by an interdisciplinary team, to determine the effects of the fire on the vegetation and soils. Active

livestock grazing would not be authorized until the vegetative resource has fully recovered from the fire and the plants have had sufficient moisture and rest to regain vigor. The time period required for this would depend primarily on the amount and timing of rainfall over the next couple of growing periods.

2-11 Thank you for your comment.

Private Citizen (Letter 3)

3-1 The final plan for the Muleshoe ecosystem does not route the Great Western Trail through this area.

3-2 The decision about mineral entry is a Land Use Plan Decision which was made during the Land Use Planning process for the Safford Resource Management Plan. As discussed in section IV part B (Geology) of the draft EMP, the mineral potential of the Muleshoe area is low, and therefore mining activity is not anticipated. As discussed in part L (Mineral Potential) of the draft EMP, the Redfield Canyon Wilderness is closed to entry for locatable minerals. Mineral material sales and oil and gas leases will not be issued in the Redfield Canyon Wilderness. The riparian areas on the Muleshoe are closed to mineral material sales and surface occupancy for oil and gas leases, and mining plans of operation are required within the Hot Springs ACEC.

3-3 Currently there is no legal vehicular access for public or administrative use onto public lands within the Muleshoe CMA. However, TNC and other landowners have been providing access through their private lands. Management Action #9 under the Social Environment Objective identifies the need to pursue acquisition of legal access and identifies several major strategies for achieving this including acquisition of rights-of-way or easements by cooperative agreement, purchase, or donation.

3-4 The proposed action is to use prescribed fire as a management tool to restore the ecological condition of the grasslands. Grazing will not resume until desired conditions are achieved.

When upland ecological conditions have been restored, a more detailed proposal for grazing on the Muleshoe allotment would need to be developed in cooperation with the lessee. This process would include development of a site-specific environmental assessment which would address a variety of resource issues including the concern that you raise about avian nests. The Muleshoe EMP prescribes a rotational grazing system in Pride Basin which incorporates either development of internal pastures to allow for rest, or allows only seasonal use during the non-growing season (November through February). The second option would address the issue of avian nests as Pride basin would not be grazed during the nesting season.

3-5 Refer to response 3-3.

Private Citizen (Letter 4)

4-1 Text has been modified to correct Table of Contents and bring forward additional goals.

4-2 The Muleshoe EMP emphasizes restoration of natural processes in the ecosystem. The team believes that proper management of riparian areas will result in sufficient revegetation to meet all the riparian objectives. Monitoring data already indicates that natural revegetation is occurring at levels which will allow the objective to be achieved. Our experience on other similar streams in this region indicates that allowing for natural revegetation is a more productive and cost effective approach. Therefore, natural revegetation of trees was identified as the preferred method of achieving desired riparian tree densities. See also response to comment 5-4.

4-3 The installation of retention instream structures in the Muleshoe CMA could, if carefully designed, selected and placed,

provide additional pool habitat in areas where such habitat is insufficient for the establishment of such fishes as Gila chub. However, this can be a complex and costly process, and design errors can result in additional problems with stream function. Therefore, the preferred approach for the Muleshoe is passive restoration. This approach relies on the natural processes in the ecosystem. The premise is that once a dense and diverse riparian plant community has established, then a stable stream form that has well defined riffles, runs and pools that, in turn, support a diverse fish assemblage will follow. No expensive structures needed, just a healthy watershed and riparian plant community.

4-4 Thank you for your comment.

4-5 We agree that the ecological conditions reached by achieving objectives 1 and 2 will ultimately determine the mix of species which exist or could potentially exist on the Muleshoe ecosystem. The list of species in Fish and Wildlife management action #1 was compiled from a review of recovery plans for threatened and endangered species whose ranges include the Muleshoe ecosystem, existing proposals and status of species. The process outlined in Fish and Wildlife management actions 1-3 is consistent with the standard processes used by agencies to assess whether a reintroduction, range extension or supplementation is feasible.

4-6 Thank you for your comment.

4-7 The text has been modified in Section IV, Part J (Ecological Resources, Recreation) of the final Plan to more clearly describe where the zones are located. The zone locations are difficult to depict on the scale of maps in the final Plan due to their size and configurations.

Society for Environmental Truth (Letter 5)

5-1. Figure 1 in the draft Muleshoe EMP (page 5) shows the planning area boundary and land ownership. Figure 2 (page 14) and Figure 9 (page 52) in the draft Muleshoe EMP show grazing allotment boundaries, existing and proposed. These figures are poor quality in the draft plan and hard to read. They have been revised in the final plan to portray the situation more clearly.

5-2. We are unclear as to which wells you are specifically referring to. Upland management action # 2 (Table 9) describes re-equipping two wells: Swamp Springs Canyon Well (on public land) and Pride Cabin Well (on private land). Wilderness Management Action #4 also describes re-equipping an additional well, Sycamore Canyon Well (on public land). Because the Swamp Springs Canyon Well and Sycamore Canyon Well are within wilderness, the redevelopment will be done to minimize the visual impact of the facilities. Windmills would be replaced with solar electric pumps. The solar panels, storage, and drinking troughs would be located to reduce visibility.

5-3. The plan does not include a comparison of wildlife conditions and populations between the leased land (we assume you mean within the Muleshoe ecosystem) and surrounding ranch lands for two major reasons. The first is that this type of information is not readily available. Information collected by the Arizona Game and Fish Department for game species is collected on a broad scale which does not allow for these type of comparisons. Information has been collected for non-game species such as migratory birds, native fish, and threatened and endangered species for specific projects within the Muleshoe ecosystem. Many of these species, such as the native fish, are not present on surrounding lands which is one of the reasons the Muleshoe has such high ecological value. The second reason is

that no issues were raised in this planning effort which indicated the need for making these type of comparisons.

5-4. One of the riparian vegetation objectives is to increase the density of sapling tree species along the perennial stream reaches on the CMA, and our rationale is detailed beginning on page 38 of the draft plan. The team believes that the increased sapling densities play an important role in the structure, function, and habitat values of these riparian areas.

The reason the data may not be as dramatic as one might think they should is rather complicated. Riparian area development is very dynamic, and influenced by many factors. Probably the two most significant on the Muleshoe streams are livestock grazing and flood events.

The livestock were removed from the Muleshoe Ranch between 1978 and 1980. Riparian monitoring was not initiated until 1983 and 1984, so the initial recovery of the vegetation upon the initial removal of the cattle and horses was not documented. Also major flood events occurred in 1983 and again in 1993.

We accept the fact that natural flooding will scour the existing vegetation along the streams and remove large trees. After such events tree seedlings will germinate. This is the period when, if livestock are present, these seedlings are most vulnerable to grazing damage by livestock. Our observations in other areas are that without livestock present more of these seedlings will survive and move into the sapling stage to replace those saplings and mature trees that were lost during the flooding. It is a natural process, that is hindered by grazing. Similar results can be achieved on grazed riparian pastures by removing the cattle for a few years after a flood to allow the seedlings to grow above the browse line before allowing resumption of grazing.

Another factor influencing the development of vegetation in the riparian zones is the condition of the adjacent upland sites. Due to past livestock grazing and the lack of fire in the Muleshoe ecosystem, the upland vegetation communities have been invaded by shrubby species. The increase in brush and lack of desirable perennial grasses, causes more runoff then would be expected if the range was in better condition. Thus the flood events are often larger than they should be, and the stability of the steam channel and vegetation communities is lowered.

As stated above, there are many factors influencing the processes. We believe our assumptions are sound, and that the data collected since 1983 indicate that we are in fact headed in the right direction for achieving the proposed objectives.

5-5 A section on socio-economic has been added to the description of ecosystem resources in the final plan. This information was considered in the environmental assessment for the final plan.

The decisions involving livestock grazing on the Muleshoe have not been based on an economic analysis of the benefits and costs associated with livestock grazing compared to the other uses which may or may not occur on the Muleshoe CMA. The Muleshoe Ranch property was acquired from the State of Arizona through a land exchange to improve and protect the outstanding natural resources present. Our approach in development of this plan was to develop resource objectives and implement management actions to achieve this. The BLM is mandated by FLPMA to manage the public lands on the basis of multiple use and sustained yield. The uses proposed in the draft plan and the timeframes and constraints under which they are expected to occur are a result of our environmental assessment. The team believes this was the best mix of uses which could be

allowed while sustaining the improvement of the resource base.

Regarding the collection of grazing fees on public lands on the Muleshoe, the current fee charged by BLM for livestock grazing is $1.35 per Animal Unit Month ($16.20 per year per cow) for forage off the BLM administered lands. There is no charge for grazing nonuse, so TNC is not currently paying grazing fees while the Muleshoe Allotment is in non-use. The current permitted livestock numbers on the BLM portion of the Muleshoe is 267 cattle for 12 months. This would equate to $4,325.40 if grazing were occurring this year. Grazing fees collected for the 44 cattle on the Soza Mesa portion of the Muleshoe were $677.70. The cost of the 6 miles of fencing on the Soza Mesa allotment to allow resumption of grazing while protecting the riparian zone in 1993 was approximately $18,000. The cost of the proposed range and recreation actions are included in the implementation table in Chapter IX.

5-6. BLM has prepared the Muleshoe Ecosystem Management Plan (EMP) in order to conform with the Bureau's three tiered planning system. This three tiered system consists of policy, Resource Management Plan (RMP), and activity plan levels.

Section 202 of the Federal Land Policy Management Act of 1976 (FLPMA) required that BLM complete land use plans for all public lands under BLM management. BLM has complied by completing RMPs such as the Safford District RMP. This same section of FLPMA also directed BLM to develop regulations to guide the development of these RMPS. These regulations at 43 CFR 1601.0-5(k)(5) direct BLM to identify, in the RMP, "Need for an area to be covered by more detailed and specific plans,". Partial Records of Decision I and II for the Safford District RMP identify the Muleshoe Ranch as an area that needs coverage by a more detailed and specific plan. The Muleshoe EMP is the method BLM has chosen to comply with this decision in the RMP. The Muleshoe EMP was developed to comply with laws, regulations, and decisions made in the RMP and does not depend on the significance of environmental impacts as a reason for its initiation and completion.

According to 43 CFR 1601.0-6, approval of an RMP constitutes a major federal action significantly affecting the quality of the human environment and is therefore accompanied by and Environmental Impact Statement (EIS). There is no similar requirement for an activity level plan such as the Muleshoe EMP. Therefore, in conformance with 40 CFR 1501.4, the decision to prepare an EIS for the Muleshoe EMP is dependent on the outcome of the analysis presented in the Environmental Assessment (EA) that accompanies the plan. In this case, the BLM has determined that implementation of the Muleshoe EMP will not have a significant impact on the environment and an EIS need not be prepared. The rationale for this finding is presented in the Finding of No Significant Impact (FONSI) attached to the final plan and EA.

Private Citizen (Letter 6)

6-1. Thank you for your comments.

6-2. As discussed in the draft Muleshoe Plan, when the ecosystem planning process began, the Forest Service's Safford Ranger District had in place plans which covered the Galiuro Wilderness including a Wilderness Implementation Schedule. Therefore, a primary purpose of the FS involvement was coordination to ensure as much consistency as possible in management of the adjoining BLM and FS wilderness areas. The Muleshoe EMP does not prescribe new management actions for FS lands. A Forest Service representative actively participated on the planning team. The data that was available for the Forest Service lands was included in the Description of Ecosystem Resources. For example, the BLM and

Forest Service lands do have overlaps in biotic communities and wildlife species. However, much of the Forest Service lands are higher elevation and reach into some biotic communities not represented on BLM lands. All of these biotic communities are described in the ecosystem resources section of the plan.

6-3. Please see response to comment 2-4.

6-4. The effects of resumption of grazing in Pride basin are analyzed in the Environmental Assessment. Specifically refer to the sections on Impacts to Watershed Function and Processes and Impacts to Fish and Wildlife under the Impacts of the Proposed Action Alternative section of the EA.

6-5. It is generally recognized that the amount of permanent water both in springs and in streams has declined in the southwest over the last century. Although the Muleshoe is indeed very isolated, it is unlikely that it has escaped entirely from this trend. We have not seen any specific published accounts on this trend for the Muleshoe, but some local residents have reported reductions in amount of permanent water in streams in the area in recent decades. We recognize that local extinction and recolonization of wildlife populations are natural processes, however, we also recognize that people's intervention in ecosystems has been widespread and in many instances has directly caused these events and / or inhibited the ability of wildlife populations to recover from these events. For these reasons the Muleshoe Plan proposes an inventory of water sources to determine wildlife water needs (Fish and Wildlife Management Action #4). The plan allows for the possibility that waters may need to be developed and it also proposes assessing the ecosystem for needs and opportunities to reestablish extirpated species or augment populations. At the present time, the bighorn sheep herd in this area (of which the Muleshoe is only a small portion) is considered viable, however there have been significant declines in bighorn sheep populations in other areas at times necessitating augmentation to keep them viable. The plan provides for this contingency for the Muleshoe.

6-6. The Muleshoe plan does not claim that the two existing artificial waters were designed to increase numbers of bighorn sheep nor does it propose construction of new waters for this purpose. As you are well aware, there is currently much debate about artificial water sources. Determining the location and permanence of all water sources, natural and artificial, in an area is the logical first step in assessing water needs for wildlife in that area. The Muleshoe plan proposes a complete inventory of natural and artificial waters for the purpose of determining wildlife water needs (Fish and Wildlife Management Action #4). The rationale for this action has been revised slightly to be more clear. Furthermore, in Fish and Wildlife Management Action 1a, the plan provides for augmentation of bighorn sheep numbers, if determined necessary in the future. There have been declines in many bighorn sheep populations in Arizona for a variety of reasons necessitating in some instances the need to augment populations. This management action (1a) provides for that contingency in the Muleshoe Area. The wording for the rationale has been revised to clarify this point. In some instances, the limiting factor of sheep use of an area is determined to be water because of loss of natural waters or loss of access to natural waters from habitat fragmentation etc.

6-7 Wildlife waters have been used for years as a management technique to provide waters in areas where natural water sources have been lost or access to them has been denied or areas where changes in wildlife distributions are desired. We are unaware of any definitive research showing that artificial waters increase wildlife populations to levels which exceed the carrying capacity of the land. Water is one of many factors which contributes

to the carrying capacity of an area. Other examples are vegetation, prey and predator relationships, and habitat fragmentation.

6-8 Regulation of hunting falls under the authority of the Arizona Game and Fish Commission and is carried out by the Arizona Game and Fish Department.

Phoenix Zoo (Letter 7)

7-1. Thank you for your comments.

7-2. The monitoring proposed under each objective is designed, using the best information available, to assess whether the resource objectives are being achieved and ultimately how the ecosystems are functioning. The plan evaluations ensure a periodic review of monitoring data and allow for adjustments in techniques as new information becomes available.

7-3. Because of the low mineral potential of the Muleshoe Ecosystem, the BLM does not anticipate that mining activity will occur. In addition, much of the Muleshoe is closed to or has restrictions on mining activities. The Redfield Canyon Wilderness is closed to entry for locatable minerals. Mineral material sales and oil and gas leases will not be issued in the Redfield Canyon Wilderness. The riparian areas on the Muleshoe are closed to mineral material sales and surface occupancy for oil and gas leases, and mining plans of operation are required within the Hot Springs ACEC. Issues including consideration of sensitive species would be brought forward and addressed in the required environmental analysis. Any potential mining operation will require bonding for reclamation purposes subject to 43CFR 3809.1-9. Please also see response to comment 3-2

7-4. Thank you for your comment.

7-5. As stated in the issues section of the draft plan, the reintroduction of wolves to the Muleshoe was not considered in this planning effort as the Muleshoe is not on the list of proposed sites which were addressed in the EIS prepared by the U.S. Fish and Wildlife Service for Mexican Wolf reintroduction. The Muleshoe EMP includes a list of species that are being considered for reintroduction, supplementation, or range extension. These actions would increase the species diversity of the Muleshoe. The list is open to addition of species as new recovery plans are developed or new information becomes available.

7-6. Text has been corrected so that index has correct page numbers.

Arizona Desert Bighorn Sheep Society, Inc. (Letter 8)

8-1 Thank you for the comment.

8-2 Thank you for your comment.

8-3 The text has been modified from "monitoring" to "survey" to reflect the term the AGFD uses for these investigations whether they are for research or management activities. This has also been clarified in the rationale for wilderness management action #3.

8-4 Text has been modified to clarify that power tools can be used if they are identified as the minimum tool necessary to accomplish the action.

8-5 Thank you for your comment.

8-6 Chapter IX has been completed.

8-7 Maps have been revised to be of better quality.

Private Citizen (Letter 9)

9-1 Thank you for your comment.

9-2 As stated in the plan, grazing will not be resumed in the Pride Basin until the

grasslands are in the desired ecological condition. At this point, livestock use will be authorized, but only under specific constraints which are designed to maintain the desired condition. In addition, monitoring will be used to ensure that desired conditions will be maintained.

9-3 Pride Basin meets the criteria of both suitability and compatibility which was applied in our analysis to determine areas which could be grazed. The proposed stocking rate and constraints on grazing management in this area are designed to minimize conflicts with other resources including wildlife and recreation and also allow us to meet our resource objectives. See also response to comment 2-4.

9-4 The proposed decision to allocate 346 Animal Unit Months of forage for livestock grazing use in the Pride Basin portion of the Muleshoe CMA was not based on the economics of grazing livestock. The BLM is mandated by FLPMA to manage the public lands on the basis of multiple use and sustained yield. Further, the management actions proposed in the Muleshoe Plan had to be consistent with achieving the resource objectives developed by the planning team. The analysis of allowing this level of properly managed livestock grazing in Pride Basin once the desired vegetation objective is achieved, is consistent with our mandate and in achieving the resource objectives. Properly managed livestock grazing is also consistent with the vision statement for the Muleshoe Ecosystem, which seeks to promote rural lifestyles and activities that can occur in the ecosystem.

Once the upland vegetation objective is achieved through the use of continued rest from grazing and the implementation of prescribed burning, the BLM in consultation with the grazing lessee would require activation of the permitted use. This would require the construction of the necessary fencing, and maintenance of the wells for stock water. The lessee would be required to either fund the costs entirely, or at least split the costs of the necessary improvements with the BLM.

The motivation of the lessee for holding the grazing lease, and grazing livestock on public lands may be economic, philosophic (i.e. a lifestyle), or even political. This is really not the concern of the Bureau. What we do feel is important is that if livestock are grazed on the Muleshoe, that it be done in a manner that maintains the health of the ecosystem. This is essentially the same for all authorized uses on the public lands administered by BLM. While we do consider the benefits and costs of proposed actions, the Bureau does not base its decision rationale only on the economic benefit/cost ratio of the projects. Providing open space for recreation, habitat for wildlife, healthy ecosystems, clean water, and other products, may not always provide the greatest economic return to the public or the land user, but may be desired for other reasons.

9-5 See response to comment 9-3.

9-6 See responses to comments 2-8 and 13-3

9-7 See response to comment 9-3.

9-8 One of the alternatives considered but eliminated from detailed study was permanent retirement of the Muleshoe allotment. A rationale for why this alternative was not carried forward for full analysis is provided in Section II, part C of the Environmental Assessment for the Final Plan. See also response to comment 2-5.

9-9 The overall goal of ecosystem management is to recognize ecological connections between areas such as the Muleshoe ecosystem and lower Hot Springs Canyon. Improvements in the ecological health of the Muleshoe ecosystem should be beneficial to downstream areas.

Private Citizen (Letter 10)

10-1 Thank you for your comment.

10-2 See responses to comments 3-2 and 7-3.

10-3 Text has been modified to clarify that seeding will be done with native species or with annual species which are not at risk of establishing on the treatment sites.

10-4 Text has been modified to identify the removal of salt cedar specifically and this action has also been given high priority in the Implementation Table in Chapter IX.

10-5 At this time no other non-native species has been identified from monitoring which pose a threat to native species in riparian areas. Removal of red brome was discussed during plan development but was determined not to be feasible.

10-6 Text has been modified to add several common plant names to Appendix 5.

10-7 Text has been modified to remove extra hyphens.

10-8 Text has been modified to make lists in Appendix 5 alphabetical by common name.

10-9 Text has been modified to change "and" to "an" in Table 8.

10-10 Text has been modified to reference Table 11.

10-11 Text has been modified to remove "accelerated erosion" from the glossary.

10-12 The Table of Contents has been modified to reflect current page numbers.

Cochise County Planning Department (Letter 11)

11-1 Thank you for your comment.

Arizona Game and Fish Department (Letter 12)

12-1 Text has been modified to correct page numbers in Table of Contents.

12-2 Text has been modified to display current status designations of fish and wildlife species in Table 3. .

12-3 Text has been modified to complete sentence in description of grassland wildlife.

12-4 Text has been modified to include goals for other resources .

12-5 Text has been clarified to reflect current information and survey protocols for avian species.

12-6 Date has been changed to 2010.

12-7 Text has been modified to include updated information for Gila Chub population status.

12-8 Text has been eliminated (parenthetical phrase: vegetation or wildlife) from discussion of removal of exotics.

12-9 Text has been clarified to reflect potential for unplanned wildlife survey flights.

12-10 Text has been modified in introduction to Implementation Table to clarify constraints which may affect implementation.

12-11 Spelling of Mike Holloran's name has been corrected.

Forest Guardians (Letter 13)

13-1 See response to comment 2-5.

13-2 The Suitability Assessment for the Muleshoe Allotment was completed as part of a protest resolution on the Safford RMP in 1994. It is a specifically defined procedure described in Safford District Instruction Memorandum No. AZ-040-93-07 and summarized on page 26 of the draft Muleshoe EMP. The EA Impact Section provides a full analysis of the compatibility of grazing with other public values and uses, including rare riparian-obligate species. See also response to comment 2-4.

13-3 The "new range improvements" consist of three separate segments of gap fence totaling about one mile. A portion of Wilderness Gap Fence would be built outside of the wilderness area. The Arizona Desert Wilderness Act directed that livestock grazing be administered under guidelines set forth in Appendix A of House Report 101-405. These guidelines are a reiteration of the Congressional Grazing Guidelines established in earlier House Reports. The construction of new improvements in wilderness is permissible if in accordance with the guidelines and management plans governing the area involved. New improvements should be primarily for the purpose of resource protection and the more effective management of resources rather than to accommodate increased numbers of livestock. The purpose of the proposed gap fences is to exclude livestock grazing from riparian areas. Fewer livestock will be accommodated than is currently permitted once grazing is established in the new Pride Basin Allotment. See also response to comment 2-8.

13-4 Please see responses to comments 2-5 and 9-8.

13-5 Discharges into water of the US due to livestock grazing are generally considered to be a nonpoint source of pollution. See response to comment 2-9.

Great Western Trail Association (Letter 14)

14-1 The pipeline route was closed to all but administrative use in the Safford RMP which precludes using this route for the Great Western Trail. There were many reasons behind the RMP decision including public safety, the sensitivity and significance of the riparian resources (which were recognized in designation of this area as the Hot Springs Watershed ACEC), and the pipeline route not being designed or intended to be a public road. The Muleshoe Plan was not intended to be an amendment to the Safford RMP, and therefore the proposed management in the Muleshoe Plan must be consistent with the decisions in the Safford RMP.

14-2 We recognize that there are funding sources available to assist with access issues. However, no other proposals except using the pipeline route were submitted for routing the Great Western Trail. The problems with the pipeline route are discussed in responses to comments 14-1 and 14-3.

14-3 Please see response to comment 14-1. A proposal can be made in the future to the Safford Field Office, which now has administrative authority of the Muleshoe, to consider amending the Safford RMP and re-examining this issue. However, the pipeline access road also crosses deeded lands, and the issue would need to be resolved with the private land owners before a proposal could be considered viable.

14-4. Please see responses 14-1, 14-2, and 14-3. The closure of the upper Hot Springs Canyon road which runs along the bottom of the Canyon was made in the Safford RMP to protect the significant and sensitive riparian resources within the Hot Springs watershed ACEC. The closure of lower Hot Springs Canyon road was made by a private land owner at their property boundary.

14-5. The team believes that the Muleshoe Ecosystem Plan is consistent with the Recreation 2000 Implementation Plan Assessment including the vision and overriding parameters that you have excerpted in your letter. The plan provides for quality wildland resource based outdoor recreation opportunities and emphasizes resource-dependent recreation opportunities characterized by wide open spaces within the constraints of sound ecosystem management.

Note: Letter 14 included 7 map enclosures. This are available for public review at the BLM, Tucson Field Office.

The Nature Conservancy (Letter 15)

15-1 Thank you for your comment.

Private Citizen (Letter 16)

16-1 With the exception of Soza Mesa and Pride basin in the future, much of the Muleshoe Ecosystem has been and will continue to be ungrazed providing the opportunity to study ungrazed areas. Please see responses to comments 9-2 and 9-3 for additional information.

16-2 The plan identifies supplementing the existing population of bighorn sheep if determined necessary through evaluation of habitat and population data by AGFD. Prioritizing and implementing these activities (supplementing populations, reintroductions and range extensions) are done through established procedures of AGFD and other agencies. There is currently only 1 hunt permit-tag for bighorn sheep for hunt units 31 and 32 which includes the Muleshoe ecosystem. The Arizona Game and Fish Commission sets hunt regulations and harvest amounts based on survey data collected by AGFD through established procedures which are outside of the scope of this plan.

Private Citizen (Letter 17)

17-1 The plan has been modified to include a human environment goal. This goal encompasses human uses of the Muleshoe ecosystem, including recreation.

17-2 The issue that you raise regarding identification of lands for acquisition for access and improved resource management is covered by three issues in the draft plan. These are issues number 4 (How much, what type, and where should vehicular access occur?), and number 7 (How will legal vehicular access to public lands be obtained?) under Recreation and Access and issue number 5 (How will concerns about impacts to naturalness from potential activities on those private and state lands within the Redfield Canyon Wilderness be addressed?) under Protection of Wilderness Values. These issues are resolved by Wilderness Management Action #5 which is to continue efforts to acquire private and state land inholdings within the Redfield Canyon Wilderness as identified in the Safford District RMP and Social Environment Management Action #9 which is to pursue legal access... through acquisition of rights-of-way or easements by cooperative agreement, purchase, or donation.

The issue that you raise regarding existing trails and need for additional trails is covered by two issues in the draft plan. Issue number 2 (To what extent are visitor facilities, including trails and parking areas needed?) under Protection of Wilderness Values and issue number 2 (What types of recreation facilities may be needed and where?) under Recreation and Access. These issues are resolved through several management actions under the wilderness and social environment objectives. Although no new trails were specifically identified in the plan for development as no proposals were brought forward, the plan allows for the possibility of future trail development in the social environment objective which provides for development of additional facilities (signs, camp areas, pull-outs, trails) which will enhance recreational experiences in zones 1 and 2. Figure 11 in the draft plan, which illustrated the existing trails within the Muleshoe Ecosystem as well as proposed recreation developments has been revised for the final plan to be more clear.

17-3 The majority of the land within the Bass Canyon riparian corridor is deeded land owned by The Nature Conservancy. The Nature Conservancy restricts many of

their deeded lands, particularly those along riparian corridors, to day use only. This has been clarified in Figure 8 in the final plan. Bass Canyon receives the greatest level of recreation visitor use as it is the most accessible of the riparian canyons on the Muleshoe. It supports several nesting pairs of raptors, significant native fish resources, and has been the focus of several riparian monitoring efforts and studies. By designating the small public land inholding within Bass Canyon as day use, the plan provides for consistent management of this riparian corridor and also recognizes the sensitive and significant nature of it's riparian resources which are also within the Hot Springs Watershed ACEC. All of the public lands surrounding this riparian corridor are open to camping, providing many opportunities.

17-4 This was an oversight. Text has been added in the final plan under the Upland Vegetation Objective to address management of the Soza Wash allotment.

17-5 The wording of the Social Environment Objective has been clarified to read all unauthorized rather than unnecessary roads. The intent is to close any new, unauthorized roads which may be created in the future by off-road travel. Vehicle use is authorized on existing roads on Soza Mesa and along the Jackson Cabin road. The decisions to close the pipeline road and Hot Springs Canyon Road were made in the Safford RMP, and the Muleshoe plan is simply implementing those decisions. The text of the plan has been revised to clarify this.

17-6 Wilderness Management Action #5 identifies the need to acquire non-Federal lands within the wilderness. Please see response to comment 17-2 for additional discussion of wilderness inholdings and trails.

17-7 Figure 11 (Figure 12 in final plan) has been revised for the final plan to more clearly show road closures. Two road closures identified on Figure 11 in the draft plan are on deeded lands and were shown for information purposes to assist visitors. This has been clarified on the revised map.

17-8 As stated in comment response 14-1, the pipeline road was closed to all but administrative use in the Safford RMP which precludes using this route for the Great Western Trail. The Muleshoe Plan is an activity plan and not an amendment to the Safford RMP, and therefore the proposed management in the Muleshoe Plan must be consistent with the decisions in the Safford RMP.

MULESHOE ECOSYSTEM MANAGEMENT PLAN

APPENDICES

Appendix 1
Muleshoe Ecosystem Planning Team Participants

BLM Tucson Field Office

Karen Simms, Planning Team Leader*
Grant Drennen, Range Specialist*
Rebecca Drennen, Support Services Assistant
Debbie Miranda, Contact Representative
Don Ducote, Natural Resource Specialist (Recreation and Wilderness)*
Jesse Juen, Field Manager
Dave Krueper, Wildlife Biologist*
Ben Lomeli, Hydrologist*
Jeff Simms, Fisheries Biologist*
Max Witkind, Archaeologist*
Anita Lyerla, Secretary

BLM Safford Field Office

Rick Belger, Fire Control Officer
Diane Drobka, Public Affairs Specialist
Mike McQueen, Planning and Environmental Coordinator
Greg Merchant, GIS Specialist

BLM Arizona State Office

Marilyn Casiano, Civil Engineering Technician
Ken Mahoney, Wilderness Specialist*
Dave Wilson, Cartographer

Coronado National Forest, Safford Ranger District

Dick Streeper, Wilderness
Carrie Templin, Public Affairs Officer
Genice Froehlich, Wildlife Staff

The Nature Conservancy, Arizona Chapter

Tom Collazo, Director, Stewardship and Preserve Programs*
Dave Gori, Field Office Ecologist
Russell Hooten, Muleshoe Preserve Manager*

Arizona Game and Fish Department, Region 5

Sherry Ruther, Habitat Specialist*
Mike Holloran, Field Supervisor

Bayless-Berkalew Company

Jack Smallhouse*

Soza Mesa Ranch

Jack Hughes*

Saguaro-Juniper Association

Pat Corbett*

U.S. Geological Survey, Tucson Field Office

Leslie Cox, Geologist
Brenda Houser, Geologist

* Denotes member of planning team.

Appendix 2

Public Participation in Muleshoe Ecosystem Plan

Extensive public participation was solicited in preparation of the Muleshoe Ecosystem Plan. A scoping open house was held in Benson, Arizona, in November 1990 to initiate the planning process. The purpose was to solicit issues that needed to be addressed during planning. The plan was delayed for several years due to higher priorities. The plan was reinitiated in December 1993. At this time, an extensive mailing to solicit new or additional scoping comments occurred. Scoping letters were sent to a mailing list of over 500 including individuals in 52 Arizona communities, individuals in 12 other states, 60 public agencies, 61 organizations and special interest groups, and 66 businesses. Recipients were asked to reply if they wished to remain on the mailing list. Through this process, the mailing list was reduced to approximately 150. In June 1994, invitations were mailed to the reduced list, inviting them on two field trips to the Muleshoe. The field trips, to discuss resource objectives on the ground, were held in July and August 1994. A presentation on the draft plan was provided to representatives of the Arizona Cattlegrowers Association. Finally, various public interests were represented by agencies and private landholders on the planning team.

Appendix 3

Muleshoe Ecosystem Resource Data

Watershed Data: Tables 3-1 through 3-3

TABLE 3-1
SUBSTRATE COMPOSITION
Muleshoe Allotment 1994

SUBSTRATE	PERCENT
Soil	32
Gravel	43
Rock	25

TABLE 3-2
GROUND COVER (Raindrop Intercept)
Muleshoe Allotment 1994

TYPE COVER	PERCENT
Bare ground	3
Gravel	12
Rock	10
Grass (basal)	5
Grass (canopy)	26
Shrub (canopy)	28
Litter	16

TABLE 3-3
WATER RIGHTS SUMMARY

SOURCE	APPLICANT	PRIORITY DATE & #	AMOUNT	USE(S)	STATUS
Redfield Canyon	BLM	12/01/88 33-94369	15 cfs	ISF	APP
Redfield Wilderness	BLM	11/28/90 39-14413	1659.06	FED	QUANTIFIED
Bass Canyon	BLM	12/01/88 33-94371	3 cfs	ISF	APP
Hot Springs Canyon	BLM	33-94372	21 cfs	ISF	
Swamp Springs Canyon	BLM	33-94370	7 cfs	ISF	PERMIT
Wildcat Canyon	BLM	06/06/90 33-95454	0.625 cfs	ISF	APP

Riparian and Aquatic Resource Data: Tables 3-4 through 3-9

TABLE 3-4
RIPARIAN ECOLOGICAL SITE DEVELOPMENT
Muleshoe Ecosystem 1994
(BLM and TNC lands)
(Percent of Floodplain)

Riparian	Aquatic Zone	Regen Zone	Riverwash	Sand Bottom	Sandy Woodland	Loamy Woodland
Upper Hot Springs	10	10	34	18	0	28
Lower Hot Springs	11	14	23	38	14	0
Bass Canyon	5	5	43	13	4	30
Swamp Springs	11	0	5	33	0	51
Redfield Canyon	7	7	32	26	23	5
AVERAGE	9	7	27	26	8	23

TABLE 3-5
SWAMP SPRINGS CANYON RIPARIAN MONITORING
Density[1] of Woody Riparian Species

	1984	1986	1988	1990	1992
# trees	103	95	127	81	154
# sapling	12	44	128	181	431
# seedling	58	1,092	1,879	557	8,692
TOTAL	173	1,231	2,134	819	9,277
trees + saplings / acre	149	181	331	340	760
sapling: trees	0.12	0.46	1.0	2.2	2.8[1]

This is a complete count of all woody riparian species along the entire transect length. In 1990, only a portion of the transect was sampled.

TABLE 3-6
REDFIELD CANYON RIPARIAN MONITORING
Density[1] of Woody Riparian Species

	1983	1985	1987	1989
# trees	100	32	69	75
# saplings	64	78	344	97
# seedlings	94	122	130	6
TOTAL	258	232	543	178
trees+saplings / acre	252	169	635	265
saplings: trees	0.64	2.4	5.0	1.3

[1]This is a complete count of all woody riparian species along the entire transect length.

TABLE 3-7
SYCAMORE CANYON RIPARIAN MONITORING
Density[1] of Woody Riparian Species

	1984	1986	1988	1990	1992
# trees	187	178	178	176	154
# saplings	143	188	162	113	105
# seedlings	120	70	89	192	156
TOTAL	450	436	429	481	415
trees + saplings / acre	71	79	73	62	56
saplings: trees	0.76	1.06	0.91	0.64	0.68

[1]This is a complete count of all woody riparian species along the entire transect length.

TABLE 3-8
1994 RIPARIAN INVENTORY
Muleshoe Ecosystem
(BLM and TNC lands)

Stream	1994 density (# / acre)	1994 ratio (saplings:trees)
Upper Hot Springs Canyon	60	6.5 (52:8)
Lower Hot Springs Canyon	202	2.2 (138:64)
Bass Canyon	116	1.6 (71:45)
Swamp Springs Canyon	150	1.5 (89:61)
Redfield Canyon	474	3.0 (357:117)

Note: Density is the number of saplings and trees per acre of any woody riparian species (ash, sycamore, cottonwood, alder, or willow) present in the drainage. Saplings are defined as greater than 6.5 feet tall or greater than one inch dbh. Trees are defined as greater than six inches dbh.

TABLE 3-9
AQUATIC HABITAT INVENTORY
Muleshoe Ecosystem 1994
(BLM and TNC lands)

Habitat Parameter	Redfield Canyon	Bass Canyon	Hot Springs Canyon
Pools/mile	44	32	8
Linear Proportion of Pool Habitat	.20	.21	.03
Proportion of Pools w/ max. depth > 2 ft.	.71	.14	.33
Woody cover (ft^2/mile)	1,413	2,682	300
Undercut bank (ft/mile)	220	0	73
Bank stability	excel	good	excel
Overstory (%)	50	41	8

Rangeland Resource Data: Tables 3-10 through 3-11

TABLE 3-10
MULESHOE ALLOTMENT
EXISTING RANGE IMPROVEMENTS

PROJECT NAME	Township	Range	Section	Land Status	Units
Sycamore Canyon Well	11 S	20 E	22 SE	BLM	1 Well, 1 Tank
Swamp Springs Canyon Well	11 S	20 E	35 SE	BLM	1 Well
Old Pride Well	12 S	20 E	11 NE	Private	1 Well
Pride Cabin Well	12 S	20 E	11 SE	Private	1 Well, 1 Tank Corral, Cabin
NE Boundary Fences	11 S	20 E	20,28,33		Gaps
NE Bradberry Fence	12 S	20 E	4,9		2 Miles
Muleshoe Division Fence	12 S	20 E	10,15,23 26,27,28 32		6 Miles
Forest Boundary Fence	11 S	20 E	21,22,23 25,26		5 Miles
	11 S	21 E	31		1 Mile
Redus Canyon Fence	12 S	21 E	8		1 Mile
SW Boundary Fence	13 S	21 E	5,6,7		2 Miles
HQ Pasture Fences	13 S, 20 E	21 E	1,2,6		3 Miles, 2 Miles

TABLE 3-11
SOZA MESA ALLOTMENT
EXISTING RANGE IMPROVEMENTS

PROJECT NAME	Township	Range	Section	Land Status	Units
Muleshoe Division Fence	12 S	20 E	10,15,23 26,27,28,32		6 Miles
West Boundary Fence	12 S	20 E 19 E	10,15,19 20,21,30, 36		10 Miles 2 Miles
Mesa Reservoir 1	12 S	20 E	28 SW		1
Mesa Reservoir 2	12 S	20 E	29 SE		1
Poor Canyon Well	12 S	20 E	21 SE		1 Well, 1 Pump 1 Tank, 1 Drinker
Poor Canyon Pipeline	12 S	20 E	20,21,28 29		1 Mile, 1 Corral 1 Tank, 1 Drinker
Poor Canyon Wing Fence	12 S	20 E	28,29		.5 Mile
Lower Well Facility	12 S	19 E	36 NW		1 Well, 1 Tank
Eureka Spring Development	12 S	20 E	20 NW		1 Drinker

Appendix 4

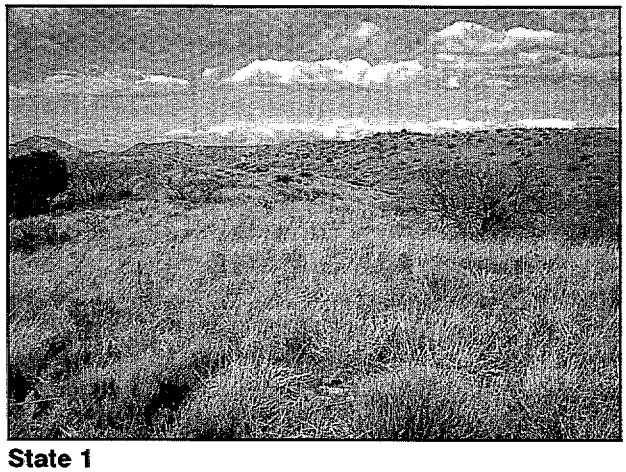
Grassland State Transition Model

The Muleshoe planning group decided to use a modification of "The State and Transition Model for Semidesert Grasslands of Southern Arizona and Northern New Mexico" (Dr. Richard Young, The Nature Conservancy, Arizona Chapter, 300 E. University Blvd. # 230, Tucson, Arizona 85705) to explain some of the significant processes and changes that occur in the semidesert grasslands. Young's model applies generally to the semidesert grasslands which occur on the Muleshoe CMA. The Muleshoe modified version applies specifically to the Volcanic Hills, Granitic Hills, and Loamy Upland Ecological Sites in the 12-to 16-inch precipitation zone of the Chihuahuan Semidesert Grasslands of the Southeastern Arizona Basin and Range (MLRA 41-3).

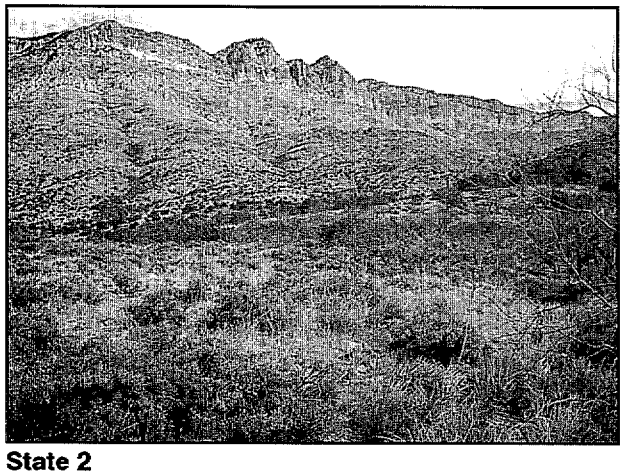
The major differences between the models are that the Muleshoe planning team found it necessary to define parameters for the vegetation "states" identified in Young's model in order to develop **measurable** upland vegetation objectives. The team also decided to plot the model on an "X-Y" coordinate system to make it easier to understand the transitions from one state to another. The following descriptions of the grasslands states are taken directly from Young's model:

Catalog of States

State I. Grasslands (co-)dominated by any of several native perennial grasses (mostly mid to tall grasses). A wide variety of shrubs, cacti, and stem and leaf succulents are common but not abundant in this community. Certain oaks and pinon pines may also occur in this community. Except on certain aspects or edaphic conditions, woody and succulent species are not sufficiently abundant to dominate the structure or functioning of the community. Grass species dominance is maintained by a fire regime of moderate to high frequency. Grazing by large ungulates (native or domestic) is light to moderate during the summer growing season.



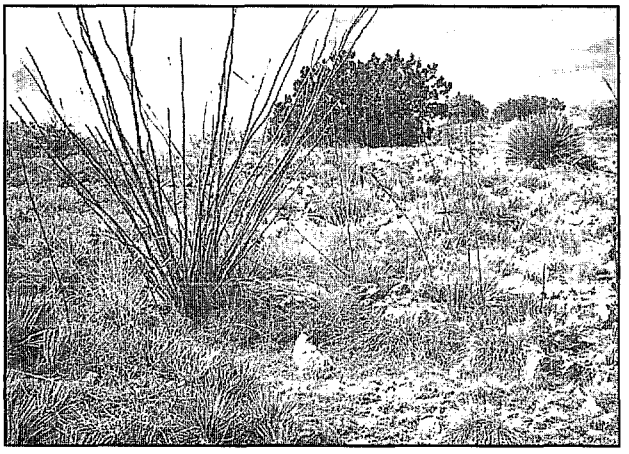
State 1



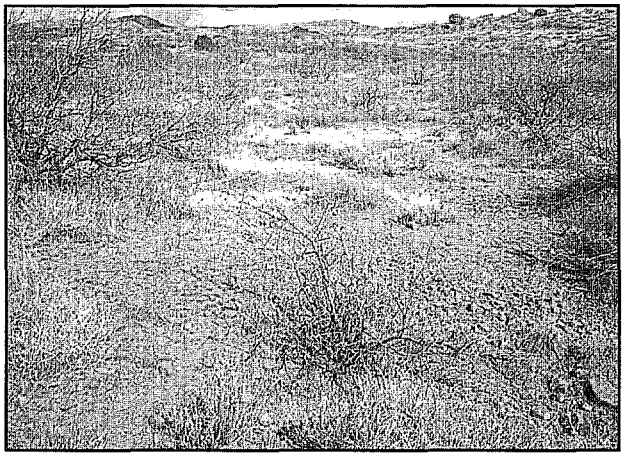
State 2

State II. A mixed shrub-perennial grass community is composed largely of the same species as are present in State I. The principle difference is the greater abundance and dominance of shrubs and succulents. Pinons and oaks may be more abundant, but not to the degree that a savannah type is evident. This community is maintained primarily by lower fire frequencies than that which occurs in the maintenance of State I; that is, a moderate fire frequency.

State III. A mixed shrub-grass community. Shrub and succulent species are more abundant than in State II, dominating the aspect and ecosystem functioning of these communities. Annual grasses, especially red brome (*Bromus rubens*), co-dominate with perennial grasses in the herbaceous layer. Composition of the perennial grasses differs from States I and II. Formerly dominated by long-lived, mid to tall species, the perennial grass component now consists largely of shorter-lived and lower-statured species, including threeawns (*Aristida spp.*) and curly mesquite (*Hilaria belangeri*). This state is maintained by moderate to heavy grazing during the growing season, and with low incidence of fire.



State 3

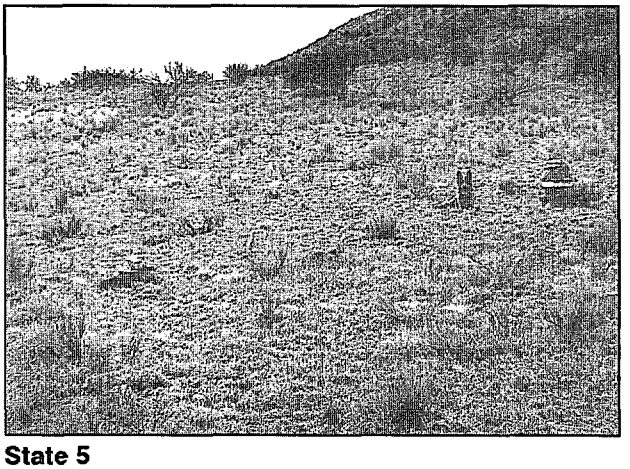


State 4

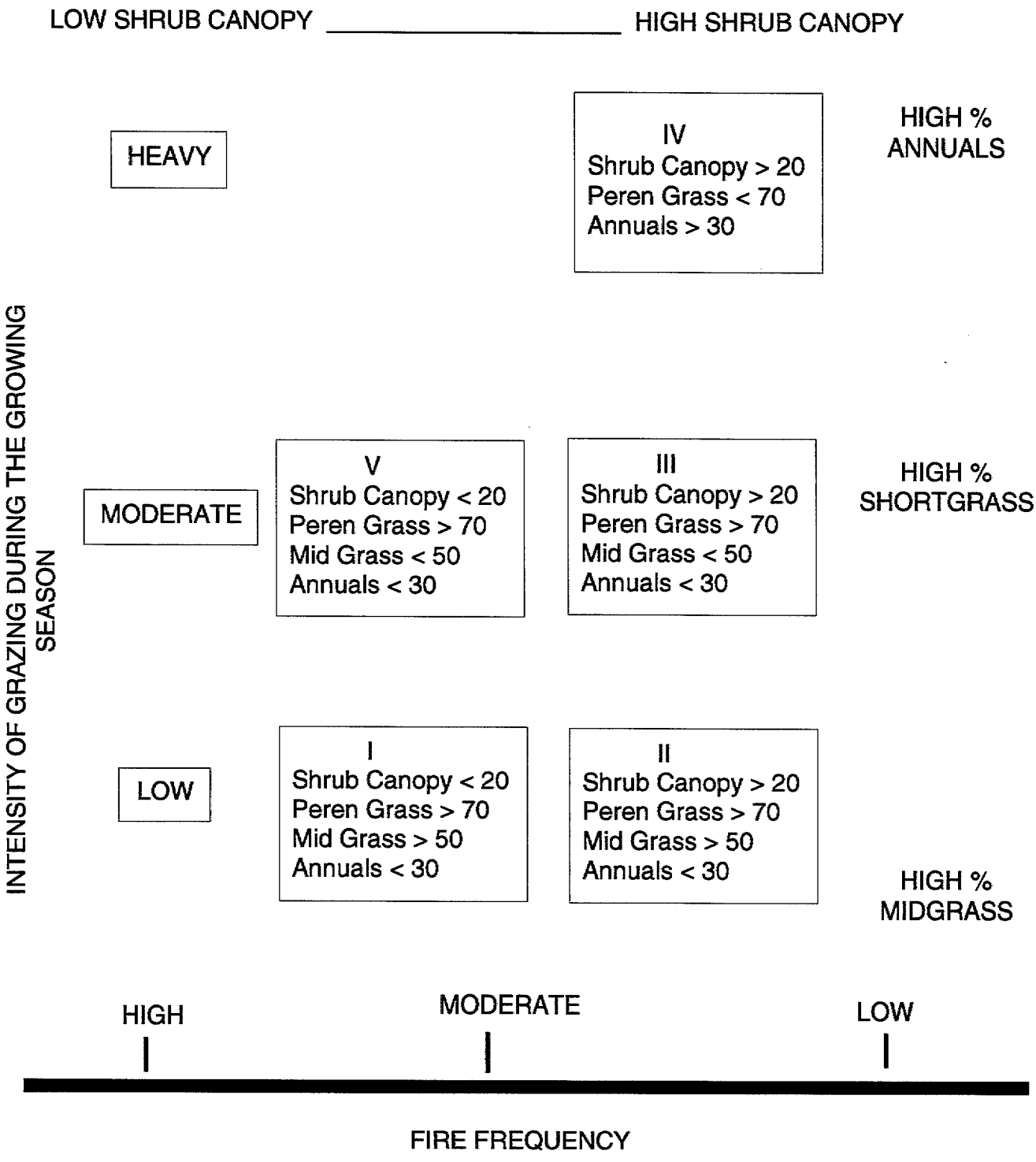
State IV. A mixed shrub-annual grass community. Composition differs little from State III, with the exception of the dramatic reduction of all perennial grasses. This state is maintained by moderate to heavy grazing during the growing season, and with low incidence of fire.

State V. A grassland community co-dominated by the same annual and perennial grasses found in State III. This state is maintained by moderate to heavy grazing during the growing season, and with moderate to high fire frequency.

Young identified two additional states in his model, States VI and VII, which addressed the invasive exotic Lehmann's lovegrass. Currently, this species is not present in significant amounts on the Muleshoe and therefore these states were not included in the modified model.



State 5


LOW SHRUB CANOPY
HIGH SHRUB CANOPY
HEAVY
IV
Shrub Canopy > 20
Peren Grass < 70
Annuals > 30
HIGH %
ANNUALS
MODERATE
V
Shrub Canopy < 20
Peren Grass > 70
Mid Grass < 50
Annuals < 30
III
Shrub Canopy > 20
Peren Grass > 70
Mid Grass < 50
Annuals < 30
HIGH %
SHORTGRASS
LOW
I
Shrub Canopy < 20
Peren Grass > 70
Mid Grass > 50
Annuals < 30
II
Shrub Canopy > 20
Peren Grass > 70
Mid Grass > 50
Annuals < 30
HIGH %
MIDGRASS
INTENSITY OF GRAZING DURING THE GROWING SEASON
HIGH
MODERATE
LOW
FIRE FREQUENCY

Appendix 5

List of Scientific Plant and Animal Names Used in this Document

Plants

Common Name	Scientific Name
Trees	
Arizona alder	*Alnus oblongifolia*
Arizona black walnut	*Juglans major*
Arizona cypress	*Cupressus arizonica*
Arizona sycamore	*Platanus wrightii*
Arizona white oak	*Quercus arizonica*
beargrass	*Nolina* spp.
black willow	*Salix nigra*
Bonpland willow	*Salix bonplandiana*
coyote willow	*Salix exigua*
Fremont's cottonwood	*Populus fremontii*
Goodding willow	*Salix gooddengii*
hackberry	*Celtis* spp.
juniper	*Juniperus* spp.
mesquite	*Prosopis glandulosa*
Mexican blue oak	*Quercus oblongifolia*
palo verde	*Cercidium* spp.
pinon pine	*Pinus edulis*
ponderosa pine	*Pinus ponderosa*
velvet ash	*Fraxinus pennsylvanica*
yew willow	*Salix taxifolia*
Shrubs and Cactus	
acacia	*Acacia* spp.
amole, shindagger	*Agave schotti*
buck brush	*Ceanothus fendleri*
burroweed	*Isocoma tenuisecta*
cat-claw	*Acacia greggii*
century plant (agave)	*Agave* spp.
creosote bush	*Larrea tridentata*
false mesquite	*Calliandra eriophylla*
manzanita	*Arctostaphylos* spp.
mimosa	*Mimosa* spp.
Mormon tea	*Ephedra* spp.
saguaro	*Carnegiea gigantea*
seepwillow	*Baccharis salicifolia*
snakeweed	*Gutierrezia sarothrae*
snowberry	*Symphoricarpos oreophilus*
whitethorn	*Acacia constricta*

Common Name	Scientific Name
Grasses and Grasslike	
black grama	*Bouteloua eriopoda*
bush muhly	*Muhlenbergia porteri*
cane beardgrass	*Andropogon barbinodis*
curly mesquite grass	*Hilaria belangeri*
deergrass	*Muhlenbergia rigens*
fluff grass	*Erioneuron puchellum*
plains lovegrass	*Eragrostis intermedia*
rushes	*Juncus* spp.
sedges	*Carex/Cyperus* spp.
sideoats gramma	*Bouteloua curtipendula*
slender grama	*Bouteloua filiformis*
sprucetop grama	*Bouteloua chondrosioides*
three-awns	*Aristida* spp.
vine mesquite grass	*Panicum obtusum*
wild rye	*Elymus* spp.
Forbs	
Aravaipa sage	*Salvia amissa*
desert zinnia	*Zinnia acerosa*

Animals

Common Name	Scientific Name
Fish	
Desert pupfish	*Cyprinodon macularius*
Desert sucker	*Catostomus clarki*
Gila chub	*Gila intermedia*
Gila topminnow	*Poeciliopsis occidentalis*
Loach minnow	*Rhinichthys cobitis*
Longfin dace	*Agosia chrysogaster*
Speckled dace	*Rhinichthys osculus*
Spikedace	*Meda fulgida*
Sonoran sucker	*Catostomus insignis*
Amphibians and Reptiles	
Canyon spotted whiptail	*Cnemidophorus burti*
Desert box turtle	*Terrapene ornata luteola*
Desert grassland whiptail	*Cnemidophorus uniparens*
Desert kingsnake	*Lampropeltis getulus splendida*
Desert tortoise	*Gopherus agassizzi*
Gila monster	*Heloderma suspectum*
Lowland leopard frog	*Rana yavapaiensis*

Common Name	Scientific Name
Mexican garter snake	*Thamnophis eques*
Southwestern earless lizard	*Cophosaurus texanus scitulus*
Texas horned lizard	*Phrynosoma cornutum*
Birds	
Baird's sparrow	*Ammodramus bairdii*
Bell's vireo	*Vireo bellii*
Botteri's sparrow	*Aimophila aestivalis*
Brown-crested flycatcher	*Myiarchus tyrannulus*
Common black-hawk	*Butegallus anthracinus*
Common yellowthroat	*Geothlypis trichas*
Gambel's quail	*Callipepla gambelii*
Gould's turkey	*Meleagris gallopavo mexicana*
Loggerhead shrike	*Lanius ludovicianus*
Mexican spotted owl	*Strix occidentalis mexicanus*
Montezuma quail	*Cyrtonyx montezumae*
Mourning dove	*Zenaida macroura*
Northern beardless-tyrannulet	*Camptostoma imberbe*
Northern gray hawk	*Buteo nitidus maximus*
Northern oriole	*Icterus galbula*
Peregrine falcon	*Falco peregrinus*
Scaled quail	*Callipepla squamata*
Song sparrow	*Melospiza melodia*
Southwestern willow flycatcher	*Empidonax traillii extimus*
Summer tanager	*Piranga ludoviciana*
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*
Western Wood-pewee	*Contopus sordidulus*
Western yellow bat	*Lasiurus ega*
Yellow-breasted chat	*Icteria virens*
Yellow warbler	*Dendroica petechia*
Zone-tailed hawk	*Buteo albonotatus*
Mammals	
Badger	*Taxidea taxus*
Black bear	*Ursus americanus*
Bobcat	*Felis rufus*
California leaf-nosed bat	*Macrotus californicus*
Coati	*Nasua nasua*
Coyote	*Canis latrans*
Desert bighorn sheep	*Ovis canadensis mexicana*
Greater western mastiff bat	*Eumops perotis californicus*
Javelina	*Tayassu tajacu*
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*
Mexican long-tongued bat	*Choeronycteris mexicana*
Mexican wolf	*Canis lupus baileyi*
Mountain lion	*Felis concolor*
Mule deer	*Odocoileus hemionus*
Occult little brown bat	*Myotis lucifugus occultus*

Common Name	Scientific Name
Red bat	*Lasiurus borealis*
Southwest cave myotis	*Myotis velifer brevis*
Spotted bat	*Euderma maculatum*
White-tailed deer	*Odocoileus virginianus*
Yellow-nosed cotton rat	*Sigmodon ochrognathus*

Appendix 6

Monitoring Protocols

Riparian Monitoring Protocol Muleshoe Riparian Areas

In 1994, key monitoring sites for riparian vegetation were established and sampled in Hot Springs Canyon (2 sites-1 in Upper Canyon, 1 in Lower Canyon), Swamp Springs Canyon (1 site), Redfield Canyon (1 site), and Bass Canyon (1 site). An additional site will be established in Double R Canyon in 1997. Ten belt transects, 10 feet in width, and spanning the entire floodplain, perpendicular to the stream, were set up at each site; the distance between transects was approximately 250 feet. Within each belt transect, the total number of seedlings, saplings, mature and old trees were counted by species. The length of each transect (across the flood plain) was also recorded so that densities of the different age-classes could be calculated for each site. Seedlings were defined as plants less than 1 inch diameter at breast height (dbh) or less than six feet tall; saplings were defined as plants 1-6 inches dbh or greater than six feet tall; mature trees were 6-20 inches dbh; and old trees were greater than 20 inches dbh. For seedlings, utilization (based on browsing of apical stem) was measured on a subsample of 50 or 100 seedlings (depending on availability) spread over the 10 bands. At each band, the lengths of six different ecological sites (aquatic, regeneration zone, river wash, lower terrace sand bottom, mid terrace sand bottom, upper terrace loamy bottom, upper terrace loamy woodland) were also measured across the flood plain. These lengths were used to calculate the percentages of each ecological site at each key location. Two photo points were established at each site and two photographs were taken at each photopoint, one facing upstream and one downstream.

Aquatic Habitat Monitoring Muleshoe Streams

Permanent monitoring stations have been established in stream reaches in conjunction with riparian monitoring stations. No less than ¼ mile will be monitored at each station in order to get a representative sample of aquatic macrohabitats present. Within each monitoring segment, habitats will be classified sequentially using the stream habitat classification schemes in McCain et al. (1989) and Hawkins et al. (1993); additional habitat types applicable to Muleshoe streams may be described and used once they have been reviewed and accepted. The following information will be recorded by habitat: length, average channel width and water depth, maximum depth, canopy cover overhanging grass/shrubs (ft^2), floating vegetation(ft^2), emergent vegetation(ft^2), debris cover(ft^2), overstory canopy cover(ft^2), the three dominant substrate types estimated to the nearest 10% (boulder, cobble, pebble, gravel, sand, and silt cover), and primary contribution to pool formation (either bedrock or vegetation). Bank stability will be evaluated by measuring the linear quantity of stable and unstable (or disturbed) stream bank and its apparent cause following methods of Platts et al. (1983).

Monitoring Streamflows Muleshoe Streams

Streamflows (base-flows) will be measured, using a Marsh-McBirney or Pygmy meter at established sites: Hot Springs Canyon (two sites), Bass (one site), Double R (one site), and Redfield Canyon (one site). These sites will be monitored on a monthly basis at specific points of compliance recognized by ADWR. Once a stream gauge is installed on Hot Springs Canyon and is accepted by ADWR as a new point of compliance, the two stream discharge monitoring sites will be phased out. Standard procedures for quantifying stream discharge will be followed (Buchanan and Somers, USGS, 1980).

Monitoring Native Fish Muleshoe Streams

Since 1991, five permanent monitoring stations were established for native fish monitoring along the perennial portion of Hot Springs, eight permanent stations along Bass, two permanent stations along Double R and two permanent stations along Wildcat Creek. At each station, 100-200 m of aquatic habitat is sampled for native fish using fine meshed (1/8 inch) seines or a backpack electroshocker, depending on the stream conditions. Prior to sampling, the stream transect is divided into macrohabitats using the same classification system employed for the Aquatic Habitat Monitoring. Afterwards, each macrohabitat is sampled independently by a single pass of the appropriate sampling equipment. Fish numbers are enumerated by species and age-class (juveniles vs. adults). These data are recorded for each macrohabitat along with the distance of individual seine hauls or the number of shocking seconds in that macrohabitat. From these data, the relative abundance by species and age-class is calculated and an index (catch per unit effort) to absolute abundance is estimated by normalizing fish numbers by the distance or time sampled. Two photopoints have been established at each monitoring station, one on the downstream end of the transect and on the upstream end. Two photographs are taken at each photopoint, 1 looking upstream, the other looking downstream, to document riparian habitat along the transect and adjacent to it. All monitoring stations on all streams are sampled annually in October.

Monitoring Note: In addition to fish monitoring, TNC has been monitoring habitat features in relation to fish abundance and species composition. Each of the sequential macrohabitats along a stream transect is recorded along with the length of that macrohabitat (McCain et. al. 1989), width, 8-10 random depth measurements, maximum depth, areal cover of woody debris (in m^2) and length of undercut bank (in meters). After collecting several years of these data, TNC plans to analyze them for relationships between fish abundance and habitat characteristics. In 1992, TNC augmented the habitat measurements to include estimates of current velocity, substrate composition, and percent cover by riparian vegetation along monitoring transects. They are also collecting biweekly stream flow measurements. Their goal is to develop a model for fish populations that can predict changes in the relative abundances of fish species with changes in habitat characteristics. Using this model, the agencies involved with the Muleshoe CMA will be able to better interpret monitoring data and evaluate whether changes in the relative abundance of species is due to natural or human-caused changes in aquatic habitat or to the impact of exotic fish. Thus, the model along with continued collection of monitoring data will provide an "early warning" system for identifying threats to native fish populations.

The aquatic habitat monitoring associated with the Riparian Objective in this plan does not correspond to that for the fish monitoring due to differences in monitoring goals. The fishery monitoring was put in place in 1991 based on fish abundance, while the aquatic habitat monitoring associated with the Riparian Objective was put in place to observe changes in habitat characteristics with changes in riparian habitat in segments with the least geologic channel control (i.e., areas with wide flood plains influenced primarily by vegetation).

Ecological Site Inventory

The purpose of the Ecological Site Inventory was to provide baseline data of the soil and terrestrial vegetation on the Muleshoe CMA for use in management decisions for current and future use. The inventory includes mapping soils, vegetation and important botanical characteristics.

Soils Mapping

An Order 3 Soil Survey was completed for the Muleshoe CMA by Norgren and Spears in 1990. This survey is on file at the Tucson Field Office. The mapping units are delineated on aerial photographs and USGS 7.5' topographic maps at a scale of 1:24,000. Each unit is identified by a map symbol which is composed of one, two, or more major soil components. The following legend correlates the map units with their respective Ecological Site:

TABLE 6-1
SOIL SURVEY - MULESHOE CMA
Mapping Units and Ecological Sites

Map Symbol	Map Unit	Ecological Site
1	Greyeagle Cobbly Loam	Limy Upland
2	Argiustolls-Haplustolls Complex	Volcanic Hills
3	Greyeagle-Eloma Complex	Limy Upland Clay Upland
5	Arizo-Brazito-Riverwash Complex	Sand Bottom Loamy Bottom
6	Caralampi Gravelly Loam	Loamy Upland
7	Ustorthents-Haplargids- Rock Outcrop Complex	Volcanic Hills Clay Hills
8	Rock Outcrop-Torriorthents Complex	Granitic Hills
9	Lemitar-Rock Outcrop Complex	Tuff Hills
11	Ustorthents-Rock Outcrop Complex	Volcanic Hills
12	Romero-Haplargids- Rock Outcrop Complex	Volcanic Hills
13	Lampshire-Argiustolls Complex	Volcanic Hills
14	Cumulic Haplustolls	Loamy Upland

Vegetation Mapping and Ecological Site Condition Ratings

Field mapping of vegetation consisted of correlating soil complexes with ecological sites, then delineating the ecological sites on USGS 7.5" topographic maps. The ecological sites were then inventoried to determine the ecological condition rating. Ecological condition was determined by comparing the present plant community with that of the Potential Natural Community for that ecological site. The range site descriptions used to determine PNC were those developed by the Natural Resources Conservation Service. (See the SCS National Range Handbook for discussion of range condition determinations.)

An ecological site classification provides a basis for identification and delineation of distinct land units in order to predicting potential values, management needs, and responses of a given area. The ESI provides a means of stratifying the present character or status of vegetation and soil in such a way as to provide an estimate of present resource values and to predict the consequences of a change in management or the continuation of present management.

Four classes were used to express the degree to which the composition of the present plant community reflects that of the potential:

TABLE 6-2
ECOLOGICAL CONDITION CLASSES

Condition Class	Estimated % Existing Plant Community that is Potential for the Site
PNC	76 - 100
High	51 - 75
Mid	26 - 50
Low	0 - 25

Vegetation Sampling Procedures

The following vegetation sampling procedures were followed in the delineated ecological site write-up areas to determine the current conditions:

A 500-foot-long transect (or two parallel transects - 250 feet each) was run in each ecological site where there was a notable difference in appearance. One hundred sample plots (40 cm X 40 cm) were read along the transect at five foot intervals. Vegetation composition, production, species frequency, and ground cover were measured in each plot.

Vegetation Composition

The Dry Weight Rank method of estimating plant species composition was used (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle (University of Arizona, Division of Range management, Extension Report 9043).

One hundred - 40 cm X 40 cm quadrants were sampled along each 500-foot transect. The three most abundant species on a dry weight basis were identified in the quadrant and ranked. The species yielding the highest annual above ground production was given a rank of 1, the next highest a 2, and the third highest a 3. If a quadrant had less than three species, more than one rank was assigned to some species. The dry weight rank method assumes that a rank of 1 corresponds to 70% composition, rank 2 to 20%, and rank 3 to 10%. These weighing factors were derived empirically (Mannetje and Haydock, 1963). To estimate percent composition for the species within the write-up area, the ranks for each species were summed, multiplied by the weighing factor for each rank, and divided by the sum of the weighted ranks for all species combined.

Vegetation Production

The comparative yield method for estimating range productivity was used (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle University of Arizona, Division of Range management, Extension Report 9043).

Five reference quadrants or standards (40 cm X 40 cm) were selected adjacent to the transect to represent the range in dry weight of standing plant biomass which was likely to be encountered along the 500-foot transect. The five standards were clipped and weighed to document the production. The transect was then run sampling 100 quadrants along the transect. The vegetation yield in each plot was then compared to the standards and placed in the closest rank.

To estimate the total plant production in lbs/acre, the number of quadrants in each of the comparative yield standards is summed and multiplied by the number of grams clipped for that standard. This total is then multiplied by 0.557 to convert the grams to lbs/acre for that standard. This is done for all five

standards. These totals are then added together to calculate the total lbs/acre for the ecological site. To calculate the production of an individual species, the percent composition of the species can be obtained by multiplying the percent composition for that species by the total production for the site.

Plant Species Frequency

The relative abundance of each plant species in each ecological site write-up area was determined using the Pace Frequency sampling method (Methods of monitoring rangelands and other natural area vegetation) by G. Ruyle, University of Arizona, Division of Range Management, Extension Report 9043).

Again 100 quadrants (40 cm X 40 cm) were sampled along a 500-foot transect. The frequency of occurrence for each species was calculated. Herbaceous vegetation species (grasses and forbs) were counted as occurring if they were rooted in the quadrant. Trees and shrubs were counted if they were either rooted in or had canopies that overhung the quadrant. The probability of occurrence for a species (total frequency) was calculated by dividing the number of occurrences by the total number of quadrants (100) sampled.

Ground Cover

Ground cover was measured using along the same 500-foot transect by collecting point intercept data. A pointer was attached on the quadrant frame used for sampling. One hundred points were recorded along the transect. The following categories were used to group cover:

TABLE 6-3
Ground Cover Categories

Bare Ground	0 to 0.24 inches
Gravel	0.25 inches to 3 inches
Rock	>3 inches
Litter (includes annual plants)	
Live Vegetation	
Grass/Forb Basal Cover	
Canopy Cover	
Shrubs/Trees	
Basal Cover	
Canopy Cover	

The ground cover "hit" was determined by visualizing the pointer from a raindrop viewpoint. The first category of cover that the raindrop would intercept on its path to the ground was counted as the "hit". The percent cover was then calculated by dividing the number in each category by the total number of points sampled (100).

In addition to the data collected in the ESI conducted by the BLM, The Nature Conservancy has collected additional vegetation and cover data on the Muleshoe CMA in order to track changes in the composition and structure of semi-desert grasslands over time and to relate the changes to different management activities (Monitoring Upland Vegetation on the Muleshoe Ranch CMA: Summary of 1991 Results), by Dave Gori. The Nature Conservancy, Arizona Chapter, 1994. Most of the studies and their respective protocols are essentially the same as those conducted by the BLM in the Ecological Site Inventory. The future monitoring protocol will combine the two agencies methodology so that data collection is standardized.

Proposed Vegetation Monitoring

The monitoring methodologies to be used and the timeframes and responsibilities for collection are as follows:

TABLE 6-4
Upland Vegetation Monitoring Schedule

STUDY TYPE	METHOD	TIMEFRAME	RESPONSIBILITY
Trend Studies	Pace Frequency	Every 5 Years	BLM/TNC
Ecological Condition	BLM - ESI	As Necessary	BLM
Plant Composition			
Herbaceous Species	Dry Weight Rank		BLM/TNC
Woody Species	Clipping Tables		BLM
Plant Production			
Herbaceous Species	Comparative Yield		BLM/TNC
Woody Species	Clipping Tables		BLM
Substrate Composition			TNC
Shrub Canopy Cover	Need protocol		TNC
Ground Cover	Point Intercept		BLM

FINAL MULESHOE ECOSYSTEM MANAGEMENT PLAN

ENVIRONMENTAL ASSESSMENT

EA-AZ-060-98-004

Prepared by:
The Muleshoe Ecosystem Planning Team
Karen Simms, Team Leader

I. INTRODUCTION

A. Background

The Muleshoe Ecosystem is located in the Galiuro Mountains in southeastern Arizona within northern Cochise County and southern Graham County. The Ecosystem planning area encompasses the Muleshoe Cooperative Management Area (CMA) which is jointly managed by the Bureau of Land Management (BLM), U.S.D.A. Forest Service (FS), and The Nature Conservancy (TNC). The planning area includes approximately 26,500 acres of BLM public lands, 22,000 acres of FS forest lands, 6,000 acres of private lands and 3,000 acres of Arizona state lands. These lands comprise major portions of the Redfield, Hot Springs, and Cherry Springs watersheds. Included within the planning boundary are the Redfield Canyon Wilderness and Hot Springs Area of Critical Environmental Concern (ACEC), administered by the BLM, and a portion of the Galiuro Wilderness, administered by the FS.

The Muleshoe Ecosystem Management Plan (EMP) was developed to provide guidance for the Muleshoe CMA, including the Redfield Canyon Wilderness and Hot Springs ACEC, in conformance with the Safford District Resource Management Plan (RMP) (1994). This environmental assessment analyzes the potential impacts of proposed actions and management alternatives that were considered in the Muleshoe EMP.

More detailed background information on the ecosystem is provided in the Introduction to the final Muleshoe Ecosystem Management Plan.

B. Purpose and Need for the Proposed Action

The purpose of the actions proposed in the Muleshoe Ecosystem Plan is several fold: to provide management direction for the Muleshoe CMA, implement decisions made in the Safford RMP, implement multiple use management in a manner that ensures ecosystem health and integrity with an emphasis on riparian and grassland biotic communities, and to fulfill the intent of Congress to protect and preserve the area for the use and enjoyment of present and future generations as wilderness.

C. Conformance to Land Use Plans

The proposed plan is in conformance with the approved Safford District RMP and Final Environmental Impact Statement (EIS) (Partial Record of Decision I, September 1992 and Partial Record of Decision II, July 1994). The Safford RMP directs that a Coordinated Resource Management Plan be developed for the Muleshoe CMA including the Hot Springs ACEC. The plan is to be prepared by an interdisciplinary team of BLM resource specialists, landowners, lessees, academia, and representatives of other state and federal agencies with management responsibilities in the planning area. The plan will propose specific resource allocations and prescriptions for multiple uses to achieve identified resource objectives. Range suitability will be determined through a range evaluation process as part of the resource inventory for the plan, but suitability will not be used to establish livestock carrying capacity.

The RMP leaves livestock use on the Hot Springs ACEC in suspension pending resource allocations made in the interdisciplinary activity plan. The RMP authorizes livestock use on the new Soza Mesa Allotment at an initial stocking rate of 44 cattle yearlong. The RMP directs that watershed conditions in the upland areas of the Muleshoe CMA will be improved by vegetation manipulation and sound range management practices. Prescribed natural fire will be one of the tools used to achieve the resource objectives for the Muleshoe CMA.

D. Relationship to Statutes, Regulations, or Other Plans

The proposed plan actions comply with mandates of the Federal Land Policy and Management Act (FLPMA) of 1976, which require the Bureau of Land Management to manage public lands for multiple use on a sustained yield basis.

The Muleshoe EMP includes interdisciplinary activity planning for the Muleshoe CMA including the Redfield Canyon Wilderness, Hot Springs ACEC, and the Soza Mesa Allotment. This approach eliminates the need to develop separate wilderness, ACEC, wildlife habitat, allotment, recreation or cultural activity plans. In the Muleshoe EMP, resource objectives are integrated and management prescriptions include actions to achieve resource objectives as well as constraints to achieve compatible and sustainable levels of public land uses.

Those actions pertaining to the Redfield Canyon Wilderness comply with the Wilderness Act of 1964 and the Arizona Desert Wilderness Act of 1990, and are guided by wilderness management policy as outlined in BLM Manual 8560.

Those actions relating to cultural resources are managed according to mandates set forth by the National Historic Preservation Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act, management policy specified in BLM Manual 8100, and the Programmatic Memorandum of Agreement between the BLM, Arizona State Historic Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation.

Those actions pertaining to threatened and endangered species management conform to regulations of the Endangered Species Act of 1973 as amended, BLM Manual 6840, and relevant endangered species recovery plans which include the following: The Desert Pupfish Recovery Plan (USFWS 1993), Sonoran Topminnow [Gila and Yaqui] Recovery Plan (USFWS 1984)(soon to be replaced with Gila topminnow revised recovery plan now in final stages of draft), Spikedace Recovery Plan (USFWS 1991), Loach Minnow Recovery Plan (USFWS 1991), **draft** lesser long-nosed bat recovery plan, Mexican Gray Wolf Recovery Plan (USFWS 1982), and American Peregrine Falcon Recovery Plan (USFWS 1984). The Muleshoe EMP plan meets the Sikes Act (1974) requirements for a wildlife habitat management plan. The Muleshoe EMP replaces those portions of the Mescal-Dripping Springs Habitat Management Plan (HMP) which applied to lands on the Muleshoe CMA. The Mescal-Dripping Springs HMP directed the agencies to prepare a new, separate HMP for the Muleshoe. The Muleshoe EMP is consistent with BLM's Arizona Fish and Wildlife 2000 Plan and with the Arizona Game and Fish Wildlife 2000 Strategic Plan.

Those actions pertaining to range management are consistent with the Eastern Arizona Grazing EIS (1986), conform to provisions of the Taylor Grazing Act of 1934, and meet requirements of the Public Rangeland Improvement Act of 1978. All proposed grazing and rangeland improvement practices are consistent with Arizona Standards for Rangeland Health and Guidelines for Grazing Administration.

The Ecosystem Resources section on water quality, and the proposed management actions and monitoring strategies for each objective in the Muleshoe EMP comply with the requirements of Arizona Department of Environmental Quality and the Clean Water Act for state water quality certification. The management actions described in Chapter VII for grazing and recreation management are consistent with the best management practices identified by ADEQ for maintaining and improving surface water quality.

II. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action Alternative

The proposed action is the adoption and implementation of the Muleshoe Ecosystem Management Plan. In general, the proposed action would provide for the protection and enhancement of ecosystem resources, processes and function including riparian and upland vegetation, wildlife, wilderness, cultural and social environment values while allowing for compatible and sustainable levels of use. Proposed management actions that could have environmental effects are listed below. These actions are described in greater detail in Section VII (Objectives, Management Actions and Monitoring) of the Muleshoe Ecosystem Management Plan.

1. Riparian Objective

The objective for the riparian areas on the Muleshoe is to achieve or maintain proper functioning condition and high seral ecological states for the riparian vegetation.

Proposed actions to achieve the riparian objective include pursuing instream flow water rights, removing non-native vegetation, implementing closure of Hot Springs Canyon riparian area to vehicles, eliminating livestock grazing in riparian areas, designating Bass Canyon as a day use area, ensuring that recreation activities in riparian areas do not cause adverse impacts to stream bank stability, and prohibiting commercial collection of plant materials or wood-cutting in riparian areas. Casual uses and traditional use collecting by Native Americans will be allowed. Prescribed fire units will include riparian areas, but special practices will be used to avoid burning them except for small experimental areas.

2. Upland Objective

For the Muleshoe portion of the planning area, the upland objective is to improve watershed conditions and wildlife habitat by converting shrub-invaded grassland to more open, denser stands of grass with mid-tall statured perennial grasses replacing annual or short growth forms of perennial grasses. For the Soza Mesa and Soza Wash portions of the planning area, the upland objective is to maintain current high and potential natural community (PNC) range conditions and also for Soza Mesa to improve mid- condition range to high or PNC.

Proposed actions to achieve the upland objective include implementation of a prescribed fire program and changes in livestock grazing management. Livestock management actions include reducing the size of the Muleshoe Allotment to exclude riparian areas, placing the grazing on the remaining area of the allotment in Pride Basin in nonuse until desired upland vegetation conditions are achieved and then constructing necessary range improvements when grazing is resumed. In addition, active grazing will continue on Soza Mesa and Soza Wash under rotational grazing plans, and the necessary range improvements on Soza Mesa will be cooperatively developed.

3. Fish and Wildlife Objective

The fish and wildlife objective is to maintain and enhance the biological diversity of the Muleshoe Ecosystem by re-establishing extirpated native species to the Muleshoe and removing threats to, and supplementing or extending the ranges of existing native species on the Muleshoe.

Proposed actions to achieve the fish and wildlife objective include evaluating habitat potential for reintroduction, reestablishment, range extension or supplementation of fish and wildlife including

several native fish species, bighorn sheep, and turkey. Where habitat potential is present, the appropriate action will be pursued using AGFD established procedures. Other actions include inventories for exotic species and removal of any exotics which are threatening native species and inventories of natural and artificial water sources to assess the adequacy of permanent water for wildlife.

4. Cultural Resources Objective

The objective for cultural resources (prehistoric and historic properties and artifacts as well as Native American traditional use plants) is to protect and preserve them on the planning area while making them available for scientific, public, and sociocultural uses.

Proposed actions to achieve the cultural objective include conducting Class III inventories of the planning area on a project-by-project basis and if funding becomes available, conducting a combined Class II survey and ethnoecology study of the planning area, posting regulatory and interpretive signs about cultural resources, classifying traditional use plants and areas, creating a partnership education program with universities, fencing livestock out of significant cultural properties, and pre-treating cultural properties that could be impacted by prescribed burns.

5. Wilderness Objective

The wilderness objective is to maintain and improve wilderness values of naturalness and outstanding opportunities for solitude and primitive, non-motorized types of recreation in the Galiuro Wilderness and Redfield Canyon Wilderness.

Proposed actions to achieve the wilderness objective include placing wilderness boundary signs, limiting group size to 15 persons, maintaining or redeveloping necessary range improvements, providing for wildlife management in wilderness including annual surveys and maintenance and development of waters, attempting to acquire wilderness inholdings if they become available, and limiting prescribed burns in wilderness to those occurring by natural ignitions.

6. Social Environment Objective

The social environment objective is to maintain or improve the current range of open-space recreation opportunity settings (rural, semi-primitive motorized, semi-primitive non-motorized and primitive) that provide existing recreational activities on the Muleshoe.

Proposed actions to achieve the social environment objective include developing pullouts along Jackson Cabin road, constructing a visitor kiosk with sign-in station at the beginning of Jackson Cabin road, developing informational recreational brochures, maintaining and improving hunting opportunities, pursuing legal public access as identified in the Safford RMP, implementing road closures in the Safford RMP, and maintaining Jackson Cabin and Soza Mesa roads to four wheel-drive standard.

B. No Action Alternative

Under the no action alternative, current management would continue under the guidance of the Safford RMP and Muleshoe CMA. An integrated, interdisciplinary approach would not be pursued for the ecosystem. Individual activity plans for wilderness, ACEC, wildlife habitat, recreation, cultural and allotment management would be prepared as needed, and implementation would likely be disjunct and relatively uncoordinated. Adoption of this alternative would require amending the Safford RMP since it directs that a Coordinated Resource Management Plan be developed for the Muleshoe CMA including the Hot Springs ACEC.

1. Current Riparian Management

Full suppression of all wildfires on BLM public lands including riparian areas would continue. Suspension of livestock use would continue indefinitely including within riparian areas (see Upland Management).

2. Current Upland Management

Full suppression of all wildfires on BLM public lands would continue. Prescribed fires could be implemented in upland areas on a case-by-case basis through individual environmental assessments. TNC would continue their fire program on their deeded lands. FS would continue modified suppression on FS lands.

The current grazing preference of 3,204 AUMs (267 cattle yearlong) on the public lands in the Muleshoe Allotment No. (4401) would be recognized. Suspension of livestock use would be continued indefinitely. The existing grazing allotment boundaries would remain as they are, and no range improvement projects would be constructed. Active livestock grazing use would be authorized at some date in the future when the resources in the upland and riparian areas have recovered sufficiently. The BLM would authorize active use of the 267 cattle on a yearlong basis at this point. Any future adjustments in the number of livestock allowed would be based on BLM's monitoring and evaluation procedures.

The current grazing preference of 502 AUMs (44 cattle yearlong) on the Soza Mesa Allotment (No. 4402) would be recognized and authorized. Range improvements on the allotment would be constructed on a case-by-case basis. Rangeland monitoring would be continued and future adjustments of livestock numbers would be made based on evaluation of the trend and utilization studies.

The current grazing preference of 60 AUMs (5 cattle yearlong) on the public lands portion of the Soza Wash Allotment (No. 4409) would continue to be recognized and authorized.

Wildlife waters and other wildlife habitat projects would be constructed on a case-by-case basis.

3. Current Fish and Wildlife Management

The BLM would cooperate with the U.S. Fish and Wildlife Service (USFWS) in the development and implementation of Recovery Plans for federally listed threatened and endangered species and would cooperate with USFWS and AGFD on proposals for re-establishment, supplementation or range expansion for federally listed threatened and endangered species, and with AGFD for non-listed species on public lands within the Muleshoe CMA.

The BLM would cooperate with state and federal agencies, universities, conservation groups, and other organizations with proposals for wildlife habitat improvements, inventories, and research projects on the public lands portions of the Muleshoe CMA.

BLM, AGFD, TNC, AND FS would continue cooperative inventory and monitoring of fish and wildlife populations and habitats on the CMA.

4. Current Cultural Resources Management

Selected properties would be identified for scientific and educational use through a separate cultural resources activity plan. Some interpretation and stabilization of cultural properties could be accomplished through educational partnerships and private funding. A study of the CMA's ethnoecology could also be accomplished in this manner.

5. Current Wilderness Management

Pending the development of a separate Wilderness Management Plan, visitation to the wilderness would be uncontrolled. Monitoring would continue on a non-routine basis to record problems occurring primarily through lack of

boundary fencing, signing, and literature explaining wilderness rules and regulations. All wildfires, whether human caused or natural, are suppressed using the appropriate response from the Interim Guidelines for Wildfire Suppression in Wilderness (BLM 1995).

6. Current Social Environment Management

Extensive recreation opportunities of an unstructured and dispersed nature would continue to be available throughout the planning area. Except for closed areas designated in the Safford District RMP, off-highway vehicle (OHV) use on the public land portions of the planning area is limited to existing roads and trails. Two OHV closed areas are designated within the Muleshoe Planning Area. These are Hot Springs Canyon and the Pipeline Road. The Pipeline Road can be used only for administrative purposes.

No provisions for special designations or developed recreation areas are proposed under this alternative. Visitor information is available through the various offices having jurisdiction. Little public information is available at the site or on the ground.

Road maintenance is allowed as provided by the Safford District RMP for the public land portion of the road between Hooker Hot Springs and Jackson Cabin. However, such maintenance is done as needed depending upon available funding.

C. Description of other Alternatives Considered

The following alternatives were considered but eliminated from detailed study when the team determined that the alternative was not compatible with meeting plan objectives or for other reasons. The rationale for not studying each of these alternatives in detail is presented following the description of each alternative.

1. Riparian Objective

Alternative Actions for Fire Management in Riparian Areas

a. Prescribed, both natural and management ignited, fire units will include riparian areas. Riparian areas will be burned as part of the units used to manage upland vegetation. If fire leaves the pre-determined boundary, then the fire must be suppressed.

Rationale for not pursuing alternative: The role of fire in riparian areas is not well understood. Historically, fires occurred naturally in the grassland areas of the Muleshoe Ecosystem without suppression. It is likely that portions of riparian areas adjacent to grasslands maintained by fire were directly impacted on a regular basis. However, the frequency and amount of impact are unknown. The impacts from natural ignitions occurring at a localized source are likely to differ from those from management ignitions which usually are more widespread and burn more thoroughly. Riparian habitat is a rare habitat type which has been diminished greatly over the last 150 years. This is some of the most productive and valuable wildlife habitat, harboring a variety of rare plants and animals. It is too important to fish and wildlife to impact on a large scale with controlled burning. Spring burning in riparian areas is likely to kill or displace rare wildlife species and may cause fish kills.

b. Prescribed, both natural and management ignited, fire units will not include riparian areas. Riparian areas will not be burned.

Rationale for not pursuing alternative: This management action is more conservative than the preferred in its approach to protecting riparian habitat. However, it neglects to address the need to understand the role of fire in riparian areas adjacent to fire maintained semi-desert grasslands.

Alternative Action for Management of Livestock Grazing in Riparian Areas

Under this alternative, there would be no livestock use in the riparian areas during the growing season (March through October). Two options were considered: changing the season of grazing use for the allotment to winter use only, or defering grazing use in the riparian pastures. Numerous different grazing strategies could be proposed for the area which would result in winter grazing of the riparian areas. Two are presented here:

a. Seasonal Grazing Strategy (Winter Grazing - October through March)

Under this strategy, no new pasture fencing would be required. The entire allotment would be used for grazing as one large pasture from October through March. If this strategy is selected, the grazing preference would be 334 cattle from 11/01 to 3/31 at 78% public land use. This equates to 1,563 AUMs for the Muleshoe Allotment.

Rationale for not pursuing alternative: It was anticipated that the amount of streambank disturbance resulting from the livestock trampling, and utilization of riparian plant species would exceed the amount allowable in the riparian objective. Due to the narrow steep sided nature of the canyons along the riparian corridors, even in the cooler winter weather cattle would tend to spend an excessive amount of time in the creek bottoms. Exposed loose soil would be subject to erosion resulting from winter flood events. Livestock distribution would be poor across the allotment without additional fencing. Cattle would find preferred areas which they would tend to overuse, while other areas would be only lightly used. The overuse of the preferred upland sites (loamy upland range sites) would result in increases in shrub cover and reduction in the composition of the tall-mid stature perennial grass species. The upland objectives would not be achieved.

b. Yearlong Grazing Strategy - Riparian pastures used during non-growing season.

Under this strategy, pasture fencing could be constructed to isolate those areas adjacent to the perennial stream segments. These riparian pastures could be incorporated into a pasture rotation where they could be used during the non-growing season (October through March). Approximately eight miles of fencing would be required. This strategy would use the Pride Basin area during the growing season, then either moving the cattle through a series of riparian pastures or scattering the cattle in all the riparian pastures through the winter. Under this strategy, the grazing preference would be 86 cattle yearlong at 65% public land use. This equates to 671 AUMs. If a cow-calf operation is being run, the herd size would be limited to the total number of animals that could be run in the Pride Basin area during the growing season (86 cattle for the allotment for the entire year).

Rationale for not pursuing alternative: While this strategy would reduce the selective grazing habits of the livestock and improve distribution over the range, the impacts resulting from the higher stock densities in riparian pastures during use periods would exceed those allowable under the riparian and aquatic objectives. Use limits on riparian plant species and the amount of streambank disturbance would be too high. Even if a rotation was developed that provided yearlong rest of riparian pastures after use, it was anticipated that damage to streambanks and riparian vegetation in the year of high intensity grazing would not be restored by the subsequent rest from grazing (Impacts of grazing on wetlands and riparian habitat, Jon M. Skovlin 1984).

2. Upland Objective

Alternative Actions for Fire Management in Uplands

a. Allow only natural ignition fires to burn within a specified prescription (No management-ignited fire for both wilderness and non-wilderness portion of the CMA).

Rationale for not pursuing alternative: Natural ignition may not occur frequently enough and fires may not burn hot enough under the current ecological conditions to effectively burn units. In addition, the timing of the ignitions would not

be controlled. Wildfires could occur during periods when desirable perennial grasses would actually be harmed, or during periods which would expose excessive areas of bare soil to wind and water erosion.

b. Management-ignited prescribed fires in wilderness also.

Rationale for not pursuing alternative: It is not known whether or not natural prescribed fire will occur frequently enough to improve vegetative characteristics of the Redfield Wilderness, so the team also considered the use of management ignited fire in wilderness. The team concluded that natural prescribed fire with periodic evaluation to determine the adequacy of such a fire regime was the most consistent with the wilderness objective. In order to promote the wilderness value of naturalness, lightning caused ignition of fires is preferred to management-caused ignition even if upland restoration is slower.

Alternative Actions for Management of Livestock Grazing in Uplands-Muleshoe Allotment

a. Under this alternative, the existing grazing preference of 267 cattle yearlong would remain. All of the lands in the Muleshoe would be grazed, and the necessary pastures and waters to implement a rotational grazing plan would be developed. There are a variety of different options for implementing this alternative. Two options are discussed below:

Option 1:

Under the first option, livestock grazing use would be initiated while the prescribed fire program is implemented

Rationale for not pursuing option 1 of alternative a: There would not be enough pastures to allow implementation of the prescribed fire program if livestock grazing is initiated at the full active preference. Pastures to be burned would need to be rested from livestock grazing for a year or two prior to ignition to allow sufficient fine fuels to accumulate to carry a fire. The burned pasture would also need to be rested from livestock grazing for another year or two following a burn treatment to allow new perennial grass seedlings to become established and gain vigor. Because the proposed prescribed burning program could burn up to 20 percent of the burn units each year through three to five cycles over 20 years, the cattle operation would quickly be restricted to too small an area to make it feasible.

Option 2:

Under the second option, the area would be grazed immediately **without** implementing the management ignition prescribed fire program.

Rationale for not pursuing option 2 of alternative a: Under this alternative, proper livestock grazing would be initiated which could eventually increase the composition of the desirable perennial grass species. However, if the prescribed fire program is not implemented and livestock grazing is initiated, it is unlikely that sufficient fine fuels (grass cover and litter) would accumulate to allow natural ignition of wildfires on a broad enough scale to reduce the current shrub cover. The upland vegetation objective would not be achieved, and fire would not return as a natural process in the ecosystem.

b. Under this alternative, the Muleshoe Allotment would be reduced to the Pride Basin only with a preference of 346 AUMs, and the remainder of the allotment would be retired. This strategy would involve using the Pride Basin Pasture (non-riparian area pasture) for yearlong grazing use and excluding livestock grazing on the rest of the Muleshoe allotment. The necessary pastures and waters would be developed to implement a rotational grazing plan. This alternative differs from the proposed action in that the prescribed fire program would not be implemented.

Rationale for not pursuing alternative b: Under this alternative, proper livestock grazing could be initiated which could increase the composition of the desirable perennial grass species. However, if the prescribed fire program is not implemented and livestock

grazing is initiated, it is unlikely that sufficient fine fuels (grass cover and litter) would accumulate to allow natural or managed ignition of wildfires in the Pride Basin livestock use area to reduce the current shrub cover. The upland vegetation objective would not be achieved in the Pride Basin area, and fire would not return as a natural process in the ecosystem.

c. Under this alternative, the Muleshoe Allotment would be retired and the existing grazing preference would be cancelled on public lands.

Rationale for not pursuing alternative c: A livestock grazing operation can be conducted within the Muleshoe Cooperative Management Area in the Pride Basin Area on a sustainable basis, while achieving the resource objectives identified in the proposed action.

The Federal Land Policy and Management Act of 1976 mandates that the Bureau of Land Management shall manage the public lands under the principles of multiple use and sustained yield, except where the land has been dedicated to specific uses by provisions of another law. No such provisions which would preclude the use of the resource for livestock grazing are in effect on the Muleshoe CMA. Livestock grazing operations can be conducted in designated wilderness areas, Areas of Critical Environmental Concern, or in riparian habitats if the grazing is managed in a manner which preserves and protects the future health , productivity, and natural processes on these public lands.

The livestock grazing alternative in the proposed action modifies the existing allotment boundary to exclude the riparian areas, reduces the grazing preference to 346 AUMs on the public lands, and defers any active livestock grazing until the use of prescribed fire and additional rest has brought about the desired changes in the vegetation communities. Analysis of the grazing proposed in the upland sites of Pride Basin indicates that the action could be accomplished while meeting the resource objectives in the plan.

Since a livestock grazing operation can be conducted within the Muleshoe Cooperative Management Area in the Pride Basin Area on a sustainable basis, while achieving the resource objectives identified in the proposed action, the planning group decided to propose active grazing in Pride Basin. The action is consistent with the procedures for developing the management prescriptions for livestock grazing within the Hot Springs Watershed ACEC as detailed on page 4 of the Partial Record of Decision II for the Safford District Resource Management Plan (July 1994). It was also felt that the proposed livestock use in both Pride Basin and on Soza Mesa presented a combination of balanced and diverse resource uses within the planning area.

Alternative Actions for Management of Livestock Grazing in Uplands-Soza Mesa Allotment

a. Under this alternative the season of livestock grazing use would be changed to winter use only on the Soza Mesa portion of the CMA.

Rationale for not pursuing alternative: The current BLM grazing lessee is conducting a yearlong grazing operation on the allotment. Since he has no grazing lands owned or leased apart from this allotment, he would have no place to go with the cattle during the rest of the year. He has proposed a rotational grazing program, that would provide proper management and achieve the objectives stated in the plan. The Soza Mesa allotment does not contain significant riparian habitat, and is not located in the Hot Springs Watershed ACEC.

3. Social Environment Objective

Alternative Action for OHV Management

a. Designation of segment of Great Western Trail (OHV Trail) along pipeline road or any other suitable route.

Rationale for not pursuing alternative: A proposal to include the pipeline road as a segment in the proposed Great Western Trail OHV system was rejected because it was not

consistent with decisions made in the Safford RMP. The Safford RMP closed the pipeline road to public use for safety, resource and cost reasons. The "road" was cut during the laying of a gas pipeline and was not intended to be used as part of the transportation network of the planning area. This road is not engineered for vehicle traffic and presents a liability. The proposed segment traverses very rough terrain with extremely steep inclines. To modify and maintain such a road to allow general OHV traffic would not be cost effective. In its present state, the pipeline road is eroding and allows for unregulated vehicle access to adjacent riparian areas in Hot Springs Canyon The Hot Springs Canyon riparian area includes sensitive and significant riparian resources which were recognized in designation of this area as the Hot Springs Watershed ACEC.

III. AFFECTED ENVIRONMENT

A description of the affected environment can be found in Section IV (Ecosystem Resources) of the attached Final Muleshoe Ecosystem Management Plan.

IV. ENVIRONMENTAL CONSEQUENCES

The following critical elements have been considered and would not be affected by implementing either the Proposed Action or No Action Alternatives:

1. Prime or Unique Farmlands
2 Native American Religious Concerns
3. Solid or Hazardous Wastes
4. Wild and Scenic Rivers
5. Environmental Justice

Potentially affected would be:

1. Air Quality
2. Areas of Critical Environmental Concern
3. Cultural Resources
4. Floodplains
5. Threatened or Endangered Species
6. Water Quality
7. Wetlands or Riparian Zones
8. Plants identified as Traditionally Useful by Native Americans (Western Apache Indians).
9. Wilderness

Environmental Justice

The term "environmental justice" refers to the fair treatment of all races, cultures, and income levels with respect to laws, policies, and government actions. In February 1994, Executive Order 12898 titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was released to Federal agencies. This order requires each Federal agency to incorporate environmental justice as part of its mission. Federal agencies are specifically ordered to identify and address disproportionately high and adverse effects of its programs, policies, and activities on minority and low-income populations.

To ensure compliance with Executive Order 12898 on Environmental Justice, the BLM Tucson Field Office identified any minority or low-income populations that the Proposed Action could disproportionately affect. BLM determined that the nearest community to the Muleshoe Ecosystem Management Plan is ten

miles away. There are no significant number of minorities or low income populations identified living in those areas.

A. Impacts of the Proposed Action

Impacts to Air Quality from Proposed Action

Impacts to air quality from the proposed action are expected to be short-term, negative; restricted to nearby areas, disperse rapidly in relation to distance from the CMA, persist from one to three days annually, and not pose any threat to human health in the Willcox Valley and the nearby communities of Redington and Cascabel. No long-term impacts to air quality are anticipated.

Implementation of the prescribed fire program under the upland and riparian objectives will have short-term negative impacts on air quality. During the ignition period of each burn unit (generally two-three days), air quality in the immediate area will diminish. During the burning period, the fires will produce a cloud of smoke which will be visible in nearby communities. It is our professional judgement that due to the remote locations of the burn units, the distance from local communities, and the prescription of having winds be from the north or northwest, the smoke from most units will drift in a southeasterly direction across the Willcox valley and dissipate without posing a significant human health risk. Down slope winds in the evenings may result in smoke drifting into the small communities of Redington and Cascabel for some units. In the longterm, air quality will not be significantly affected by the prescribed fires due to the dissipation of smoke following the short burn periods. No other actions under the other objectives will impact air quality either positively or negatively.

Impacts to Watershed Functions and Processes from Proposed Action

Watershed functions and processes, including riparian and aquatic habitat components are expected to enjoy long-term benefits from implementation of the EMP. Management actions that decrease invading woody shrubs, increase the extent and vigor of grassland communities, protect riparian and aquatic communities from direct impacts of livestock and recreation uses as well as the implementation of a prescribed fire program are expected to result in long term improvement of the natural processes and functions of the Muleshoe watersheds.

Implementation of management actions contained in the EMP are expected to attenuate erosion, runoff, sedimentation, and flood peaks while promoting enhanced infiltration, aquifer recharge, and plant community biodiversity, as well as improved streambank stability, and baseflow conditions in nearby streams. These impacts are expected to accrue over a decade or more and primarily impact local watersheds of the Muleshoe CMA. Some minor positive impacts may reach the San Pedro River but would quickly be overwhelmed by conditions and events on the large watershed upstream of the confluence of the San Pedro River with Hot Springs Canyon and Redfield Canyon.

Potential negative impacts to riparian areas and watershed functions and processes, resulting from prescribed fire, are expected to be infrequent, short term, and limited in extent. These impacts are expected to be limited to small portions of the local watersheds and short stream reaches.

Continuous yearlong livestock grazing in the past on the Muleshoe ranch has had a negative effect on watershed hydrologic function by removing protective vegetation and by causing trampling disturbances. The resulting reductions in the vegetation cover have increased raindrop impact, decreased soil organic matter and soil aggregates, and decreased infiltration rates (Blackburn 1984). Other related detrimental impacts include increased overland flow, reduced soil water content, and increased erosion. Continuous yearlong grazing also resulted in large sacrifice areas around water sources, and creation of

established trails to and from points of livestock concentrations.

Implementing the proposed management actions to achieve the riparian and upland vegetation objectives would have positive long-term effects through restoring watershed functions and processes. These objectives are closely interrelated, and achieving the riparian objectives is largely dependent on achieving the upland objectives.

Implementing the prescribed fire program and livestock management program should result in the desired conversion of shrub-invaded grassland to more open grassland dominated by mid-tall statured perennial grasses. This should generally improve the protection of the soils, by increasing the vegetative ground cover and litter components (Martin 1978). The increase in the taller bunchgrasses would increase the ground cover, produce better shading of the soils, reduce evaporation by wind, and produce greater stability by increasing the biodiversity of the existing plant communities. These higher seral plant communities which are expected due to improved management would contain the taller bunch grasses such as plains lovegrass, sideoats grama, and cane beardgrass. These species are deeper rooted than the lower seral species like curly mesquite and threeawns, and will better hold the soils together. The expected improvement in range condition under the proposed management would result in an increase in the density and vigor of perennial grass plants. The increase in plant densities and size of plants would slow overland flow of water, impede formation of rills and gullies, and trap sediments. With the improved infiltration of moisture into the soil and the reduced evaporation resulting from the expected accumulation of plant litter, more water will be retained for use by plants or, potentially, for deposition into underground aquifers.

Restoration from shrub cover to grass cover should result in increased infiltration rates and improved ground water recharge as well as a gradual enhancement of riparian function. Improved groundwater recharge results in water being ultimately transmitted to streams or aquifers located lower in the basin. (Lewis 1968, Bosch and Hewelet 1982, Johnson and Carothers, Stabler 1985). This is expected to result in some increase in baseflow and reduced peakflows. Increases in riparian vegetative cover, vegetative structure and composition will result in improved stream bank stability and a channel morphology that is more stable and flood resistant (Platts 1991). As a result of improved riparian function, increased overbank flow, increased shallow aquifer water capacity and recharge may result. This is anticipated to provide benefits of increased drought resistance of the creeks and springs, as well as, enhanced riparian development. Upstream improvement may benefit downstream segments through indirect and cumulative positive impacts such as reduction of flood peak discharge, attenuation of flood discharge and increased base discharge (Hendrickson and Minckley 1984).

The effects of fire are largely unpredictable as they are subject to a large number of factors including: topography, soil characteristics, fuel loads and moisture, vegetation density, variability in weather and microclimates on slopes. These factors and more alter fire severity and leave a mosaic of post fire conditions across the burned landscape (Beschta 1987). The hydrologic response of a watershed influences stream function. Repeated controlled burning will alter the watershed response to rainfall on both a short-term and long-term basis.

Implementing the prescribed fire program under the riparian and upland objectives could have some short-term negative impacts, but is expected to have long-term positive impacts to watershed function and processes as discussed above. The contributions from each burn unit to overall improvement in watershed function will vary depending on the site potential. Areas with deeper soils and gentler slopes will have better establishment of grass cover and are likely to contribute substantial benefits to watershed function; whereas, areas with rocky slopes will see less grass cover established and marginal contributions. Burning steep slopes with fine soils poses the greatest risks of accelerating erosion, but can also benefit greatly from improved grass cover as long as burns are carefully planned on these sites.

The short-term impacts to riparian areas from prescribed fires are expected to be minimal since fire will be limited to upland areas with some small scale riparian burning. Negative impacts to riparian areas are minimized by the use of a specific prescription that controls the intensity of the burn and its spread into riparian vegetative zones and by keeping the burn units small enough to protect streams from the extensive burning of a whole watershed. Since only a portion of the watershed of any single stream will be burned annually, the amount of impact any stream will receive from prescribed burns in any one year is limited. Thus, the burning will be spread out over space and time which buffers the stream channel and water quality from the negative impacts of extensive burning. The management of prescribed burns will emphasize precautions to minimize the chance of fire damaging riparian areas. This will require buffer zones and other mitigation to negative short-term fire effects on riparian and aquatic areas.

With mitigation measures in place, there is still a small possibility of increased sedimentation and flood volume that can alter stream channel development should the following conditions occur: 1) where a large portion of the burn was severe enough and had enough shrubs to cause the formation of a hydrophophic (water resistant) soil layer on, 2) steep slopes and 3) heavy rains that occur before the decomposition of the hydrophibic soil layer (al Medina, pers. comm.). Proper planning for each prescribed fire will limit increases in sedimentation and run off that could affect fish habitat quality. It is possible that short stream reaches will be affected. The duration of the effect is likely to dissipate in a few seasons to a years time. These conditions are expected to occur only infrequently over the life of the plan.

Cattle grazing of Soza Mesa is not anticipated to have a negative impact on watershed processes. Proper utilization (40 percent) of perennial grasses caused no measurable change in runoff or erosion compared to no grazing (Rich and Reynolds 1963). The periodic concentration of livestock numbers in the pastures being utilized, particularly around water sites, would cause localized compaction of soil and trampling of vegetation for short periods of time. The disturbance of these sites would increase the opportunity for erosion and sediment transport offsite. Studies by Dadkhah and Gifford (1980) in the intermountain west show that trampling by livestock causes a decline in infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50 percent.

There maybe slight adverse impacts to watershed functions and processes from implementing management actions under the fish and wildlife, cultural, wilderness, or social environment objectives. However, these impacts are expected to be negligible.

Impacts to Fish and Wildlife from Proposed Action

Fish and wildlife habitat and populations are expected to experience long-term benefits from implementation of the Muleshoe EMP through long term improvement of the natural processes and functions of the Muleshoe watersheds. Species that depend on riparian, aquatic or grassland habitat are expected to enjoy the greatest benefits.

Improved riparian and aquatic habitat conditions are expected from management actions in the EMP that reduce or eliminate direct impacts in riparian areas such as livestock exclusion and limitations on types and duration of acceptable recreation use. Native fish and avian species are expected to benefit the most from the improved riparian and aquatic conditions.

Increases in the extent and vigor of the grasslands in the Muleshoe CMA are anticipated from implementation of prescribed fire and livestock management actions in the EMP. The result will be improved habitat conditions for grassland dependent avian and mammal species in the local area. Benefits to grassland dependent species may come at a slight cost to species better adapted to shrub or shrub-grassland habitat. Although shrub and shrub-grassland areas will be reduced, they will not be eliminated. Implementation of the EMP will provide a mosaic of habitat types in the ecosystem including open grassland, shrubland and shrub-grassland mixes.

Improved habitat conditions are expected to translate into increases in numbers of individuals in some wildlife populations and perhaps increases in the overall numbers of species utilizing these areas. Negative impacts to species preferring shrublands and shrub-grasslands are expected to be slight within the CMA and negligible on near by areas, outside the CMA boundary. Positive impacts to fish and wildlife populations will primarily occur within the Muleshoe CMA and are not likely to extend very far beyond its boundaries, at least in the short-term. Over the long-term, habitat improvements may result in additional populations of species becoming established on the CMA through either managed reintroductions or natural movements into the area. These populations potentially could contribute individuals for colonization of surrounding areas.

The attainment of tree density and age structure as stated in the riparian objective is anticipated to have high positive value to the fishery and associated aquatic community. Riparian tree development should promote aquatic habitat diversity in the form of pool, run, and riffle habitat development with varied hydraulic, light, temperature, and thermal conditions. Such diversity is important for maintenance of self-sustaining populations of the existing fish communities. Continued improvement of the riparian plant community may improve aquatic habitat conditions to the point where some drainages could support additional fish species in the future (e.g. Gila chub in Hot Springs Canyon). Higher densities of riparian trees improve shading of the water surface which moderates water temperature extremes for the fish and other aquatic species. For Gila chub, riparian trees provide living root wads and large woody materials that promote the scouring of pools and provide escape cover, essential habitat elements for this species.

In the desert Southwest, it is estimated that nearly 80% of all terrestrial wildlife species use riparian habitats at one or more stages of their lives (Chaney et al. 1990). These wildlife

species require the water, food and cover that a healthy riparian ecosystem offers.

Implementation of management to achieve the riparian objective would maintain or enhance recovery of riparian resources for wildlife. A dense and structurally diverse riparian area already occurs in some areas and will develop further in others. This high quality riparian habitat provides valuable wildlife habitat and contributes to increased biodiversity. Continued exclusion of cattle from the riparian zones would maintain or enhance recovery of riparian resources for riparian-dependent species. Achieving the riparian objective could provide high-quality potential habitat for southwest willow flycatchers. An increased density of mature age-class trees which are suitable for cavities is expected to develop over time in riparian areas providing potential nesting habitats for cactus ferruginous pygmy owl and Mexican spotted owl.

The acquisition of water rights through the State of Arizona will provide legal protection for fishery and wildlife resources through maintenance of riparian and aquatic habitats resulting in positive long-term benefits to these resources for future generations. The installation of stream gauges, if feasible, would result in positive impacts for fishery and wildlife resources though increased hydrologic information used to understand and manage aquatic and riparian habitat. In some cases the gauges could be used to maintain instream water rights once they are obtained. Installation of these gauges is anticipated to have minor short-term negative impacts to the immediate area of gage location. Information derived from the development of ecological site guides coupled with stream gage information is anticipated to provide a solid foundation for future management of riparian areas; the impact is expected to be positive for riparian resources and dependent fish and wildlife.

The risk of the unauthorized stocking of non-native fishes by visitors is low since most of the streams and springs are too small to support most game fishes. The limitation on bank disturbance will help define an upper limit to recreation should it expand in the future to levels that begin to impact aquatic habitat.

Removal of non-native vegetation is anticipated to promote ecosystem integrity and function

which will prevent a sudden alteration of biological interrelationships. Exotic plant species may provide some of the critical elements which wildlife depend upon, but in many cases these plant species are lacking in some characteristic which animals require such as cover, food utilization, and temperature regulation. Exotic vegetation has been shown to have a negative effect on breeding success of avian species (Anderson et al 1977, Carothers 1977). Salt cedar is not ideal nesting habitat for willow flycatcher, as branching is often too widely spaced to properly support nests at desired building heights (Tibbits et al. 1994). Monitoring is anticipated to identify non-native plant invasion problems before they become difficult to manage. Therefore, removal operations are not anticipated to disturb riparian or other habitats significantly. The subsequent re-establishment of native vegetation, which is likely to follow exotic species removal, will positively impact native wildlife species using riparian areas by providing additional or higher quality escape, nesting or resting cover within riparian areas.

Implementing off-highway vehicle restrictions in riparian areas will reduce the susceptibility of these areas to erosion and will decrease disturbance to wildlife during all months of the year. This action will have a positive impact on fish and wildlife populations.

Prescribed burning may result in some short-term, negative impacts to limited reaches of stream from sedimentation and increased flood flows. The long-term benefits from prescribed burning and the resulting improvement in the watershed condition are anticipated to outweigh the potential risk of short-term impacts to aquatic wildlife and fish. This benefit is expected to occur in the form of improved watershed function that, in turn, positively affects stream function through increased stream stability and habitat diversity. Hydrologic processes such as aquifer recharge, sediment transport, and storm runoff are anticipated to be affected in a manner that improves fish habitat.

The inclusion of small areas of riparian habitat in prescribed burn units for experimental purposes should have no long-term impacts to fish and wildlife. Short-term localized displacements of individuals from burned areas may occur and some less-mobile individuals may not survive. The development of special management guidelines for riparian areas in the operational burn plans will greatly enhance mitigation efforts and decrease impacts on wildlife resources.

Implementation of the prescribed burning program is anticipated to result in an increase in grassland and reduced shrub component on the Muleshoe portion of the CMA. This change would tend to benefit those wildlife species which are better adapted to a grass-dominated vegetative state. However, a mosaic of grassland and grass-shrubland would probably result in the overall landscape. This would provide a diversity of habitat types which should still accommodate those species which prefer the cover the shrubs provide.

In general, grasslands that have been invaded by trees and shrubs often have greater wildlife diversity than those without the tree and shrub components. Bird species and population densities tend to be lower in grasslands than other areas (Germano 1983, Carothers and Johnson 1975, Graul 1980, Johnson et. al. 1980). However, these areas are of importance to maintaining regional biodiversity by providing habitat for grassland specialists. Grasslands are important to a variety of wildlife including graminivorous bird species, golden eagles, burrowing owls, scaled quail, meadowlarks, Cassin's sparrows and pronghorn antelope.

Fire is a natural process within desert grasslands. Wildlife responses to prescribed burning are expected to be positive. The new, nutritious growth which occurs following burns benefits most wildlife species directly or indirectly. Some species benefit from more open terrain following fire, and others benefit from increased densities of grass plants over the long-term. For many grassland avian species, fires are required to set back plant succession to earlier ecological stages. In addition, seed production has been noted to be greater on burned sites rather than unburned sites during the first post-fire growing season (Bock et al. 1976). Loggerhead shrikes use grasslands for hunting small mammals and large invertebrates. Botteri's and Cassin's

sparrows use mature grasslands for breeding and foraging habitat (D. Krueper pers. obs., Bock et al. 1976). Wintering Baird's sparrows are found in expansive grasslands which are dependent upon fire to maintain grass cover and reduce shrub growth (J. Whetstone pers. comm.). Slight negative impacts might be expected from loss of shrub species for some avian species which use them for singing perches, (Bock et al. 1976), but overall negative impacts caused by loss of shrubby species would be minimal. Conversion to more open grasslands is expected to benefit granivorous bird species which are prey for several raptor species, including peregrine falcons. The fires will also result in more open terrain for foraging by these species.

Small mammals and many reptile species will also benefit from periodic fires in the uplands, as it will provide dense grass cover for feeding and reproduction. There is a potential that some desert tortoise will be out of their burrows during prescribed fire activities which will expose them to the risk of burning. However, in those areas known to have desert tortoise, precautions to avoid injury to desert tortoise will be included in individual burn plans which will help minimize negative impacts to this species.

The prescribed fires will have little impact on foraging habitat for the lesser long-nosed bat and Mexican long-tongued bat. Prescribed fire is not being used in areas with saguaros. Prescribed fires will occur in some areas with paniculate agaves, however densities of paniculate agaves on the Muleshoe are very low. Minimal loss of paniculate agaves (*Agave palmeri*) is expected. Since most stands of agave occur on rocky soils where fuels are light, it is likely that few agave will be severely scored by the proposed prescribed fire. On the Canelo Hills TNC Preserve in similar habitat, prescribed fire resulted in only 3.9% mortality of agave (D. Gori, 1995. pers. comm.). Fires are expected to burn in a patchy distribution due to the large amount of rocky terrain in the watersheds. In addition, units will be burned using sequencing and checkerboard patterning to ensure that burn blocks are spread across different watersheds. For the first five years, no more than 20% of the total acreage within all burn blocks will be treated with prescribed fire annually. These methodologies will help ensure that even if small numbers of agaves are lost following prescribed fire, adjacent areas will still have agaves available.

Large mammals will benefit from the increased herbaceous forage available after the fire. Amole, which supplies forage for javelina, will be reduced by prescribed burning. However, this is not anticipated to reduce javelina populations since sufficient amole is anticipated to remain in areas less susceptible to burning and javelina have flexible dietary habits. Bighorn sheep may benefit from prescribed burns through enhanced visibility, reduced predation, and increased forage availability (Peek et. al. 1979, Graf 1980, Risenhoover and Bailey 1980, Martin 1983 in Bighorn sheep hab. eval. 1995); this is especially true for the Wildcat Hills which have become heavily invaded by brush.

Limiting future livestock use to the Pride Basin area would benefit wildlife species in several ways. More forage would become available for herbivores. On the Muleshoe Allotment, forage which would have been consumed by livestock, would be made available to wildlife species, such as white-tailed deer and mule deer. In addition, direct physical destruction of avian nests due to cattle use would be eliminated in non-grazed areas and could be minimized in future grazed areas by adjustments in season of use, utilization levels, and locations of range improvements. Reducing the size of the Muleshoe allotment to the Pride Basin Area (where few agaves are present) and keeping the grazing in suspension until desired upland ecological conditions are met, will protect foraging habitats for lesser long-nosed bats. Keeping livestock and livestock developments away from riparian areas should minimize the impacts of cowbirds (*Moluthrus spp.*) which parasitize willow flycatcher by laying eggs in the flycatcher's nest (Armour 1991, Tibbits et al. 1994).

Maintenance of livestock and wildlife waters will benefit wildlife populations directly and indirectly by providing a permanent, and therefore, dependable source of water.

Implementation of a rest/rotational grazing system within the Soza Mesa uplands will benefit wildlife species in a variety of ways. With rest, the current grasslands will be able to produce more forage for mule deer and other herbivores. Increased cover will also result in higher numbers of nesting and wintering birds. Implementing a rotational grazing system on the Soza Mesa allotment will help protect any agave seedlings by providing periodic rest in pastures.

The assessment of habitat for and the initiation of actions to expand or develop additional populations of fish and wildlife species in danger of extinction and struggling game species will have a positive impact on fish and wildlife.

Implementation of these management actions will allow for fish and wildlife populations to be re-established into historic habitat or will augment a species' population. Some of the species presently identified for action will have increased security against extinction should new populations or range extensions succeed. Augmentation of existing populations or establishment of new populations of game species will expand hunting opportunities and/or help prevent local extirpation of less stable populations. Many of these species represent elements of the ecosystem that are under-represented or missing.

The expansion of existing or introduction of new populations of federally listed wildlife or those species likely to become listed, within the CMA, has the potential to have a large positive impact. By implementing recovery actions through this plan, the security of these endangered species will increase while expenses and delays associated with compliance with the ESA may be reduced.

All four of federally listed fish species identified in this plan have historic distributions in the San Pedro River drainage. The recovery plans for the spikedace and loach minnow specifically mention Redfield Canyon as a potential reintroduction site. Because many of these fishes became rare before thorough surveys were conducted, there historic presence for many locations, especially less noteworthy streams, is unknown. However, their known presence in larger or more prominent waters in a drainage indicate that re-establishment anywhere in the drainage where natural dispersal occurred is likely to play a natural and largely benign role in the existing ecosystem.

The inventory and control of foreign fish and amphibian species introduced (i.e. non-native species) to the area will have a large positive impact to the native fish community through increased security from foreign diseases carried by or displacement by aggressive, competitors and predators.

Management actions undertaken for cultural resource management will have little or no impact to fish and wildlife populations on the Muleshoe CMA. Minimal disturbance to wildlife populations will occur if an excavation or a lengthy inventory were conducted in a limited area during the breeding season of a sensitive species, such as a bird of prey, but potential impacts could be easily mitigated if deemed to be detrimental to the animal.

Fish and wildlife populations would likely have a slightly beneficial impact from management proposed to achieve the wilderness objective. Providing informational kiosks will educate the public as to the sensitivity of wildlife populations and their habitats. Conducting annual big game surveys in wilderness will benefit wildlife populations by providing information needed to manage them. Providing for maintenance of wildlife water developments will ensure permanent water for wildlife at the two locations in wilderness. Keeping group sizes small will minimize human disturbance to wildlife in the wilderness. Most of the suitable peregrine nesting habitat is within designated wilderness. The restrictions placed on wilderness activities because of this designation will benefit the falcons by minimizing disturbances from aircraft, power equipment, and large groups of people.

Management actions to achieve the Social Environment Objective will have only minor, short-term impacts on fish and wildlife populations. The limited scope of recreational activities and development will minimize negative impacts to wildlife populations. The proposed level of recreation use will allow

wildlife populations to remain in areas with little chance for displacement by human activity.

Due to the remoteness and low visitor use (< 1700 visitors annually) on the planning area, dispersed recreation impacts are expected to be minor and limited to short-term displacements of individual animals as recreationists pass through an occupied area while hunting, hiking, riding, etc. Most recreationists are expected to continue to concentrate at the TNC headquarters and trail system and recreational use is expected in scattered areas of the remainder of the planning area at very low, dispersed levels.

The proposed maintenance of roadways will have little negative impact on wildlife populations. These activities could result in short-term displacement of wildlife species. However, maintenance of the Jackson Cabin Road to four-wheel drive standards minimizes the number of visitors to the more remote areas of the Muleshoe resulting in lesser disturbance of wildlife and higher quality wildlife viewing and hunting opportunities. Construction of waterbars and other structures within roadways will reduce erosive runoff into riparian systems, thus positively affecting fish and wildlife populations. The addition of water bars to the pipeline corridor is likely to have indirect beneficial impacts to fishery resources through reduced sedimentation to Hot Springs Canyon where excessive sedimentation of undetermined origin is suspected of limiting pool development which in turn limits Gila chub establishment.

Implementing road closures will help minimize disturbance to wildlife in sensitive areas currently being accessed. Entry to the pipeline road utilizing a walk-through gate will lessen pressure from illegal entry of off-highway vehicles and thus benefit sensitive wildlife species such as common black-hawk and western yellow-billed cuckoo. Pullouts will be placed where erosion will be minimized and will least impact sensitive wildlife species, especially desert bighorn sheep, raptors and other state or federal listed species.

Interpretive brochures will educate the public to ethical outdoor behavior and responsible wildlife viewing opportunities. Improved interpretive materials that include information about wildlife including threatened and endangered fishes will improve understanding and appreciation of these resources resulting in a positive impact.

None of the proposed actions will effect any known roosts of lesser long-nosed bats as none have been located within or adjacent to the planning area. The proposed actions will not result in any modification of mines or caves which could be potential roosting sites for this species. None of the proposed actions will effect any known nests of peregrine falcons. Dispersed recreation activities are unlikely to disturb any peregrine nest sites or any lesser long-nosed bat roost sites, if any are discovered, because of the low visitation and remoteness of the planning area.

Impacts to Special Designation Areas from Proposed Action

Special designation areas, the Hot Springs ACEC and the Redfield Canyon Wilderness, are expected to experience a mixture of low intensity positive and negative impacts.

Overall impacts to special designation areas are expected to be positive and local in scope. The wilderness values of the contiguous Galiuro Wilderness Area or other wilderness areas in the region are not expected to be impacted by implementation of the EMP.

Hot Springs Area of Critical Environmental Concern

Implementing the EMP is expected to cause positive impacts to the Hot Springs ACEC. This ACEC was designated because it contains valuable riparian vegetation communities, populations of five native fish, as well as nesting habitat for raptors and it requires specialized management to meet the needs of these values. Management actions that benefit watershed processes and functions as well as fish and wildlife populations further the purposes for which this ACEC was designated. The positive impacts of these actions have been discussed previously in this document under sections addressing watershed processes and

functions and fish and wildlife. Long-term beneficial impacts to the ACEC are anticipated.

Wilderness

The Redfield Canyon Wilderness will benefit from management actions designed to improve watershed processes and functions, increase wildlife populations and species diversity, limit the size of groups utilizing the wilderness, and reduce the number of livestock allowed within the wilderness. These actions are expected to improve the solitude and naturalness values of this wilderness.

Management actions addressing prescribed fire, road maintenance standards, fence maintenance and construction and redevelopment of existing wells is expected to have a mixture of positive and negative impacts on wilderness values.

Improving vegetative cover, structure and species diversity within riparian areas in wilderness will benefit wilderness values through restoration of natural ecosystem processes.

Natural ignition prescribed fire may have short term negative impacts on wilderness area visual values for a short period following the burn and on solitude values while the fire is being managed. Emphasizing minimum tool and appropriate responses will help to minimize the short-term impacts. At the same time, allowing natural prescribed fires will be contributing to positive long-term impacts on watershed/riparian wilderness values. Restricting prescribed fires in wilderness to those occurring from natural ignition will help to preserve wilderness values, particularly naturalness. This approach is more compatible with wilderness than management ignited prescribed fires. Allowing small areas of riparian to burn experimentally will improve knowledge about the role of fire in riparian areas. This knowledge will help managers decide on the best ways to restore or maintain natural ecosystem processes in wilderness.

The lands on the Muleshoe have not been grazed since wilderness designation in 1990. The proposed action would eliminate livestock grazing on approximately 3,800 of the 6,600 acres of public land in the Redfield Canyon Wilderness Area. This would equate to a reduction in grazing preference on the public lands in the wilderness from 752 AUMs to 350 AUMs. The proposed livestock grazing during the winter dormant period on the Pride Basin Allotment should provide adequate rest to maintain the desired plant communities. Reductions in the amount of cattle which could be authorized in the wilderness will benefit solitude and naturalness values over the long-term. The public lands in the Soza Wash allotment receive only very light grazing use because of the rough topography. It is expected that this level of grazing will not adversely affect the vegetation communities or wilderness values.

The presence of livestock, particularly along the Jackson Cabin Road, would adversely affect some people's wilderness experience. The redevelopment and use of wells at Pride and Swamp Springs Canyon would result in trailing of livestock between waters and concentrations of animals around the waters. Much of this impact would be visible from the Jackson Cabin Road. However, if the proposed livestock grazing occurred in the winter when visitor use is lowest, impacts on visitor experience would be less. This will result in a small negative impact to wilderness values.

The construction of one mile of new fence combined with 4.5 miles of existing fence will have an unnatural visual impact on the wilderness area. However, these fences will also control livestock access and movement in the wilderness and contribute to the maintenance of existing values. The impacts from the construction of one mile of new pasture fence within the wilderness area will be minimized by the use of minimal tools to construct and maintain the fencing and by the special design features such as green fence posts to blend in with vegetation and rustic designed gates.

The redevelopment of the two wells along the Jackson Cabin Road would have little impact on the wilderness values since it will be designed to minimize the visual impact of these wells on the naturalness of the wilderness. The availability of reliable water at these wells may

increase wildlife presence in these areas resulting in increased wildlife viewing opportunities.

Positive impacts to wilderness would result from implementing the Fish and Wildlife actions and the Cultural Resource actions. An increase in populations of rare species and game animals would add to the wilderness experiences available to visitors. Preservation and interpretive efforts for cultural resources would help maintain important wilderness values.

All of the actions proposed under wilderness management are designed to protect wilderness values and to inform the public about those values. These actions, taken together, would have both short-term and long-term beneficial impacts on wilderness.

The actions to implement the social environment objective would benefit wilderness recreation experiences. The acquisition of legal passage over roads which access the wilderness would have the beneficial effect of providing visitors a long-term guarantee of use. Maintaining the wilderness access roads to a four wheel-drive standard would have a slightly negative impact by eliminating a small portion of the visiting public without proper vehicles from having the ability to approach this particular wilderness by road. However, the experiences of other visitors would be of higher quality. The quality of wildlife viewing and hunting opportunities would remain high and those desiring solitude would continue to have opportunities to experience it. Actions to provide maps detailing roads and parking areas, overnight use areas, and information on uses and restrictions would benefit wilderness by reducing inadvertent wilderness intrusions and violations. The availability of literature and placing of signs emphasizing low impact camping techniques in riparian areas would have a positive effect in maintaining wilderness values.

Impacts to Cultural Resources and Native American Concerns from Proposed Action

Impacts to cultural resources are anticipated to be positive and restricted to those sites located within the CMA. Cultural sites located downstream of the CMA may receive minor benefits from management of the upstream watersheds. No positive impacts are expected to extend beyond the confluence of CMA streams with the San Pedro River.

Implementation of the EMP is expected to provide protection for cultural resources and Native American traditional use plants near riparian areas by eliminating disturbance associated with livestock use, reducing direct impacts from recreation use, and curbing or prohibiting other activities that have negative impacts on stream side vegetation. Reduction of direct impacts in riparian areas is expected to increase and/or maintain vegetation community density which will improve stability of the cultural sites and help protect them from erosion.

Cultural resources, located in upland areas, including the Redfield Wilderness and Hot Springs ACEC are expected to benefit from limitations on livestock use, road closures and road maintenance practices. They are also expected to enjoy benefits from limitations on the size of groups allowed in the wilderness area and efforts aimed at educating the public about the value and fragile nature of cultural resources in the CMA. The prescribed fire program is not likely to result in adverse impacts to cultural resources due to the nature of these fires and protective measures that will be taken prior to their ignition.

The majority of cultural properties documented in the CMA are located in close proximity to riparian areas and are vulnerable to ground disturbing activities that may have direct adverse effects on these sites or lead to indirect effects through increased erosion. Cultural resources located in the CMA's riparian areas would generally benefit, or would not be significantly impacted, under the proposed riparian actions.

Continued elimination of livestock from riparian areas would benefit the CMA's cultural resources by allowing increased growth of vegetation cover, which would help reduce

erosion of historic and archaeological properties and protect them from being trampled by livestock. It would also protect Native American traditional use plants from being eaten or trampled by livestock. Prohibition of recreational activities that cause heavy stream bank impacts would reduce trampling of cultural properties by humans, and would also eliminate other activities which promote compaction and erosion of sites. Prohibiting the commercial collection of riparian plants would prevent over collection of Native American traditional use plants by the general public. Prohibiting firewood cutting in riparian areas would reduce displacement of surface artifacts and compaction of subsurface materials. There would be minor impacts from collection of dead and down firewood which can provide some protection to properties against erosion and exposure to natural elements. If specified mitigation measures are followed, prescribed fires and road maintenance activities will have minimal impacts on cultural resources.

Achieving the upland objective would result in improved vegetation cover. Increased vegetation cover would help protect cultural properties by reducing wind and water erosion.

Prescribed fires in the upland areas of the CMA would probably result in negligible impacts to most cultural resources. Based on existing inventory data, relatively few cultural properties are believed to be located in the CMA's upland areas. Therefore, it is believed that prescribed burns would impact few, if any, cultural properties in the uplands. In addition, these areas are arid and have fairly low fuel loads. Fires in such areas tend to burn rapidly, and develop low intensity heat. With the exception of historic structures, such fires would probably cause minimal surface disturbance to cultural resources located in the uplands.

Reduction of the Muleshoe Allotment to the Pride Basin area would protect a major number of the CMA's cultural resources. Disturbance caused by livestock at the Pride Cabin Homestead Site (which may be eligible for National Register of Historic Places designation), and one near by prehistoric property, would be prevented by fencing the properties.

The proposed actions for Soza Mesa would benefit the cultural resources in the Soza Mesa Allotment. The results of inventories indicate that densities of cultural properties are low in this allotment and that fences, cattle guards, wells, tanks, and pipelines could easily be planned and located so as to avoid impacts to cultural resources.

The proposed fish and wildlife management actions are not expected to impact cultural resources.

Accomplishing the cultural resource management actions would be beneficial to cultural resources as our knowledge about them would increase contributing to improved management. Cultural resources would also be protected and preserved. Interpreting cultural resources for the public would allow for better understanding and appreciation of these resources.

Cultural resources in the wilderness area could benefit under from the wilderness management actions. Ensuring zero vehicle use, and limiting group size, would lower the number of people who visit the cultural resource properties, resulting in fewer visitor impacts and also reduce vandalism and looting of cultural properties. An interpretive kiosk at the beginning of the Jackson Cabin Road would provide an opportunity to present information to the public about cultural resources in the wilderness area, and contribute to imbuing visitors with a preservation ethic.

The proposed management actions for the Social Environment are expected to benefit cultural resources. Implementing and enforcing road closures would make it more difficult for people to reach some cultural properties, which would result in less vandalism, artifact collecting and looting, as well as lower degrees of normal visitor impacts. Maintaining the Jackson Cabin and Soza Mesa roads to a four wheel-drive standard, would restrict the number of people who visit the CMA's cultural properties, resulting in fewer opportunities for vandalization, surface collecting and looting. These restrictions would also help to minimize collection of traditional use plants by non-Native Americans.

Impacts to Livestock Grazing and Rangelands from Proposed Action

Reductions in livestock use of the CMA under the proposed action is a relatively high percentage (89%) of the historic use of this area. However, consideration of the other values of the CMA and their management needs had to be taken into consideration by the EMP and the process leading to its development. Planning considerations included but were not limited to management of riparian areas, needs of the ACEC, and wilderness concerns. When the reduction is considered from the Field Office or even state-wide perspective the impact of the reduction in use becomes minor to negligible. These reductions will not affect the viability of the Field Office grazing program nor will it affect grazing use on other BLM lands within the area managed by the Safford Field Office.

Authorized grazing use of the CMA will be reduced by 2,858 AUMs or about 238 head of livestock year long by implementation of the EMP. This will result in a loss of income to BLM ($3,858 in 1997 at $1.35 per AUM) and the permittee from these operations. Limitation of livestock use on the CMA, to the Soza Mesa allotment and potential future use of the Pride Basin allotment, is considered a negative impact to the livestock grazing program. However, livestock have not been grazed on most of the CMA since 1982 and the Safford District RMP implemented a suspension on grazing until, for all practical purposes, this plan is completed.

The Safford Field Office authorized about 158,000 AUMs in 1997. The resulting reduction of the Field Office grazing program by 2,858 AUMs amounts to a 1.8% reduction in AUMs authorized on a Field Office wide basis. On a State wide basis, BLM authorized about 675,000 AUMs in 1995. A reduction of 2,858 AUMs amounts to a 0.4% reduction in authorized BLM grazing within the state of Arizona. In the eleven western states, BLM authorized over 10 million AUMs in 1995. A reduction of 2,858 AUMs amounts to less than a 0.03% reduction within the western states.

The proposed modification of the Muleshoe allotment boundary was the result of livestock suitability (slope and distance to water) and compatibility (limitations on livestock to meet the various objectives for the area) analyses as required in Partial Record of Decision II for the Safford RMP. As a result of the modification, livestock grazing would be limited to the Pride Basin and the allotment size would be reduced from 26,360 to 4,127 acres. The preference would be reduced from 3,204 AUMs (267 cattle yearlong at 100% public land use) to 346 AUMs (86 cattle from October 1 to March 31 at 67% public land use).

The proposed grazing programs would provide substantial rest periods and grazing deferments to improve plant vigor, herbage production, and slowly over time, change the species composition to more desirable perennial grass species (Martin 1978). The time required and the amount of change expected will vary from site to site on the ranch depending on the site potential of the particular range site.

Range condition should improve over the long-term. This is a result of an expected improvement in plant density and vigor, hence potential production, as has been indicated in studies on the Santa Rita Experimental Station south of Tucson. The principles of grazing systems that include periodic rest phases to benefit the forage plants have been substantiated on the Santa Rita Experimental Range as well as by numerous range scientists (Hormay, A.L.; Merrill, L.B.; Schmutz, E.M.; Martin, S.C.; Sampson, A.W.; et al).

The proposed rotational livestock grazing strategy on Soza Mesa and the change from yearlong to seasonal use during the non-growing season in Pride Basin will provide the opportunity for the stabilization and improvement of the present upland plant communities.

No impacts on livestock grazing or rangelands are anticipated from implementing Fish and Wildlife Population Objective actions, Cultural Resource Management Objective actions, or Social Environment Objective actions.

Increased public awareness of rangelands, their ecology, and multiple uses could have a positive effect by developing an interest in protecting these resources for future generations. Also information obtained from the prescribed burning program and the effects to rangelands would increase our ability to better manage these resources.

Impacts to Recreation from Proposed Action

A mixture of low intensity positive and negative impacts on recreation are anticipated from implementation of the Muleshoe EMP.

Management actions expected to improve riparian and aquatic habitats along with the associated positive response of fish and wildlife populations are anticipated to enhance the quality of the recreational experience in the CMA. Minor negative impacts to some recreation use of these areas could result from the designation of some riparian areas as day use only or the infrequent and short term impacts of prescribed burns in some of these areas.

Implementation of management actions in upland areas are also anticipated to have both positive and negative impacts on various groups of recreationists. Actions that are expected to improve upland habitat conditions and associated wildlife populations will enhance opportunities for wildlife viewing and hunting. Increased availability of information concerning the CMA, interpretation of cultural resources, improved parking, and signing of the wilderness boundary are also expected to improve recreation opportunities for some user groups.

Minor adverse impacts are anticipated for recreationists that lack 4 wheel drive vehicles due to the maintenance standard applied to Jackson Cabin Road and to some hikers from the fences and gates associated with the Pride Basin livestock operation. Implementation of the EMP is not expected to affect the number of visitors utilizing the CMA. All recreation impacts are anticipated to be low intensity and local in nature.

Efforts to improve vegetative cover and diversity of habitats along riparian corridors would have a positive effect on recreational experiences available to visitors, particularly wildlife enthusiasts. The attainment of riparian objectives is expected to increase populations of wildlife and plants, including rare species, which many recreationists seek to view.

Including riparian areas within target areas for prescribed burning could temporarily impact small portions of riparian areas which might be burned experimentally. This would have a short-term negative impact on recreational use of these areas. Long-term benefits would be positive, however, due to decreased understory cover allowing for less demanding hiking, and to an expected increase in numbers and diversity of plants and wildlife.

Designation of Bass Canyon as a day-use area would displace some traditional overnight users who would probably look at alternative sites, cease to camp overnight or pack in for overnight camping. Possible impacts vary depending on the public's response. Overnight campers may experience a negative impact, but opportunities for day users and backpackers would be of high quality.

Treating blocks of upland areas with prescribed burning would temporarily suspend the affected area for recreation use. The short-term effect of the burning program would be slightly negative for recreationists. Long-term benefits of the burn plan would be positive, however, due to decreased shrub cover allowing for less demanding hiking, and to an expected increase in numbers and diversity of plants and wildlife.

The proposed livestock grazing on the Pride Cabin Allotment and the Soza Mesa Allotment may have a mix of negative and positive impacts to people's recreational experience. The presence of livestock and their physical impacts may be annoying to some people, although others may enjoy seeing livestock. The existence of fences will require use of several gates. Fences and gates associated with the livestock operations will create an inconvenience to hikers resulting in a slightly negative impact.

Implementing actions to achieve the fish and wildlife population objective, would have a long-term beneficial impact on recreation by providing visitors more opportunities for wildlife viewing and hunting due to increased populations of native species, particularly game species.

Positive impacts to recreation would result from implementing the Cultural Resource Management Objective actions. Preservation of sites and interpretation efforts would help maintain important recreation related experiences available to visitors.

Implementing actions to achieve the wilderness objective including signing the wilderness boundary, develop parking areas and provide informational brochures and maps would have a positive impact on recreation. Without these actions inadvertent wilderness intrusions would result in negative experiences for some recreationists and enforcement problems for the agency.

Implementing actions to achieve the social environment objective such as increasing public information available to visitors would have a positive impact on recreation. Informational signs, brochures and maps would increase the public's comfort level when visiting the area. The availability of parking would discourage off-road intrusions and diminish standard enforcement problems. Maintenance of hunting opportunities on public lands and improving those opportunities on private lands would have a positive impact on recreation related hunting. With more land available for hunter dispersal, less congestion would occur and the recreation experience would be enhanced for most visitors. Maintaining main access roads to a four wheel-drive standard would have a slightly negative impact by eliminating a small portion of the visiting public without proper vehicles from having the ability to access a portion of the area by road.

The implementation of the Muleshoe EMP is not expected to affect the visitor use of the Muleshoe CMA. However, growth of surrounding communities, particularly the Tucson metropolitan area, is expected to result in increased visitation to public lands in southeastern Arizona, including the Muleshoe CMA.

B. Impacts of the No Action Alternative

Impacts to Air Quality from No Action Alternative

Air quality will not be impacted under current management except in the case of a large wildfire which escaped immediate suppression. In this instance, air quality would be negatively impacted during the wildfire but should recover shortly afterward.

Impacts to Watershed Function and Processes from No Action Alternative

Watershed Function and Processes are expected to improve over the long-term under the no action alternative. However, the improvements are expected to take longer to occur than under the proposed action alternative and may not be as extensive. Short term impacts are expected to be a mix of positive and negative impacts.

Improvement of vegetative cover and diversity of habitats along riparian corridors would continue slowly under the no action alternative. Positive effects on riparian functions are expected to occur gradually. Without significant improvement in upland infiltration and recharge rates, riparian areas are expected to remain in their present condition, or could be frequently set back, depending on climatic variation. Under current management, some localized down-cutting and other forms of accelerated erosion may continue, or may heal slowly. Baseflows and peak flows are expected to remain about the same, or either increase or decrease only slightly. The long-term effect would be positive, if the area does not receive increased pressure from recreational or other uses.

By continuing "full suppression" of all fires within the riparian areas, fuels will continue to build to unnatural levels. Such loading could result in catastrophic wildfires of unnaturally high intensities, which could have highly negative impacts on the riparian ecosystem and its fluvial functions. Heavy loads of suspended sediments and high turbidity of streamflow may result from intense large burn areas. Such fires may occur from natural starts and could become large due remoteness of area and response times for fire personnel.

Long-term benefits for all watershed functions within the riparian areas and other water courses is expected to be positive. Long-term benefits would be positive due to gradually increased infiltration rates expected from continued improvement of ground-cover from prolonged continued total rest from cattle grazing. Only slight and gradual improvement is expected in areas where topsoils remain compacted. On rocky slopes less improvement is expected.

No significant impacts to watersheds would result from continuing with current management of fish and wildlife populations. Long-term benefits might be expected if the area remains in low recreation use. Current impacts from hunting and wildlife viewing are not posing any significant threat to these watersheds.

No impacts are expected to watershed condition from continuing current management of cultural resources. Preservation and interpretive efforts would help maintain important watershed education values.

Current wilderness management is designed to protect wilderness values, and to a great degree this is already protecting watershed values.

The continued use of unimproved roads could have long-term negative impacts to drainages below roads if runoff is increased by the roads, especially if road systems are not properly drained. However, because present road conditions probably deter usage of the area by most vehicle types, no major impacts are expected, because only marginal increases in road usage are foreseen.

Periodic maintenance of the wilderness access roads to a four wheel-drive standard would have a positive impact by eliminating a small portion of the visiting public without proper vehicles from having the ability to approach this particular wilderness by road, and thus would reduce associated impacts in unaccessible areas.

Impacts to Fish and Wildlife from No Action Alternative

A mixture of positive and negative impacts are expected on fish and wildlife from the No Action Alternative over the long-term.

Full suppression of wildfires may allow for excessive fuel build-up in riparian areas which, if ignited, could seriously damage mature riparian forest habitats. This would result in decreased habitat for wildlife species, especially for the riparian obligate species within the planning area.

Continuation of full suppression of all fires on BLM-administered lands would promote the maintenance of brush invaded grasslands. Restoration of more open grasslands would be unlikely under this alternative. Periodic wildfires are generally not frequent enough or large enough to set back ecological stages and select against excessive brush and fuel buildup. This would negatively affect those wildlife species who prefer open grassland habitats. Historic habitat for bighorn sheep in the Wildcat Hills has become heavily invaded by brush and is infrequently used by bighorn sheep. This habitat would not be restored under this alternative which would be a negative impact on bighorn sheep.

Continued suspension of livestock use within riparian areas would have beneficial effects for aquatic habitat, fish and wildlife species which would be the similar to those under the preferred alternative where livestock are eliminated from the riparian areas. Riparian vegetation development will continue with improvements in cover, structural diversity and species composition. However, this improvement will proceed at a slower pace due to the condition of the upland vegetation. The riparian vegetation may be impacted more often

by major floods under this alternative and may recover more slowly to the desired conditions.

The continued suspension of livestock grazing would have a large positive impact. There would be little risk of cattle reducing riparian vegetation or reducing watershed cover. Cattle over-grazing in the past has reduced grass cover and promoted shrub invasion on uplands. This reduces the watershed yield to ground water sources that ultimately discharge into streams. It may have increased runoff, and thus, peak discharge from storm events due to reduced interception and infiltration rates associated with decreased vegetative ground cover.

The pipeline right-of-way is a potential source of excessive runoff and sediment. A negative impact to fish does occur from an unmitigated road surface that is bare and unstable. Desert streams are subject to high peak flows and sediment naturally. Such areas exacerbate the effects of flood flows that erase habitat features and sedimentation of important habitat features such as pools.

Continuation of fish and wildlife surveys will allow management to determine population change through time as a result of the no action alternative. Some case-by-case species reintroduction and augmentation work would continue to provide a positive impact to wildlife.

There are no impacts to fish and wildlife from current management of cultural resources or wilderness under this alternative.

Current recreation management has little impact upon wildlife populations. Few improvements or developments are currently in existence along the Jackson Cabin Road. This discourages the public from concentrating heavy use in selected access areas or developed places. The quality of the four wheel-drive Jackson Cabin Road currently limits the number of visitors accessing the backcountry portions of the CMA. Wildlife populations are expected to experience very few impacts as a result of the continuation of current management actions.

Impacts to Special Designation Areas from No Action Alternative

Hot Springs Area of Critical Environmental Concern

The impacts on the Hot Springs ACEC from current management are similar to those from the proposed action alternative. ACEC values would be protected, but would be enhanced at a slower rate than through the proposed alternative.

Wilderness

Current management has resulted in healthy riparian areas which contribute to wilderness values. The condition of upland areas within the wilderness is improving slowly under current management. With continued suppression of fire and lack of a comprehensive prescribed fire program, improvements in upland areas are expected to take longer to occur than under the proposed action, and may not be as extensive. For example, it may be difficult to improve sites with extensive shrub invasion. Under current conditions fire is not able to play a natural role in maintenance of the ecosystem which is a negative impact to wilderness. Limited cattle grazing on the Soza Wash Allotment (120 acres, five cattle year-long) does not impact wilderness values significantly.

Current management of fish and wildlife populations under decisions in the Safford RMP to maintain and enhance priority species and their habitats would enhance wilderness values and thus have a beneficial effect.

Cultural properties are managed to protect, preserve and interpret the resource. No current active management of cultural resources is underway, but district, state and national policy for the protection of wilderness values, including cultural resource values, would benefit wilderness.

The current passive management of Redfield Canyon Wilderness has provided adequate

protection of wilderness values. Due to the remoteness and ruggedness of the area, few significant wilderness violations occur. Visitation is expected to increase, however, as the public becomes aware of the area's outstanding wilderness qualities. Lack of active management within the near future to authorize boundary and trail signs, information kiosks and other needed facilities would be detrimental in the near future.

Current passive management of the social environment within the Muleshoe area has provided adequate protection of the values available to visitors. Visitation is expected to increase as the public becomes more aware of the area's outstanding qualities. Lack of active management to authorize construction of parking areas, installation of directional signs, publication of informational brochures and maps, and monitoring and maintenance personnel would be detrimental in the near future.

Impacts to Cultural Resources and Native American Concerns from No Action Alternative

A mix of low intensity positive and negative impacts are anticipated for cultural resources from the no action alternative.

Gradual increase of riparian vegetation would promote stabilization of stream terraces where cultural properties are located and also contribute protection from wind erosion.

Fire suppression might initially benefit cultural properties, however long-term build-up of heavy fuel loads could promote intense, possibly destructive fires which might damage or destroy the integrity of cultural properties.

Lack of actively managed recreation would probably result in continuing artifact collection from properties and also vandalism to some historic structures.

Suspension of livestock indefinitely would probably benefit cultural resources by eliminating risk from trampling of properties.

Fish and wildlife management actions under this alternative will not affect cultural resources. Under current management, the CMA's cultural resources are only being managed for protection, and no formal interpretive or educational programs focusing on the cultural resources are in place. Under this alternative, little new knowledge would be acquired about the cultural resources. Properties may be lost to erosion or vandalism without any knowledge of their existence. The public would not have opportunities to learn about the cultural resources. Lack of signs, brochures and other educational materials may contribute to diminishing public understanding and appreciation of the CMA's cultural resources and contribute to vandalism and site looting.

Impacts to Livestock Grazing and Rangelands from No Action Alternative

Under the current management, livestock grazing would continue in suspended nonuse indefinitely, however, the grazing preference on the public lands would remain at 267 cattle yearlong (3204 AUMS), rather than 86 cattle during the non-growing season (346 AUMs) with the potential of grazing all of the 26,360 acres in the allotment at some future date.

Livestock grazing would not be resumed until upland and riparian vegetative conditions had improved. Without an active prescribed burning program, upland conditions would improve more slowly, and livestock grazing would be resumed later than under the proposed action.

No impacts are expected to livestock grazing from current fish and wildlife management, cultural resource management, wilderness management, or social environment management.

Impacts to Recreation from No Action Alternative

Continuing current management under the no action alternative would result in slight negative impacts to recreation.

Continuing current management of riparian areas, upland areas, and fish and wildlife populations would have a slightly negative impact on recreation in the short term. Lack of active management to improve wildlife habitat and increase species diversity and populations, a plus for wildlife enthusiasts, hunters and general recreationists, would delay achievement of these objectives.

Cultural properties are managed to protect, preserve and interpret the resource. Lack of active management to interpret the resource would have a negative impact on a portion of the visiting public interested in the cultural properties and history of the area.

Lack of boundary signs, parking areas, informational literature and maps related to wilderness is detrimental to wilderness recreation. Without these actions increasing inadvertent wilderness intrusions are expected to result in negative experiences for some recreationists and enforcement problems for the agency.

The current, mostly passive, management of the social environment has a slightly negative impact on recreation in the area. Lack of informational signs, brochures and maps, parking and turn-around spaces relate directly to inadvertent off-road intrusions and standards enforcement problems. Lack of hunting opportunities on some portions of the Muleshoe impacts recreation negatively. Maintaining main access roads to a four wheel-drive standard is a slightly negative impact on recreation by eliminating a small portion of the visiting public without proper vehicles from having the ability to access a portion of the area by road.

C. Cumulative Impacts

Cumulative Impacts to Air Quality

Air quality can be directly effected by a variety of natural and anthropogenic sources of chemical and particulate pollution. Emissions from industrial sources such as mine smelters, automobiles, agricultural activities, unpaved road networks, wildfire and prescribed fire can all have adverse impacts on air quality. indirect

impacts on air quality may result from close proximity to major metropolitan centers.

Air quality in the lower San Pedro basin currently meets all National Ambient Air Quality Standards (Jim Guyton, ADEQ, pers. comm.). The rural nature of the area, distance from major metropolitan areas, (Tucson is the closest and is approximately 25 linear miles away), combined with few large sources of emissions such as mine smelters all contribute to the excellent air quality found in this area.

In the past, operation of copper mine smelters at San Manual and Winkleman contributed to degraded air quality in the lower basin. Since these facilities have installed pollution control measures air quality has improved (Jim Guyton, ADEQ, pers. comm.).

Future impacts to air quality could result from increased residential development in the lower basin, expansion of the unpaved road system, agricultural expansion, wildfire, or the building of additional industrial facilities in the lower basin.

Residential development in this area is expected to increase in the next 5-10 years. This is expected to be accompanied by an increase in the number of vehicles utilizing the unpaved road network in the lower basin which will result in more dust (particulates) introduced into the air. The effects are expected to be local in nature.

Agricultural expansion is not anticipated. To the contrary, as in many other areas, residential development is expected to result in a reduction in the acreage of agricultural lands in production in the lower basin. Residential developments are often built on agricultural lands purchased for that purpose.

Wildfires are likely to occur at infrequent intervals for the foreseeable future. Wildfire introduces both particulates and chemical pollutants into the atmosphere. They are likely to have severe but short term adverse effects on air quality in the lower basin.

BLM is not currently aware of any plans to locate additional industrial facilities in the lower basin area. It is possible, at some future date, that construction of an improved road over Redington Pass into the lower basin could result in industrial development. However, this is not anticipated within the foreseeable future.

As described in impact analysis of the proposed action, implementation of the Muleshoe EMP is expected to have only short-term and localized negative impacts to air quality resulting from the prescribed fire program.

The combination of an anticipated increase in traffic on the unpaved road network, continuing wildfires and implementation of the prescribed fire program in the EMP is not expected to result in cumulative adverse impacts to air quality that would result in long term or chronic exceedence of any air quality standards in the lower basin.

Cumulative Impacts to Watershed Functions and Processes

Watershed functions and processes including infiltration rates, soil water content, overland flow and erosion rates are affected by natural events such as fire and the activities of man. Events and activities that compact surface soil layers, create hydrophobic soil conditions, reduce vegetative cover, reduce root mass, cause shrub invasions of grasslands or concentrate overland flow energy can all have negative impacts on the vegetative productivity, hydrologic regimes and erosion rates on a watershed.

In the past, large portions of the San Pedro River watershed have been affected by grazing regimes, fire suppression activities, wood cutting, road and railway construction, mining operations, agricultural activities, groundwater pumping, and stream diversions as well as residential and urban development. (Rodgers 1965, Wilkin and Galante 1987, Hadley 1991, and Bahre 1991.) These activities are believed to have resulted in many of the watershed effects identified above.

More recently, management actions have placed restrictions on livestock and other uses that are expected to improve, over time, conditions and functions in some parts of the watershed. Management of the Galiuro Wilderness, Aravaipa Wilderness, San Pedro Riparian National Conservation Area (NCA), as well as The Nature Conservancy acquisitions on the lower San Pedro River combined with generally improved grazing management on federal lands, have reduced watershed impacts in many locations. At the same time, the majority of the watershed is in private or state ownership and about 16% of the upper watershed is outside the boundary of the United States. Groundwater pumping, grazing and other development activities are continuing to take place on these lands. The net impacts to the watershed and San Pedro River remains an unresolved controversy.

Future activities on the San Pedro watershed probably include continuing residential development in the upper basin in the vicinity of Benson, Sierra Vista, Fort Huachuca and rural areas of Cochise County as well as growth of the Sierra Vista/Fort Huachuca urban area. As the population increases, there will be additional needs for water, roads, and other facilities as well as changes in land uses. The net affect on the watershed and river is uncertain and controversial.

Implementation of the EMP is not expected to contribute to any adverse cumulative impacts that have the potential to occur within the San Pedro watershed. Indeed, as described in the analysis of impacts of the proposed action, implementation of the EMP is expected to have long-term positive impacts on watershed conditions and functions within the CMA that may have small beneficial effects on downstream portions of some streams that contribute to base flows in the lower San Pedro River.

Cumulative Impacts to Fish and Wildlife

Fish and wildlife species and populations can be directly affected by natural events and human activities such as hunting, trapping,

fishing or indirectly affected through events and activities that cause habitat modification.

In the past, the San Pedro River supported species like beaver, jaguar, Colorado River squawfish, razorback suckers and others. In fact, the San Pedro River once supported 13 native fishes, but now only supports three (Gila chub, longfin dace, desert sucker). Aravaipa Creek, its major tributary supports five additional species (Sonora sucker, speckled dace, spikedace, loach minnow, roundtail chub). The rest of the fish fauna has been extirpated from the basin (razorback sucker, Colorado squawfish, flannelmouth sucker, Gila topminnow, desert pupfish).

Disruption of the San Pedro watershed by past practices including farming, unscreened water diversions that strand fish on fields, water development, introduction of non-native fishes, pollution, watershed degradation, road building, wood cutting, mining, and livestock grazing are believed to be the primary cause of the extirpation of these fish species from the area. These activities have left the aquatic habitat for fish in a degraded state (high negative impact).

Past and present removal of water which reduces or eliminates surface flows in the San Pedro River constitutes one of the largest adverse impact to fish habitats. The historic practice of stocking non-native fishes represents another negative impact to the native fish community.

Terrestrial species have also suffered adverse historic impacts. Beaver were trapped by the early explorers like James Ohio Patty and farmers who settled in the area. Eventually beaver were eliminated from the entire river upstream of Winkleman.(Rodgers, 1965; Wilkin and Galante, 1987; Bahre 1991.) Loss of beaver and the associated dams, human depredation on the squawfish and suckers (wagon loads were removed from the river), over grazing, fires, draining of swamps, woodcutting and many other human activities are believed to have made substantial changes in habitat and the wildlife species that rely on them in the entire Gila River basin (Dobyns, 1981).

More recently designation and management of the San Pedro RNCA, Aravaipa Wilderness, Galiuro wilderness, and implementation of riparian policies and improved grazing management has improved habitat conditions in some areas. For instance, populations of birds that are understory obligates for feeding and/or breeding purposes have shown populations increases in the San Pedro RNCA as a result of habitat changes attributed to improved management of the area. (Krueper 1992.)

The Muleshoe CMA, when added to other relatively undisturbed portions of streams and watersheds in the basin, plays an important role in maintaining habitat for wildlife and native fishes, a group that is rapidly declining towards extinction; only 2 of 30 native freshwater fish species remain unlisted by state or federal wildlife agencies. Implementation of actions in the Muleshoe EMP is anticipated to have a large positive effect on the remaining aquatic ecosystem in the basin.

As described in impact analysis for the proposed action, implementation of the Muleshoe EMP is anticipated to have a large positive effect on the fish and wildlife in the CMA and contribute to the maintenance of these populations in the basin. Implementation of the EMP is not expected to contribute to adverse cumulative impacts on fish and wildlife populations in the San Pedro basin.

Cumulative Impacts to Special Designation Areas

As described in the impact analysis of the proposed action, implementation of the Muleshoe EMP is expected to have overall positive and localized impacts to special designation areas. The wilderness values of the contiguous Galiuro Wilderness Area or other wilderness areas in the region are not expected to be impacted by implementation of the EMP. Implementation of the EMP is not expected to contribute to adverse cumulative impacts on other special designation areas in the San Pedro basin.

Cumulative Impacts to Cultural Resources and Native American Concerns

As described in the analysis of impacts of the proposed action, impacts to cultural resources from implementation of the Muleshoe EMP are anticipated to be positive and restricted to those sites located within the CMA. Cultural sites located downstream of the CMA may receive minor benefits from management of the upstream watersheds. No positive impacts are expected to extend beyond the confluence of CMA streams with the San Pedro River. Implementation of the EMP is not expected to contribute to adverse cumulative impacts on cultural resources or Native American concerns in the San Pedro basin.

Cumulative Impacts to Livestock Grazing

Historically, livestock grazing in the San Pedro River watershed was far more extensive than is now the case. (Wilkin and Galante, 1987) It is estimated that as many as 40,000 to 65,000 head of livestock were abandoned around 1840 due to Apache raids in the upper watershed. In this same area, cattle numbers may have approached 40,000 head in 1891. By 1930 about 13,500 head used the same area. In 1987, about 5,000 head utilized grazing lands in the upper San Pedro basin. These reductions in grazing use were driven by social and economic changes as well as changes in the carrying capacity of the upper watershed. Conrad Bahre, 1991, William Rodgers, 1965 and D. C. Wilkin and J. C. Galante, 1987 present discussions of historic events, changes in land use and alterations in the landscape of the San Pedro basin and other areas in the southwest.

More recently, the FS eliminated livestock grazing on the Redfield allotment in the Galiuro Wilderness Area in 1986 through the Coronado National Forest Land and Resource Management Plan Record of Decision. The BLM deferred grazing in the San Pedro RNCA in 1989 for a period of 15 years. These reductions in grazing use reflect changes in legal constraints and policies regarding federal land uses.

Despite historic and more recent reductions in grazing use of federal lands, the current mix of federal, state and private lands in the San Pedro River basin support a viable grazing industry. Current livestock use of the area is not quantified.

As described in the analysis of impacts of the proposed action, authorized grazing use of the CMA will be reduced by 2,858 AUMs or about 238 head of livestock year long by implementation of the EMP.

This reduction in livestock use of the CMA is a relatively high percentage (89%) of the historic use of this area. However, consideration of the other values of the CMA including riparian areas, ACEC values, and wilderness values and their management needs had to be taken into consideration by the EMP and the process leading to its development. When the reduction is considered from the Field Office or even state-wide perspective the impact of the reduction in use becomes minor to negligible. These reductions will not affect the viability of the Field Office grazing program nor will it affect grazing use on other BLM lands within the area managed by the Safford Field Office.

Grazing reductions caused by implementation of the EMP on the CMA will not trigger reductions on other federal lands and will not affect grazing use of state or private lands. Although reductions in grazing use of the CMA are a high percentage of the historic livestock use of the area it is a small percentage of the BLM field office grazing program and an even smaller percentage of the combined federal, state and private grazing activities taking place on the San Pedro watershed. Implementation of the EMP will not affect grazing outside the CMA boundary.

Cumulative Impacts on Recreation

As described in the impact analysis of the proposed action, implementation of the EMP is not expected to affect the number of visitors

utilizing the CMA. However, growth of surrounding communities, particularly the Tucson metropolitan area, is expected to result in increased visitation to public lands in southeastern Arizona, including the Muleshoe CMA.

All recreation impacts are anticipated to be low intensity and local in nature. Implementation of the EMP is not expected to contribute to adverse cumulative impacts on recreation in the San Pedro basin.

D. Mitigation

1. Prescribed burn areas will be inventoried for cultural resources, as required under BLM Instruction Memorandum No. AZ-90-52; Requirements for Cultural Inventory of Prescribed Burn Areas. Areas surrounding cultural resources will be blacklined so as to prevent them from being burned.

2. All prescribed burns conducted in the uplands would conform to Instruction Memorandum No. AZ-90-52. Areas around significant stands of traditional use plants would be blacklined so that they would not be destroyed during a prescribed burn.

3. Road maintenance will be planned so as to avoid cultural properties. If a site cannot be avoided, the required Section 106 Consultations with the Arizona State Preservation Officer will take place and the appropriate course of mitigation will be pursued.

4. To minimize damage to fish populations and habitats and water quality, prescribed fires will be planned to ensure:

   a. at least 300 foot riparian buffer strips

   b. buffer strips along non-riparian headwater drainages which can contribute large amounts of sediment and ash to streams

   c. burns will be avoided on slopes greater than 30%

   d. install waterbars and seed where needed to reduce post-fire erosion

   e. allow less than 20% of riparian area to burn from unanticipated fire

      encroachment (less than 10% if severely burned)

   f. burn when riparian area is moist and protect canyons from rolling embers

   g. if practical, pre-moisten areas at risk with sprinklers, aerial water drops or other methods

5. Areas with sensitive wildlife or plant species (such as saguaro stands and desert tortoise areas) will be avoided during prescribed fire to the extent practicable.

V. CONSULTATION AND COORDINATION

Information about consultation, coordination, and public involvement can be found in Appendix B of the proposed Muleshoe Ecosystem Management Plan.

Finding of No Significant Impact/Decision Record

EA No. AZ-060-98-004
EA Name: Final Muleshoe Ecosystem Management Plan

DECISION RECORD
It is my decision to authorize implementation of the Final Muleshoe Ecosystem Management Plan (EMP) and associated mitigation measures as described in the attached plan and environmental assessment.

FINDING OF NO SIGNIFICANT IMPACT (FONSI)
Based on the analysis of environmental impacts presented in EA No. AZ-060-98-004, and my consideration of impacts associated with implementation of the Final Muleshoe Ecosystem Plan I find that no laws or regulations will be violated, no threat to public health and safety is identified, no thresholds will be breached, no environmental standards will be exceeded and no precedent for future action will be set. Therefore, it is my determination that implementation of the Final Muleshoe Ecosystem Management Plan will not significantly affect the quality of the human environment and an environmental impact statement is not required.

Decision Rationale

In making this decision and determination I have given consideration to the impacts which are expected to result from implementation of the final Plan, on air quality, watershed function and processes, fish and wildlife, wilderness areas, areas of critical environmental concern, cultural resources, Native American concerns, livestock grazing and recreation. The intensity of these impacts have been considered in both a local (CMA) and larger context.

Implementation of all management actions in the Final Muleshoe Ecosystem Management Plan are in conformance with the Safford District Resource Management Plan, as amended. The EMP meets the protective management needs of the riparian vegetation communities as well as the fish and wildlife resources and values identified for protection in the Hot Springs Area of Critical Environmental Concern. The EMP also provides management for the Redfield Canyon Wilderness which will ensure that wilderness values including opportunities for solitude and naturalness are protected and enhanced. Overall impacts are considered positive for the resources and values for which the CMA was acquired, through exchange, by BLM in 1986.

The intensity of most positive and negative impacts are relatively low, when considered in the context of the CMA.

An exception to this may be the adverse impacts to the grazing program resulting from an 89% reduction in authorized grazing use in the CMA. However, when viewed from a Field Office wide, State wide and even BLM wide perspective these impacts are also considered minor or negligible.

Most positive long-term impacts on the natural resources and values found on the CMA are not expected to extend beyond its boundaries and are likely to develop slowly. Enhancement of upland vegetation communities, riparian areas and the associated benefits to fish, wildlife and recreation will probably take a decade or more to fully develop. The confluence of the San Pedro River with CMA streams probably represents the maximum extent of detectable change.

Beneficial and adverse impacts to cultural resources, Native American concerns, and various recreation groups are expected to be low in intensity and are also expected to be limited to the CMA. Implementation of the EMP is not expected to affect the number of visitors utilizing the CMA.

COMPLIANCE AND MONITORING

All mitigation and monitoring requirements are contained in the attached Final Muleshoe Ecosystem Management Plan.

RECOMMENDED BY:

Tucson Field Manager — Date: 4/28/98

Safford Field Manager — Date: 5/4/98

APPROVED BY:

Arizona State Director — Date: 5/7/98

GLOSSARY

ACCELERATED EROSION: Soil loss above natural levels resulting directly from human activities. Due to the slow rate of soil formation, accelerated erosion can lead to a permanent reduction in plant productivity.

ACTIVE PREFERENCE: The difference between grazing preference and suspended preference.

ACTIVE USE: Authorized livestock use for the current billing year.

ACTIVITY PLAN: A detailed and specific plan for managing a single resource program or plan element undertaken as needed to implement the more general resource management plan decisions. An activity plan is prepared for specific areas to reach specific resource management objectives within stated time-frames. Interdisciplinary activity plans are now being emphasized which are for coordinated management of several resource programs.

ALLOTMENT: An area of land where one or more individuals graze their livestock. An allotment generally consists of federal rangelands, but may include intermingled parcels of private, state, or federal lands.

ALLOTMENT MANAGEMENT PLAN (AMP): A livestock grazing management plan dealing with a specific unit of rangeland and based on multiple use resource management objectives. The AMP considers livestock grazing in relation to other uses of rangelands and in relation to renewable resources--watershed, vegetation, and wildlife. An AMP establishes the seasons of use, the number of livestock to be permitted on rangelands, and the rangeland improvements needed.

ALLUVIAL: Pertaining to material that is carried and deposited by running water.

ALLUVIUM: Any sediment deposited by flowing water, as in a river bed, floodplain, or delta.

ANIMAL UNIT: A unit of measure for rangeland livestock equivalent to one mature cow or five sheep or five goats, all over six months of age. An animal unit is based on average daily forage consumption of 26 pounds of dry matter per day.

ANIMAL UNIT MONTH (AUM): The amount of forage needed to sustain one cow, five sheep, or five goats for a month. A full AUM's fee is charged for each month of grazing by adult animals if the grazing animal (1) is weaned, (2) is six months old or older when entering public land, or (3) will become 12 months old during the period of use. For fee purposes, an AUM is the amount of forage used by five weaned or adult sheep or goats or one cow, bull, steer, heifer, horse, or mule. The term AUM is commonly used in three ways: (1) stocking rate as in X acres per AUM, (b) forage allocation as in X AUMs in Allotment A, and (3) utilization as in X AUMs consumed from Unit A.

ANNUAL PLANT: A plant that completes its life cycle and dies in one year or less.

AQUATIC HABITATS: Habitats confined to streams, rivers, springs, lakes, ponds, reservoirs, and other water bodies.

AQUATIC RESOURCES: Plants and animals that live within or are entirely dependent upon water to live; living resources of aquatic habitats (fish, invertebrates, amphibians); aquatic species.

AQUIFER: A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding large amounts of water.

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC): An area within public lands where special management attention is required (1) to protect and prevent irreparable damage to fish and wildlife; important historic, cultural, or scenic values; or other natural systems or processes or (2) to protect life and provide safety from natural hazards.

ARID REGION: A region where precipitation is insufficient to support any but drought-adapted vegetation.

ASPECT: (1) The visual first impression of vegetation at a particular time or as seen from a specific point. (2) The predominant direction of slope of the land.

AUTHORIZED OFFICER: Any person authorized by the Secretary of the Interior to administer BLM's management programs.

AVAILABLE FORAGE: Forage that can be grazed and still allow sustained forage production on rangeland. Available forage may or may not be authorized for grazing.

AVIFAUNA: All the birds of a specific region or time division.

BASAL COVER (AREA): The area of ground surface covered by the stem or stems of a rangeland plant, usually measured one inch above the soil, in contrast to the full spread of the foliage.

BASE PROPERTY:

BLM: Lands or water sources on a ranch that are owned by or under long-term control of the operator.
Forest Service: Lands and improvements owned and used by a permittee or lessee for a farm or ranch and designated by the permittee or lessee to qualify for a term grazing permit.

BIODIVERSITY: See BIOLOGICAL DIVERSITY.

BIOLOGICAL DIVERSITY (BIODIVERSITY): The full range of variability within and among living organisms and the ecological complexes in which they occur. Biological diversity encompasses ecosystem or community diversity, species diversity, and genetic diversity.

BIOMASS: The total amount of living material, plants and animals, above and below the soil surface in a biotic community.

BIOTA: The animal and plant life of a particular region considered as a total ecological entity.

BIOTIC COMMUNITIES: The assemblage of native and exotic plants and animals associated with a particular site or landscape, including microorganisms, fungi, algae, vascular and herbaceous plants, invertebrates, and vertebrates. These assemblages and their biotic and abiotic relationships serve landscape and watershed functions by promoting soil properties supporting water infiltration and storage, energy and nutrient fixation, recycling and transfer, species survival, and sustainable population dynamics.

CARRYING CAPACITY: The maximum stocking rate possible without damaging vegetation or related resources. Carrying capacity may vary from year to year on the same area due to fluctuating forage production.

CERTIFICATE: A document containing a certified statement, especially as to the truth of something.

CATEGORY 1 SPECIES: Species for which the Fish and Wildlife Service has enough information on biological vulnerability and threats to support their listing as endangered or threatened species.

CATEGORY 2 SPECIES: Species for which the Fish and Wildlife Service has information suggesting the possible appropriateness for listing as endangered or threatened. Note: this designation is no longer used by FWS.

COMMUNITY: An assemblage of plant and animal populations in a common spatial arrangement.

COMMUNITY OF INTEREST: All parties concerned with the management and function of a geographical unit of land. The tie between community of interest, watershed management, and ecosystem management is important. Watersheds are the basic functional units of land that tie together the interests of a variety of participants, including ranchers, farmers, agencies, and town and city representatives. Other participants concerned with the relationships of individual watersheds to broader ecological functions should participate as members of the community of interest to influence management decisions relative to these broader perspectives.

COOL-SEASON SPECIES: Plants whose major growth occurs during the late fall, winter, and early spring.

COOPERATIVE MANAGEMENT AGREEMENT: A document that describes agreements made between BLM and the public on adjustments in grazing use. This document also defines the specific adjustments and the schedule of adjustments (usually over a five-year period).

COORDINATED RESOURCE MANAGEMENT PLAN: A plan for managing one or more grazing allotments that involves all affected resources, such as vegetation, wildlife, soil, and water.

COVER: Plants or objects used by wild animals for nesting, rearing of young, escape from predators, or protection from harmful environmental conditions.

CULTURAL PROPERTY: The definite location of a past human activity, occupation, or use identifiable through field inventory, historic documentation, or oral evidence. Cultural properties include prehistoric and historic archaeological remains, or architectural sites, structures, objects, or places with important public and scientific uses.

CULTURAL RESOURCES: The fragile and nonrenewable remains of human activity found in historic districts, properties, buildings, and artifacts that are important in past and present human events.

DEFOLIATION: The removal of plant leaves, by grazing or browsing, chemical action, or natural phenomena such as hail, fire, or frost.

DESIRED FUTURE CONDITION: The future condition of rangeland resources on a landscape scale that meet management objectives. Desired future condition is based on ecological (such as desired plant community), social, and economic considerations during the land and resource management planning process. Desired future condition is usually expressed as ecological status or management status of vegetation (species composition, habitat diversity, age and size classes of species) and desired soil qualities (conditions of soil cover, erosion, compaction, loss of soil productivity).

DESIRED PLANT COMMUNITY (DPC): The plant community that has been determined through a land use or management plan to best meet the plan's objectives for a site. A real, documented plant community that embodies the resource attributes needed for the present or potential use of an area, the desired plant community is consistent with the site's capability to produce the required resource attributes through natural succession, management intervention, or a combination of both.

DEVELOPED RECREATION SITES: Recreation sites that have facilities, structures, or developments such as drinking water, bathrooms, picnic tables, and developed campsites.

DIRECT: To be related exactly and without interruption to or from other sources.

DISCHARGE: The rate of flow or volume of water flowing in a stream at a given place or within a given period of time.

DRAINAGE: A water source, such as a stream.

ECOLOGICAL CONDITION (OR HEALTH): See ECOLOGICAL STATUS.

ECOLOGICAL SITE: A distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community.

ECOLOGICAL SITE CAPABILITY: The highest ecological status an ecological site can attain given political, social, or economical constraints.

ECOLOGICAL STATUS: The present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site. Vegetation status is the expression of the relative degree to which the kind, proportions, and amounts of plants in a community resemble that of the potential natural community.

ECOLOGICAL SUCCESSION: An ecosystem's gradual evolution to a stable state. If, through the ability of its populations and elements, an ecosystem can absorb changes, it tends to persist and become stable through time.

ECOSYSTEM: A complete interacting system of organisms considered together with their environment.

ECOSYSTEM MANAGEMENT: (A) The skillful use of ecological, economic, social, and managerial principles in managing ecosystems to produce, restore, or sustain ecosystem integrity and desired conditions, uses, products, values, and services over the long-term. (B) A process of land and resource management that emphasizes the care and stewardship of an area to ensure that human activities will be carried out to protect natural processes, natural biodiversity, and ecological integrity.

EFFECTIVENESS: The ability to work towards achieving resource goals and objectives.

EFFICIENCY: The proportion of funding spent on program administration relative to funding spent on implementation.

ENDANGERED SPECIES: Any animal or plant species in danger of extinction throughout all or a significant portion of its range as designated by the U.S. Fish and Wildlife Service under provisions of the Endangered Species Act.

ENVIRONMENTAL ASSESSMENT (EA): A concise public document for which a federal agency is responsible. An EA serves (1) to briefly provide enough evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact; and to aid an agency as compliance with the National Environmental Policy Act when no EIS is needed; and (2) to facilitate preparation of an EIS when one is needed. See ENVIRONMENTAL IMPACT STATEMENT.

ENVIRONMENTAL CONSEQUENCES: A situation that naturally or logically follows as a result of an action. Commonly used in environmental impact statements for discussions about how the human environment, which includes the natural and physical environment and the relationship of people with that environment, is influenced by the government's actions.

ENVIRONMENTAL IMPACT STATEMENT (EIS): An analytical document that portrays potential impacts on the human environment of a particular course of action and its possible alternatives. Required by the National Environmental Policy Act (NEPA), an EIS is prepared for use by decision makers to weigh the environmental consequences of a potential decision.

EROSION: The wearing away of land by water, wind, gravitation, or other geologic agents. Natural erosion is a geologic process that occurs under natural conditions of climate and vegetation.

EXOTIC SPECIES: A species that is not native to the area where it is found.

EXOTIC VEGETATION: Plants that are not native to the region in which they are found.

FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976 (FLPMA): The act that (1) sets out for the Bureau of Land Management standards for managing the public lands, including land use planning, sales, withdrawals, acquisitions, and exchanges; (2) authorizes the setting up of local advisory councils representing major citizens groups interested in land use planning and management; (3) establishes criteria for review of proposed wilderness areas; and (4) provides guidelines for other aspects of public land management such as grazing.

FISHERY: A system that includes target organisms, the habitat in which they exist, the community of species in which the target organisms live, and the humans who exploit or affect the target species.

FLEXIBILITY: A characteristic of a grazing management plan that allows it to accommodate changing conditions.

FORAGE: All browse and herbaceous growth available and acceptable to grazing animals or that may be harvested for feeding purposes. Forage includes pasture, rangelands, and crop aftermath. Whereas, feed includes forage, hay, and grains.

FORB: An herbaceous plant that is not a grass, sedge, or rush.

FOREST PLAN: See NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN.

GOAL: The desired state or condition that a resource management policy or program is designated to achieve. Broader and more general than objectives, goals are usually not measurable and may not have specific dates by which they must be reached. Objectives are developed by first understanding one's goals.

GRASSLANDS: Lands on which the vegetation is dominated by grasses, grasslike plants, or forbs. Nonforest land is classed as grassland if herbaceous vegetation constitutes at least 80 percent of the canopy cover, excluding trees. Lands that are not now grasslands but were originally or could become grasslands through natural succession may be classified as potential natural grasslands.

GRAZING: Consumption of native forage from rangelands or pastures by livestock or wildlife.

GRAZING ALLOTMENT: An area where one or more livestock operators graze their livestock. An allotment generally consists of federal land but may include parcels of private or state-owned land.

GRAZING PERMIT/LICENSE/LEASE: Official written permission to graze a specific number, kind, and class of livestock for a specified time period on a defined rangeland.

GRAZING PREFERENCE: The status of qualified grazing permittees acquired by grant, prior use, or purchase, that entitles them to special consideration over applicants who have not acquired preferences.

GRAZING REST: Deferral of grazing on an area.

GRAZING SEASON: On federal lands, an established period for which grazing permits are issued.

GRAZING SYSTEM: Systematic sequence of grazing use and nonuse of an allotment to meet multiple use goals by improving the quality and amount of vegetation.

GROUND COVER: The percentage of material, other than bare ground, covering the land surface. Ground cover may include live and standing vegetation, litter, gravel, cobble, stones, boulders, and bedrock.

GROWING SEASON: Generally, the period of the year during which the temperature remains high enough to allow plant growth. The most common measure of this period is the number of days between the last frost in the spring and the first frost in the fall.

HABITAT: The natural abode of a plant or animal, including all biotic, climatic, and soil factors affecting life.

HERBACEOUS: Vegetation growth with little or no woody component. Nonwoody vegetation, such as graminoids and forbs.

HERBIVORES: Animals that subsist mainly or entirely on plants or plant materials.

IMPACTS: The effect of one thing upon another. Impacts may be beneficial or adverse. See ENVIRONMENTAL CONSEQUENCES.

INFILTRATION: The downward entry of water into the soil or other material.

INTERDISCIPLINARY TEAM: A team of varied land use and resource specialists formed to provide a coordinated, integrated information base for overall land use planning and management.

KEY SPECIES: (1) Species that, because of their importance, must be considered in a management program; or (2) forage species whose use represents the degree of use of associated species.

LAND USE PLAN: Any document developed to define the kinds of use, goals and objectives, management practices and activities that will be allowed to occur on a parcel or parcels of land.

LEASE: See GRAZING LEASE.

LESSEE: One who has specified rights or privileges under a lease. The terms written in the lease define the actual length of time and seasons of the lease.

LITTER: The uppermost layer of organic debris on the soil surface, essentially the freshly fallen or slightly decomposed vegetal material.

LIVESTOCK: Domestic animals, including cattle, sheep, goats, and horses kept or produced on farms or ranches.

MAJOR LAND RESOURCE AREA: Geographically associated land resource units with particular patterns of soils, climate, vegetation types, water resources, and land uses.

MOTORIZED USE: Recreation use in which driving is the main activity and an end unto itself. Examples include scenic drives in the family car or operating off-highway vehicles for fun. See OFF-HIGHWAY VEHICLE.

MULTIPLE USE: A combination of balanced and diverse resource uses that considers long-term needs for renewable and nonrenewable resources, including recreation, rangeland, timber, minerals, watershed, and wildlife, along with scenic, scientific, and cultural values.

NATIONAL FOREST SYSTEM: A system of federally managed forests, rangelands, and related lands consisting of the national forests; national grasslands; land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act; and other lands, waters, or interests therein that are administered by the Forest Service or designated for administration through the Forest Service as part of the system.

NATIONAL WILD AND SCENIC RIVERS SYSTEM: A system of nationally designated rivers and their immediate environments that have outstanding scenic, recreational, geologic, fish and wildlife, historic, cultural, and other similar values and are preserved in a free-flowing condition. The System consists of three types of streams: (1) Recreational--rivers or sections of rivers readily accessible by road or railroad that may have some development along their shorelines and may have undergone some impoundment or diversion in the past, (2) Scenic--rivers or sections of rivers free of impoundments with shorelines or watershed still largely undeveloped but accessible in places by roads, and (3) Wild--rivers or sections of rivers free of impoundments and generally inaccessible except by trails with watersheds or shorelines essentially primitive and waters unpolluted.

NATIVE SPECIES (FISH): Any species that naturally occurred within a given body of water.

NEOTROPICAL MIGRATORY BIRDS: Birds that breed in the United States and Canada and later migrate south to Central and South America, Mexico, and the Caribbean islands. These birds include almost half of the bird species that breed in the United States and Canada.

NEPA ANALYSIS: Analysis conducted during the preparation of documents required under the National Environmental Policy Act, particularly environmental assessments and environmental impact statements.

NONPOINT-SOURCE POLLUTION: Water pollution whose sources cannot be pinpointed but that can be best controlled by proper soil, water, and land management practices.

NONUSE: (1) absence of grazing use on current year's forage production. (2) lack of exercise, temporarily, of a grazing privilege on grazing lands. (3) an authorization to refrain, temporarily, from placing livestock on public rangelands without loss of preference for future conditions.

OBJECTIVE: The planned results to be achieved within a stated time period. Objectives are subordinate to goals, more narrow in scope, and shorter in range. Objectives must specify time periods for completion, and products or achievements that are measurable.

OFF-HIGHWAY VEHICLE: Any vehicle that is capable of or designed for travel off of a paved highway or paved secondary road. Includes high-clearance vehicles, 4-wheel drive vehicles, dune buggies, motorcycles, and all-terrain vehicles (ATV's).

OPERATOR: One who is in the business of buying, raising, and selling livestock.

OVERSTORY: The upper canopy or canopies of plants, usually referring to trees, shrubs, and vines.

PALATABILITY: The relish with which a particular plant species or part is consumed by an animal.

PASTURE: (1) Land that is separated from other areas by a fence or natural barriers. (2) The act of letting livestock graze land for forage.

PERENNIAL STREAM: A stream that flows throughout the year for many years.

PERMEABILITY, SOIL: The ease with which gases, liquids (water), or plant roots penetrate or pass through a bulk mass of soil or a layer of soil. Since different soil horizons vary in permeability, the particular horizon under question should be designated.

PERMIT: See GRAZING PERMIT.

PERMITTEE: One who holds a permit to graze livestock on state, federal, or certain privately-owned lands.

PERENNIAL PLANT: A plant that has a life cycle of three or more years.

PLANT SUCCESSION: See ECOLOGICAL SUCCESSION.

POTENTIAL NATURAL COMMUNITIES (PNC): The stable biotic community that would become established on an ecological site if all successional stages were completed without human interference under present environmental conditions.

PRESCRIBED BURN: A controlled fire used to meet such management goals as reducing shrub and tree invasion or changing species composition toward a more desirable forage.

PRIVILEGE: The benefit or advantage enjoyed by a person or company beyond the common advantage of other citizens to graze livestock on federal lands. Privilege may be created by permit, license, lease, or agreement.

PROGRAM: The disciplines in the field of land use planning that are organized within the BLM and Forest Service to contribute to the management of public land. These disciplines include economics, rangeland, wildlife biology, botany, ecology, realty, law, and communication.

PROPERLY FUNCTIONING CONDITION: Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is influenced by geomorphic features, soil, water, and vegetation. Uplands function properly when the existing vegetation and ground cover maintain soil conditions capable of sustaining natural biotic communities. The functioning condition of uplands is influenced by geographic features, soil, water, and vegetation. Also see NONFUNCTIONING CONDITION and FUNCTIONING AT RISK.

PUBLIC LANDS: As defined in Public Law 94-79, public lands are any land and interest in land outside of Alaska owned by the United States and administered by the Secretary of the Interior through BLM. In common usage, public lands may refer to all federal land no matter what agency has responsibility for its management.

PUBLIC PARTICIPATION: A procedure allowing citizens as individuals or interest groups to review proposed government procedures or information and offer suggestions, comments, and criticism, and help identify the issues and concerns associated with federal land management.

RANGE OR RANGELAND: Rangelands, forests and woodlands, and riparian zones that support an understory or periodic cover of herbaceous or shrubby vegetation amenable to rangeland management principles or practices.

RANGE CONDITION: The current productivity of a rangeland relative to what it could naturally produce.

RANGE EXTENSION: Establishment of a species population into areas previously unoccupied, but which now support habitats suitable to maintain that species.

RANGELAND: A kind of land on which the native vegetation, climax or natural potential consists predominately of grasses, grasslike plants, forbs, or shrubs. Rangeland includes lands revegetated naturally or artificially to provide a plant cover that is managed like native vegetation. Rangelands may consist of natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

RAPTORS: Birds of prey.

RECORD OF DECISION: A document signed by a responsible official recording a decision that was preceded by the preparation of an environmental impact statement.

RE-ESTABLISH: The establishment of a population of a species in a basin where it historically occurred but no longer occurs naturally.

RESOURCE MANAGEMENT PLAN (RMP): A BLM planning document, prepared in accordance with Section 202 of the Federal Land Policy and Management Act, that presents systematic guidelines for making resource management decisions for a specified geographic area. Based on an analysis of an area's resources, its existing management, and its capability for alternative uses, RMPs are issue oriented and developed by an interdisciplinary team with public participation.

REST: See GRAZING REST.

RIPARIAN: Pertaining to or situated on or along the bank of a stream or other body of water.

RIPARIAN ECOSYSTEM: A transition between an aquatic ecosystem and an adjacent terrestrial ecosystem identified by soil characteristics or distinctive vegetation communities that require free or unbound water. Riparian ecosystems often occupy distinctive landscapes, such as floodplains or alluvial benches.

RUNOFF: The portion of the precipitation of a drainage area that flows from the area.

SEDIMENTARY ROCK: Rock formed from sediments or from transported fragments deposited in water.

SEDIMENT YIELD: The amount of sediment removed from a watershed over a specified period, usually expressed as tons, acre-feet, or cubic yards of sediment per unit of drainage area per year.

SENSITIVE SPECIES: All species that are under status review, have small or declining populations, or live in unique habitats. May also be any species needing special management. Sensitive species include threatened, endangered, and proposed species as classified by the Fish and Wildlife Service. In the Forest Service, sensitive species are designated by regional foresters.

SERAL: Pertaining to the successional stages of biotic communities.

SERAL (SUCCESSIONAL) COMMUNITY: One of a series of biotic communities that follow one another in time on any given ecological site.

SOIL HORIZON: A layer of soil or soil material roughly parallel to the land surface and differing from adjacent, genetically related layers in physical, chemical, and biological properties or characteristics, such as color, structure, texture, consistence, degree of acidity or alkalinity, and kinds and numbers of organisms present.

SOIL MOISTURE: The water content stored in a soil.

SOIL PROFILE: A vertical section of the soil from the surface through all its horizons.

SPECIAL STATUS SPECIES: Plant or animal species listed as threatened, endangered, candidate, or sensitive by federal or state governments. See also SENSITIVE SPECIES, KEYSTONE SPECIES, and KEY SPECIES.

STOCKING: The act of placing livestock on rangeland.

STOCKING RATE: The number of specific kinds and classes of animals grazing or using a unit of land for a specified time. Not the same as carrying capacity.

STREAM ENERGY: The potential of flowing water, at a given time and place, to detach and transport solid particles.

STRUCTURAL DIVERSITY: The diversity of the composition, abundance, spacing, and other attributes of plants in a community.

SUCCESSION: See ECOLOGICAL SUCCESSION.

SUITABILITY: The adaptability of a particular plant or animal species to a given ecological site.

SUITABILITY CRITERIA: In protecting a site from resource damage, the standards for judging whether a rangeland should be accessible to a specific kind of animal.

SUITABLE RANGE: Rangeland that is accessible to a specific kind of animal and that can be grazed on a sustained yield basis without damage to the resource.

SUPPLEMENT: The augmentation of additional individuals to an existing population.

SUSPENDED NONUSE: Forage from BLM-administered land that at one time could be grazed by livestock, but was later suspended from grazing because an evaluation showed that the rangeland could not support that level of grazing. Although suspended forage cannot be used, it remains as part of the total number of animal unit months of forage on grazing permits.

SUSTAINED YIELD: The continuation of a healthy desired plant community.

TAKE: As defined by the Endangered Species Act, "to harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect, or attempt to engage in any such conduct."

TAYLOR GRAZING ACT OF 1934 (TGA): The Act of June 28, 1934, providing for the regulation of grazing on the public lands (excluding Alaska) to improve rangeland conditions and stabilize the western livestock industry. The law permitted 80 million acres to be placed into grazing district to be administered by the Department of the Interior as Division of Grazing (later renamed the Grazing Service). The General Land Office was responsible for administering grazing on public lands outside the districts. TGA conferred broad powers on the Secretary of the Interior to do all things needed for the preservation and use of the unreserved public lands of the United States.

THREATENED SPECIES: Any plant or animal species likely to become endangered within the foreseeable future throughout all or a part of its range as designated by the U.S. Fish and Wildlife Service under the Endangered Species Act. See ENDANGERED SPECIES.

TRAILING: (1) Controlled directional movement of livestock. (2) Natural trailing is the habit of livestock or wildlife repeatedly treading in the same line or path.

UNDERSTORY: Plants growing beneath the canopy of other plants, usually grasses, forbs, and low shrubs.

UNSUITABLE RANGE: Rangeland that is not accessible to a specific kind of animal and/or that cannot be grazed on a sustained yield basis without damaging the resource.

UPLAND GAME: A term used in wildlife management to refer to hunted animals that are neither big game nor waterfowl. Upland game includes such birds as grouse, turkey, pheasant, quail, and dove, and such mammals as rabbit and squirrel.

UPLANDS: Land at higher elevations than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones.

UTILIZATION: The proportion of a year's forage production that is consumed or destroyed by grazing animals.

VEGETATION: Plants in general, or the sum total of the plant life above and below the soil surface in an area.

VIGOR: The capacity for natural growth and survival of plants and animals.

WARM-SEASON SPECIES: Plants whose major growth occurs during the spring, summer, or fall, and are usually dormant in winter. See COOL-SEASON SPECIES.

WATER QUALITY STANDARDS: Standards for water quality established under Section 303 of the Clean Water Act. The water quality standards program is covered by an implementing regulation in 40 CFR 131. A water quality standard is a rule or law consisting of three elements: (1) the designated use (or uses) to be made of the water body or segment; (2) the water quality criteria needed to protect that use (or uses); and (3) an antidegradation policy. Standards are to protect the public health or welfare, improve water quality, and serve the purpose of the Clean Water Act. Criteria are usually established thresholds that, when violated, are intended to reveal harm to beneficial uses of water.

WATERSHED: The total area above a given point on a waterway that contributes runoff water to the streamflow at that point.

WETLANDS: Permanently wet or intermittently water-covered areas, such as swamps, marshes, bogs, muskegs, potholes, swales, and glades.

WILDERNESS AREA: An area designated by Congress where the earth and its community of life are untrammeled by humans, where people are visitors who do not remain. An area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, that is protected and managed to preserve its natural conditions and that (1) generally appears to have been affected primarily by the forces of nature, with human imprints substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 acres of land or is large enough to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

WOODY: Consisting of wood such as trees or bushes.

YEAR-LONG GRAZING: Continuous grazing for a calendar year.

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