BIOLOGICAL EVALUATION

FOR THE

BUREAU OF LAND MANAGEMENT
SAFFORD DISTRICT
GRAZING PROGRAM

MAY 1996

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A. OBJECTIVES

The objectives of this Biological Evaluation are: 1) to determine what impacts, if any, the Safford District grazing management program may have on listed, proposed and candidate T&E species and critical habitat that exist or have the potential to exist on public lands within the Bureau of Land Management (BLM) Safford District; 2) to provide the United States Fish and Wildlife Service (FWS) with this information in compliance with Section 7 of the Endangered Species Act; 3) Identify conflicts to T&E species from the Safford District grazing program; 4) Identify mitigating measures needed to resolve conflicts between T&E species and the Safford District grazing program. The information provided in this biological evaluation is a programmatic level analysis of the grazing program as implemented on an individual allotment basis.

B. DESCRIPTION OF THE AREA

Location and Character

The BLM Safford District is located in the southeastern corner of Arizona (see District map). The cities of Tucson and Sierra Vista are the largest population centers in the District. Outside these two cities the area is rural in character. Livestock grazing, farming, and mining make significant contributions to the area's economy. Federal agencies such as the Bureau of Land Management, Fish and Wildlife Service, Bureau of Indian Affairs, and the Forest Service, as well as Indian tribes and the Arizona State Lands Department, own or manage the majority of lands in all counties in this corner of Arizona. Private land ownership is as low as 6% in Greenlee and 7% in Graham counties.

Safford District BLM is responsible for the management of about 1.6 million acres of public lands in southeastern Arizona. The District also manages public land in two counties of southwestern New Mexico by agreement with the BLM Las Cruces District. Allotments in New Mexico administered by the Safford District will not be included in this Biological Evaluation. Any Consultation necessary on these allotments is being done by Las Cruces District.

The Safford District is separated into three Resource Areas (RA): the Gila, San Simon, and Tucson Resource Areas.

Physical Description

The Safford District lies within the Basin and Range Physiographic Province south of the Colorado Plateau. The area's northwesterly trending mountain ranges reach elevations of nearly 11,000 feet and are separated by broad, flat, or gently sloping valleys filled with alluvial sediments. The Province is subdivided into the mountain

region, including the eastern half of the District, and the desert region, the Sonoran Desert comprising the western portion of the District.

The entire area is within the Gila River Watershed with the exception of two areas. These two areas are the Sulfur Springs Valley, which drains into the Willcox Playa, south of the town of Willcox, Arizona, and the extreme southeastern part of the area, in the San Bernardino Valley, east of Douglas, Arizona, which drains into Mexico. Major tributaries of the Gila River in the subject area are the San Francisco River, Eagle Creek, Bonita Creek, San Simon River, San Pedro River, Santa Cruz River, and Brawley Wash, west of Tucson, Arizona, which drains the extreme western portion of the area.

Climatic conditions in the area are similar to those throughout the desert Southwest. Alternating lowlands and mountains create abrupt climatic changes over short distances. Higher elevations have cooler temperatures and more precipitation than valleys. The highest spot on BLM managed public lands in the District is the Dos Cabezas Peaks at 8,363 feet above sea level and the lowest spot is in the northwestern portion of the District near Eloy at about 1,400 feet above sea level. Average annual precipitation is around 22 inches at the highest elevations and about five inches in the lowest valley locations. Roughly half of the precipitation falls during the summer rainy season (July through September), with the remainder falling during the winter months. The highest temperatures are over 110 degrees in the lowest locations and the lowest temperatures, well below freezing, are recorded in the high mountain locations.

Most of the soils of the Safford District have been mapped by the Soil Conservation Service. These surveys have either been published, such as the *Soil Survey of San Simon Area, Arizona, 1980,* or *Soil Survey of the Gila-Duncan Area, Arizona, 1981*, or are done under contract with the Soil Conservation Service and unpublished. Soils in the area vary from very shallow (less than 10 inches deep) to deep (greater than 60 inches) and are derived from a wide variety of parent materials. The highly diverse parent materials, topography, and climates have created soils with a very wide range in major soil characteristics.

The upland vegetation communities found in the Safford District were classified by Brown and Lowe in 1980. These communities are one of the fundamental resources managed by the BLM.

Major vegetation communities (Brown & Lowe 1980) found in the Safford District are as follows: (listed from most to least abundant)

Paloverde-Mixed Cacti
Scrub-Grassland (Semidesert Grassland)
Creosotebush-Bursage

Interior Chaparral
Chihuahuan Desert Scrub
Madrean Evergreen Forest and Woodland

Upland vegetation plays a pivotal role in protecting air, water, and soil resources. Upland vegetation, in sufficient quantities, controls soil erosion by wind and water promotes infiltration of precipitation, and improves runoff water quality. Upland vegetation communities also provide important elements of wildlife habitat and are an important source of livestock forage in the District. The BLM manages the vegetation resource for these multiple uses.

The watershed condition plays an important role in the condition of riparian streams. The watersheds need to be managed as a whole and when this is not occurring, the riparian areas in the lower portions of the watershed are difficult at best to manage. The Upper Gila watershed above Calva, located on the eastern side of San Carlos Apache Reservation, is 11,470 square miles, the portion of the Safford District in the watershed is 1,777 square miles or 15 percent. The Aravaipa watershed is 541 square miles of which the Safford District manages 109 square miles or 20 percent. In both cases, the lands managed by the Safford District are on the lower end of the watershed.

The Safford District manages over 8,000 acres of desert riparian areas (Appendix 4). These range from small isolated springs to portions of major river systems such as the San Pedro and Gila rivers. These areas are extremely important for the maintenance of water quality as habitat for fish and wildlife populations including threatened and endangered species, and are popular recreation areas. These communities also serve important hydrologic functions and play a crucial role in producing aquatic habitat.

Major species in the Southwestern Riparian Deciduous Forest and Woodland community (Brown & Lowe 1980) include cottonwood, willow, alder, sycamore, ash, and walnut. This community comprises about 2,000 acres of public lands in this area, but is of major importance to wildlife and aquatic plants.

C. SPECIES TO BE ADDRESSED

This biological evaluation will consider the impacts of the Safford District grazing program on 33 listed species, six species proposed for listing, two Category 1 species, and one extirpated species, as well as the habitats, including critical habitat, upon which they depend. This includes 23 species classified as endangered, and ten species classified as threatened under the Endangered Species Act. Fifteen species under consideration have designated critical habitat. All species considered in the Biological Opinions issued on the Safford District RMP and Upper Gila-San Simon Grazing EIS

will be re-evaluated in this Biological Evaluation. The following list of species was developed in conjunction with the Fish and Wildlife Service at the meeting held February 22, 1996. (See Table 1- Species List)

Table 1 - Species List

SPECIES	STATUS	CRIT. HAB.	RECOV. PLAN	FED. REG. NOTICE	COUNTIES
THREATENED & ENDANGERED (33)					
BIRDS (9)					
Bald Eagle	T	No	Yes	07/12/95	All District Co.
California Condor	E	No	Yes	03/67	Cochise
Masked Bobwhite	E	No	Yes	03/11/67 06/02/70	Pima
Mexican Spotted Owl	T	Yes	Yes	04/11/91	All District Co.
Northern Aplomado Falcon	E	No	Yes	01/25/86	Cochise, Santa Cruz
Peregrine Falcon	E	No	Yes	10/13/70 06/02/70	All District Co.
Southwestern Willow Flycatcher	E	Prop.	No	02/27/95	All District Co.
Yuma Clapper Rail	E	No	Yes	03/11/67	Pinal
Whooping Crane	E	Yes	Yes	03/11/67 05/15/78	Cochise
FISH (12)					
Apache Trout	T	No	Yes	07/19/75	Graham, Greenlee
Colorado Squawfish	E	Yes	Yes	03/11/67 03/21/94	Gila
Beautiful Shiner	T	Yes	Yes	08/31/84	Cochise
Desert Pupfish	E	Yes	Yes	03/31/86	Pima, Santa Cruz, Pinal, Graham
Gila Topminnow	E	No	Yes	03/11/67	Pima, Santa Cruz, Pinal, Graham
Loach Minnow	T	Yes	Yes	10/28/86 03/08/94	Graham, Greenlee Pinal
Razorback Sucker	E	Yes	No	05/22/90 03/21/94	Graham, Greenlee, Pinal
Sonora Chub	T	Yes	Yes	04/30/86	Santa Cruz
Spikedace	T	Yes	Yes	07/01/86 03/08/94	Graham, Greenlee, Pinal
Yaqui Catfish	T	Yes	Yes	08/31/84	Cochise
Yaqui Chub	E	Yes	Yes	08/31/84	Cochise
Yaqui Topminnow	E	No	Yes	03/11/67	Cochise

Table 1 - Species List (cont.)

SPECIES	STATUS	CRIT. HAB.	RECOV. PLAN	FED. REG. NOTICE	COUNTIES
MAMMALS (5)					
Jaguarundi	E	No	No	06/14/76	Cochise, Pima, Santa Cruz
Lesser Long-nosed Bat	E	No	No	09/30/88	Cochise, Pima, Santa Cruz, Pinal, Graham
Mexican Gray Wolf	E	No	Yes	03/11/67 03/09/78	Cochise, Pima, Santa Cruz
Mt. Graham Red Squirrel	E	Yes	Yes	06/03/87 01/05/90	Graham
Ocelot	E	No	Yes	07/21/82	Cochise, Pima Santa Cruz
PLANTS (6)					
Arizona Cliffrose	E	No	Yes	05/29/84	Graham
Arizona Hedgehog Cactus	E	No	No	10/15/79	Pinal
Cochise Pincushion Cactus	T	No	Yes	01/09/86	Cochise
Kearney's Blue Star	E	No	Yes	01/19/89	Pima
Nichol's Turk's Head Cactus	E	No	Yes	10/26/79	Pinal, Pima
Pima Pineapple Cactus	E	No	No	04/20/92	Pima, Santa Cruz
REPTILES (1)					
New Mexican Ridge-Nosed Rattlesnake	T	Yes	Yes	04/04/78	Cochise
PROPOSED ENDANGERED (6)					
Sonora Tiger Salamander	Prop.E				
Cactus Ferruginous Pygmy-Owl	Prop.E	No	No	12/12/94	Graham, Greenlee, Pima, Pinal, Santa Cruz
Canelo Hills Ladies' Tresses	Prop.E	No	No	04/03/95	Cochise, Santa Cruz

Table 1 - Species List (cont.)

SPECIES	STATUS	CRIT. HAB.	RECOV. PLAN	FED. REG. NOTICE	COUNTIES
Huachuca Water Umbel	Prop.E	No	No	04/03/95	Cochise, Pima, Santa Cruz
Jaguar (U.S.)	Prop.E	No	No	07/13/94	Cochise, Pima, Santa Cruz
San Xavier Talussnail	Prop.E	No	No	03/23/94	Cochise, Pima, Santa Cruz
CATEGORY 1 SPECIES (2)					
Chiricahua Leopard Frog	Cata 1				
Acuna Valley Pineapple Cactus	Cata 1				
EXTIRPATED SPECIES (1)					
Thick-billed Parrot	Extirpated				

TOTAL LISTED = 33, TOTAL PROPOSED = 6, TOTAL ENDANGERED = 23, TOTAL THREATENED = 10, TOTAL CATEGORY 1 = 2, TOTAL EXTIRPATED = 1.

II. DESCRIPTION OF THE ACTION

A. SAFFORD DISTRICT GRAZING PROGRAM

The formation of the Safford Grazing District was prescribed by the Taylor Grazing Act of 1934. The administration of livestock grazing in the Safford District was initiated in 1936 and administered by the Grazing Service. Public lands were segregated into allotments and adjudicated by the District Grazing Advisory Boards. Allotments were permitted to qualified individuals that owned or controlled a water (base water) and grazed livestock on the public lands during the 1929-1934 priority period. Those public lands located outside the Grazing District boundary were leased to qualified individuals that owned or controlled grazing lands (base land) contiguous to the BLM administered land. Due to climatic conditions, water and forage availability, and tradition, most allottees grazed the public lands on a year-round basis.

In 1946, the Bureau of Land Management was established and began to administer public land grazing in the Safford District. The part of the Bureau's mission was to administer grazing on these lands until final disposal was accomplished.

Little range management was prescribed during the period 1934-1950. Allottees grazed horses, cattle, goats and sheep on allotments year-round. After World War II, ranchers changed to primarily cow-calf operation and have remained this way to the present.

During the 1950-1960s, substantial effort was directed at watershed management to control erosion. Many areas of the District were treated with some form of brush control and reseeding. Additional efforts were directed at erosion control by construction of detention dams on the San Simon River and other eroding areas. During this time, livestock continued to utilize the allotments yearlong without the employment of active range management strategies.

In 1968, "Special Rule" was established to designate ephemeral ranges where perennial forage was absent or very scarce. Annual forage on these ranges was sporadically plentiful after unusually wet winters and springs. These allotments are only authorized for active use when conditions are favorable for production of annual forage plants. Allottees were allowed to file an application, during favorable years, and utilize the available forage.

In the late 1960s, the first land use planning (Management Framework Plan-MFP) was completed for the Safford District. This was the first effort to coordinate management of the District for all resources and uses. Generally the MFPs directed the District grazing program to develop Allotment Management Plans (AMP's) that took into consideration all resources on the allotments. AMPs were developed on major

allotments and implemented. These plans generally called for range improvements and use of a prescribed grazing system. No adjustment in livestock stocking levels were made in the MFPs. However some adjustment in livestock numbers were made during this period as the results of range surveys completed on individual allotments.

During the 1970s the mission for the Bureau's grazing program was defined by the passage of the Federal Land Policy and Management Act 1976 (FLPMA). FLPMA retained BLM lands in federal ownership and directed the BLM to manage resources present on these lands under the principles of multiple use and sustained yield.

The Upper Gila-San Simon Grazing Environmental Impact Statement (EIS) was completed in 1979, which cover the majority the District. This plan called for intensive management of livestock through the development of Allotment Management Plans which were to include: (1) adjustment of livestock numbers to carrying capacity, (2) construction of range improvements, (3) operation of the grazing management system, and (4) monitoring and evaluation of AMPs.

During the 1980s livestock adjustments were completed. The Eastern Arizona Grazing EIS was completed in 1986, which covered the remainder of the District. The two grazing EISs resulted in an approximate 30 percent reduction in permitted use on public lands in the District. It should be noted that, with the adjustment in stocking levels, the number of livestock grazing on public lands within the Safford District are at the lowest level at any time since the 1800s. Appendix 2 shows the current permitted use by allotment. During this period many AMPs were developed and/or revised. Following the guidelines in the EISs the majority of range improvements were constructed and grazing systems were implemented on allotments.

During the 1990s the Safford District grazing program has been focused on Interdisciplinary Planning (IDP) in conjunction with Special Management Areas. The Safford District RMP was completed in 1991 and has further defined the grazing program's direction. The current approach includes a multi-program interdisciplinary planning approach and development of special management for resources such as wilderness, riparian areas, T&E species, and recreation. Grazing management is now planned for and implemented in a more comprehensive manner than at any other period in the history of the Safford District.

Currently the grazing program is administered by the three resource areas. The Safford District RMP serves to provide broad direction for management. The site-specific planning is done by interdisciplinary teams at the resource area level.

The following table shows the current number of allotments, acreage, and Animal Units Month authorized by resource area.

Table - 2 Safford District Resource Areas

RESOURCE AREA (RA)	LIVESTOCK OPERATORS	GRAZING ALLOTMENTS	*ACRES FEDERAL LAND	ANIMAL UNIT MONTHS (FEDERAL)
GILA RA	66	69	509,179	47,850
SAN SIMON RA	90	110	698,012	59,077
TUCSON RA	100	109	381,067	38,610
SAFFORD DISTRICT	256	288	1,588,258	145,537

*Includes only federal acres within grazing allotments leased for livestock grazing. Does not include allotments completely in New Mexico or lands such as portions of the San Pedro Riparian National Conservation Area and other lands not currently leased for livestock grazing.

B. LAWS, REGULATIONS, BLM POLICY AND LAND USE PLAN DECISIONS AFFECTING THE SAFFORD DISTRICT GRAZING PROGRAM

Guidance and constraints for BLM land management programs are provided in federal laws and federal regulations. BLM policies and land use planning provide agency direction and make decisions that implement these laws and regulations.

Management of the Safford District grazing program is guided by many of these laws, regulations, and policies, as well as the objectives and decisions found in the Safford (1991) and Phoenix (1991) District Resource Management Plans (RMPs), Upper Gila-San Simon Grazing EIS (1979), and the Eastern Arizona Grazing EIS (1986). The following is a summation of major decisions from these sources that provide the framework for the management of grazing in the Safford District.

1. Laws, Regulations, and Policies that Affect the Safford District Grazing Program

a. Federal Laws that Guide Management of the Public Lands

FLPMA provides basic direction to the BLM relating to management of resources and uses on BLM-managed public lands. One of the prime directives is to manage public lands and resources under the concept of multiple use and sustained yield. The Taylor Grazing Act (1934) and the Public Rangelands Improvement Act (1978) provide

direction for the management of grazing on public lands. Other federal laws such as the Clean Water Act, Clean Air Act, Endangered Species Act, Wilderness Act, and Wild and Scenic Rivers Act may have direct and/or indirect effects on public land management including the grazing program.

b. Endangered Species Act Policy

The purpose of the Endangered Species Act is to provide a means whereby threatened and endangered species, and ecosystems the species depend upon, will be protected.

Bureau of Land Management Manual 6840 establishes this policy and the Safford District complies with the Endangered Species Act through this policy.

(1.) The BLM shall conserve T&E species and the ecosystems upon which they depend and shall use existing authority in furtherance of the purposes of the ESA. Specifically the BLM shall:

- Determine, to the extent practical, the occurrence and distribution of all T&E species on lands administered by the BLM, and evaluate the significance of lands administered by the BLM in the conservation of those species.

- Identify land administered by the BLM that is essential habitat and designated Critical Habitat for T&E species, and prescribe management for the conservation of these habitats in land use plans.

- Develop and implement management plans that will ensure the conservation of T&E species and their habitats.

- Evaluate ongoing management activities to ensure T&E species conservation objectives described in recovery plans are being met.

- Ensure that all activities affecting the populations and habitats of T&E species are designed to be consistent with recovery needs and objectives.

(2.) Ensure that all actions authorized, funded, or carried out by the BLM are in compliance with the ESA. To accomplish this, the BLM shall:

- Screen all proposed actions to determine if T&E species or their habitat may be affected. Normally the environmental analysis process is used.

- Initiate consultation with the FWS/NMFS, as appropriate, for those actions that may affect T&E species or their habitats.

- Until the consultation proceedings are completed and a final decision has been reached, the BLM shall not carry out any actions that would cause any irreversible or irretrievable commitment of resources or reduce the future management options for the species involved.

- Ensure that no BLM action will adversely affect the likelihood of recovery of any T&E species.

(3.) Cooperate with the FWS/NMFS in planning and providing for the recovery of T&E species. To accomplish this the BLM shall:

- Participate on recovery teams and in recovery plan preparation, as well as state or regional working teams responsible for T&E species recovery.

- Review technical and agency review drafts of recovery plans for species affected by BLM management to ensure that proposed actions assigned to BLM are technically and administratively feasible and consistent with BLM's mission and authority.

- Ensure that the decisions, terms, and conditions of resource management plans, and more detailed sitespecific plans, prepared for lands covered by previously approved recovery plans are consistent with meeting recovery plan objectives.

(4.) Retain in federal ownership all habitat essential for the survival or recovery of any T&E species, including habitat used historically by these species:

- Species proposed for listing as T&E and proposed Critical Habitat shall be managed with the same level of protection provided for T&E species except that formal consultations are not required.

c. National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA), establishes a national policy for the protection and enhancement of the environment. On any proposed action affecting public lands or resources under the jurisdiction of the BLM Safford District, NEPA requires the District to analyze the impacts on all resources that could be affected by the proposal. The impacts of a proposed action on threatened and endangered species is always considered.

With increased demands on the public lands, NEPA provides a means for the users of public lands to have input into any proposed action. NEPA has provided a

good base as a decision-making tool.

Proposed actions fall into one of five categories: (1) actions which are exempt from NEPA; (2) actions which are categorically excluded; (3) actions which are covered by an existing NEPA environmental document; (4) actions which require preparation of an environmental assessment (EA); or (5) actions which require preparation of an environmental impact statement (EIS).

An environmental assessment serves several purposes as follows:

(1.) The EA provides sufficient evidence and analysis of impacts on the quality of the human environment to support a determination of no significant impacts or a determination to prepare an EIS.

(2.) The EA serves as a vehicle for an interdisciplinary review of proposed actions and thus promotes consideration of all affected resources.

(3.) The EA provides a mechanism for identifying and developing appropriate mitigation measures.

(4.) The EA aids compliance with NEPA. EAs are made available to the public and serve as documentation of NEPA compliance.

When a proposed action, including a proposed policy or legislative recommendation, is projected to have a significant impact on the quality of the human environment, an environmental impact statement (EIS) must be prepared. An EIS is intended to provide decision makers and the public with a complete and objective evaluation of significant environmental impacts, both beneficial and adverse, resulting from a proposed action and all reasonable alternatives. An EIS is a major vehicle for fulfilling the substantive environmental goals set forth in NEPA.

The EIS process includes: (1) scoping the EIS; (2) conducting an analysis and preparing a draft EIS; (3) issuing a draft EIS; (4) analyzing comments on the draft EIS, (5) preparing the final EIS; (6) issuing the final EIS; and (7) reaching and recording a decision.

d. Grazing Regulation Standards and Guidelines, 43 CFR Part 4100

One of the changes contained in the new grazing regulations, which became effective August 22, 1995, is that Standards and Guidelines (S&Gs) be developed as they relate to livestock grazing, and be approved by the Secretary of the Interior. They can be developed for an entire state or for an ecosystem area encompassing more than one state. Standards relate to the health and productivity of rangelands. Guidelines

relate to livestock grazing. When in place, S&Gs are the basis for meeting the Fundamentals of Rangeland Health, and are applied on the ground through locally developed plans or through terms and conditions of grazing permits/leases. Where monitoring determines that there is not significant progress being made toward achieving standards, grazing management practices are changed by the next grazing season.

Arizona BLM, working through the Arizona Resource Advisory Council has proposed the following Standards and Guidelines (S&G) that meet the Minimum National S&G.

STANDARDS AND GUIDELINES: BASIC CONCEPTS

"The fundamentals of rangeland health, guiding principles for standards and the fallback standards address ecological components that are affected by all uses of public rangelands, not just livestock grazing. However, the scope of this final rule, and therefore the fundamentals of rangeland health of §4180.1, and the standards and guidelines to be made effective under §4180.2, are limited to grazing administration." (Federal Register, Vol. 60, No. 35, pg. 9955).

Following are definitions of standards, objectives, and guidelines from BLM Public Rangeland Technical Reference, Standards and Guidelines for Healthy Rangelands (TR-4180, 3/29/96, Draft).

A Standard:

(1) is a criterion regarding a resource quality or quantity upon which a judgement or decision is based (e.g., a statement concerning expected ecosystem or rangeland health);

(2) is measurable;

(3) establishes parameters within which resource use and management activities can be conducted;

(4) may limit or prohibit discretion upon implementation;

(5) is within BLM control to implement.

(6) ensures compliance with statutes, executive orders, regulations, policies, and attainment of goals and objectives; and

(7) is a component of an objective.

An Objective:

(1) describes a desired future resource condition to be achieved within a specified timeframe;

(2) is developed to address fulfillment of the standards and social and economic goals within the context of local concerns.

A Guideline:

(1) describes a practice, method or technique used to ensure that grazing management activities meet standards;
(2) is either a set of management practices from, which one or more practices is selected or is a specific, required management practice;
(3) may be adapted or changed when monitoring or other information indicates the guidelines are not effective or a better means of meeting applicable standards exists; and

(4) is selected to meet objectives.

Changes in permitted use will occur when monitoring or field observations show grazing use or patterns of use are not consistent with the provisions of Subpart 4180 Standards and Guidelines, or grazing use is otherwise causing an unacceptable level or pattern or utilization, or when use exceeds the livestock carrying capacity as determined through monitoring, ecological site inventory or other acceptable methods, the authorized officer shall reduce permitted grazing use or otherwise modify management practices (43 CFR 4110.3).

"The Department recognizes that it will sometimes be a long-term process to restore some rangelands to properly functioning condition." (Federal Register, Vol. 60, No. 35, page 9956, February 22, 1995)

ARIZONA STANDARDS AND GUIDELINES

Arizona Standards and Guidelines (S&G) for grazing administration have been developed through a collaborative process involving the Bureau of Land Management State S&G Team and the Arizona Resource Advisory Council (RAC). The RAC S&G Working Group, composed of five RAC members, was established at the first RAC meeting in September 1995. Together, through meetings, conference calls, correspondence, and four open houses with the public, the BLM State Team and RAC Working Group prepared proposed Standards and Guidelines to address the minimum considerations outlined in the grazing regulations.

Although each standard has specific guidelines, there are situations where these guidelines apply to the other standards.

Standard 1: Upland Sites

Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and landform.

Meaning that:

The ecological site has an erosion rate or shows improvement toward an erosion rate that will conserve the site potential and produce water quality consistent with the site potential. Under the best applied management, a timeframe exists to achieve the standard.

As indicated by such factors as:

- ground cover
- litter
- live vegetation, amount and type e.g. grass, shrubs, trees, etc.
- rock
- signs of erosion
- flow pattern
- gullies
- rills
- plant pedestalling

Criteria for meeting Standard 1:

Ground cover in the form of plants, litter or rock is present, and is distributed evenly without fragmentation; or, ground cover is increasing as determined by monitoring over an established period of time.

Signs of erosion are minimal, or signs of erosion are diminishing as determined by monitoring over an established period of time.

Contributing factors, may include but not limited to:

- past land uses
- land use restrictions
- livestock grazing
- recreation
- wildlife
- rights-of-way
- wild horses and burros
- mining
- fire
- weather

Exceptions and exemptions (where applicable):

Guidelines for Standard 1

1-1. Management activities will maintain or promote ground cover that will provide for infiltration, permeability, soil moisture storage, and soil stability appropriate for the ecological sites within management units. The ground cover should maintain soil organisms and plants and animals to support the hydrologic and nutrient cycles, and energy flow. Ground cover and signs of erosion are surrogate measures of hydrologic and nutrient cycles and energy flow.

1-2. When grazing practices alone are not likely to restore areas of low infiltration or permeability, land management treatments may be designed and implemented to attain improvement.

Standard 2: Riparian-Wetland Sites

Riparian-wetland areas are in properly functioning condition.

Meaning that:

Stream channel morphology and functions are appropriate for or progressing toward proper functioning condition for existing climate, landform, and channel reach characteristics. Riparian-wetland areas are functioning properly when adequate vegetation, land form, or large woody debris is present to dissipate stream

energy associated with high water flows.

As indicated by such factors as:

Gradient, width/depth ratio, channel roughness and sinuosity of stream channel, bank stabilization, reduced erosion, captured sediment, groundwater recharge, and dissipation of energy by vegetation.

Criteria for meeting Standard 2:

Riparian-wetland areas are functioning properly as determined by the checklist in the appropriate BLM Technical Reference 1737-9 or 1737-11.

Contributing factors may include, but not limited to:

- past land uses
- land use restrictions
- livestock grazing
- recreation
- wildlife
- rights-of-way
- wild horses and burros
- mining
- fire
- weather

Exceptions and exemptions (where applicable):

Facilities providing water for livestock and wildlife consumption. These facilities are specific to improvements that do not have the potential to become riparian or wetland areas. Examples are steel or fiberglass troughs and tanks, or developed areas from mining activities which are temporary in nature.

Guidelines for Standard 2

2-1. Management practices maintain or promote sufficient vegetation to maintain, improve or restore riparian-wetland functions of energy dissipation, sediment capture, groundwater recharge and stream bank stability, thus promoting stream channel morphology (e.g. gradient, width/depth ratio, channel roughness and sinuosity) and functions appropriate to climate and landform.

2-2. New facilities are located away from riparian-wetland areas if they conflict with achieving or maintaining riparian-wetland function. Existing facilities are used in

a way that does not conflict with riparian-wetland functions or are relocated or modified when incompatible with riparian-wetland functions.

2-3. The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect ecological functions and processes.

Standard 3: Desired Plant Communities

Productive and diverse upland and riparian plant communities of native species exist and are maintained.

Meaning that:

Upland plant communities meet or are making progress toward desired plant community and habitat objectives established in local plans. Riparian-wetland communities meet or are making progress toward advanced ecological status (late seral condition or potential natural community) or desired plant community as determined in local plans. Plant community objectives (desired plant community or advanced ecological status) are determined with consideration for multiple uses, native species, and the requirements of the Taylor Grazing Act, Federal Land Policy and Management Act, Endangered Species Act, Clean Water Act, and appropriate laws.

As indicated by such factors as:

- composition
- structure
- distribution

Criteria for meeting Standard 3:

Desired plant community or advanced ecological status is obtained.

Contributing factors may include, but not limited to:

- past land uses
- land use restrictions
- livestock grazing
- recreation
- wildlife
- rights-of-way

- wild horses and burros
- mining
- fire
- weather

Exceptions and exemptions (where applicable):

Ecological sites or stream reaches on which a change in existing vegetation is physically, biologically, or economically impractical.

Guidelines for Standard 3

3-1. When native species adapted to the site are available in sufficient quantities, they are recommended over non-native species.

3-2. Conservation of federal threatened or endangered, proposed, candidate, and other special status species is promoted by the maintenance or restoration of their habitats.

3-3. Management practices maintain, restore, or enhance water quality in conformance with state or federal standards.

3-4. Intensity, season and frequency of use, and distribution of grazing use should provide for growth and reproduction of those plant species needed to reach desired plant community objectives.

3-5. Grazing on designated ephemeral (annual and perennial) rangeland is allowed to occur if:

- ephemeral vegetation is present in draws, washes, and under shrubs and has grown to useable levels at the time grazing begins;

- sufficient surface and subsurface soil moisture exists for continued plant growth;

- serviceable waters are capable of providing for proper grazing distribution;

- sufficient annual vegetation will remain on site to satisfy other resource concerns, (i.e. watershed, wildlife, wild horses and burros); and

- monitoring is conducted during grazing to determine if objectives are being met.

e. Arizona BLM Ephemeral Grazing Policy

This policy was developed for all grazing allotments designated as annual range or ephemeral in the State of Arizona. Therefore, it provides guidance for the authorization of livestock grazing on ephemeral grazing allotments in the Safford District.

Upon receiving an application from a permittee for ephemeral grazing, the following policy is used. Prior to authorizing ephemeral use an allotment inspection is made.

The authorized officer ensures the following criteria have been met:

(1.) Presence of ephemeral vegetation in draws, washes, and under shrubs.

(2.) Sufficient surface and subsurface soil moisture for continued plant growth exists.

(3.) Ephemeral forage has grown to useable levels by the time grazing will be authorized.

(4.) Enough serviceable waters to provide good grazing distribution on the allotment for the number of livestock to be authorized.

(5.) All range improvements and livestock facilities needed for proper administration of authorized grazing use are properly maintained.

(6.) The level of grazing use will allow for sufficient annual vegetation to remain on site to satisfy other resource concerns, i.e. watershed, wildlife.

(7.) Salt and minerals may be provided. However, maintenance feeding of livestock on ephemeral rangeland is prohibited. The authorization of ephemeral grazing use must be based on professional judgement tempered by historical data, including past authorizations, ecological site descriptions, clipping studies and experience. Other things to consider are climate (amount of precipitation received and forecast for additional precipitation) and other specific resource concerns such as desert tortoise habitat.

(8.) On grazing allotments where no resource conflicts have been identified, livestock grazing authorizations can be given for a maximum period of 60 days per authorization. If there are known resource conflicts with livestock grazing (such as habitat for special status species), ephemeral authorizations will be

limited to a maximum of 30 days per authorization. Because the Sonoran desert tortoise generally remains in burrows until the end of March, authorizations can be given for 60 days or until March 31. After April 1, authorizations will be limited to a maximum of 30 days in desert tortoise habitat. Initial grazing applications will not be authorized for less than 15 days.

f. Safford District BLM Drought Policy

At the first sign of drought, as determined by the Safford District, normally below normal rainfall for more than two years, allottees are notified about the consequences of drought on forage production, range condition, utilization limits and are encouraged to reduce livestock numbers on their allotments voluntarily. This is handled by the range conservationist assigned the allotment.

The Upper GilaSan Simon Grazing EIS decision document states utilization limits clearly. Maximum use of key species by livestock and other uses will average 40 percent and will not exceed 60 percent of the current year's growth. The upper limit of 60 percent use level can either be based on individual key areas in pastures or in use zones mapped out during intensive utilization studies. Use should not be allowed to exceed 60 percent in a key area just because areas further away from water or in rougher country have less use. If utilization exceeds 60 percent on a key area of the allotment, District policy, established in the EIS, calls for the removal of livestock from the area (pasture or allotment) until plant growth and vigor has recovered.

If the drought continues, letters will be sent to operators of allotments where excessive utilization is becoming a problem. They will be encouraged to reduce livestock numbers and informed of possible adverse actions by the BLM if utilization exceeds 60 percent.

If a reduction is needed, calculations should be made using utilization and actual use studies for the previous grazing year. If intensive utilization results show that the use made, in animal unit months (AUMs), exceeded the allowable use calculated for the allotment, a reduction in livestock use will be made by at least the number of AUMs calculated.

The degree of reduction needed can be achieved several ways. First, the allottee will be notified of the results of BLM studies and alternatives discussed. If the problem is distribution rather than total numbers, cattle can be moved to a different pasture or to other areas of the allotment where utilization is less. If the problem is total numbers, the allottee will be encouraged to sign an agreement taking the required non-use for a period of two years, minimum. The agreement will be signed by the livestock operator and BLM Area Manager and will state that the non-use taken will not affect permitted use. It will also specify reasons why two years are necessary and outline

conditions that will result in activation of the non-use (i.e. "normal" or above average rainfall, new waters needed to service unused portions of the range).

If no agreement can reached, a decision will be issued and if necessary, the decision will be placed in full force and effect, which means the reduction in livestock numbers becomes effective immediately. If necessary, the Safford District Manager is authorized (43 CFR 4110.3-3(b)) to close allotments or portions of allotments to livestock grazing, if vegetation on public lands requires immediate protection because of drought conditions. Here again, a grazing decision would be issued and place in full force and effect.

g.Special Management Areas Designated By Congress or the Safford District RMP

These are areas that have been designated by Congress or through the Resource Management Plan. These areas are identified as needing special protection or emphasis in addition to standard BLM management. They generally are designated in response to resource needs and livestock management is constrained to some degree. These areas also are priority for management sometimes at the expense of other areas of the district due to reduced funding. (See Special Management Area overlay and Appendix 5)

Riparian Conservation Areas (2)

Congress has designated two Riparian National Conservation Areas in the Safford District. Management direction provided in the enacting legislation instructs the BLM to manage these areas to protect, conserve, and enhance the riparian area and associated resources. The associated resources include aquatic, wildlife, archaeological, paleontological, scientific, cultural, educational, and recreational resources. Together these areas contain about 65,000 acres of public lands including extremely important riparian and wildlife habitat. Planning for these areas has been initiated or completed.

Gila Box Riparian National Conservation Area
San Pedro Riparian National Conservation Area

Wilderness Areas (8)

Safford District BLM manages eight wilderness areas established by Congress in the Arizona Wilderness Act of 1984 and the Arizona Desert Wilderness Act of 1990. These areas contain about 86,000 acres of public land. Management plans have been completed for three of these eight areas. Congress instructs the BLM to manage these areas in the following manner: :"these shall be administered for the use and enjoyment

of the American People in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as provide for the protection of these areas and the preservation of their wilderness character, and for gathering and dissemination of information regarding their use and enjoyment as wilderness."

Safford District Wilderness Areas include:

Dos Cabezas Mountains
Peloncillo Mountains
Aravaipa Canyon
Fishhooks
North Santa Teresa
Redfield Canyon
Baboquivari Peak
Coyote Mountains

Wild and Scenic Rivers (5)

Segments of five rivers and streams in the Safford District have been included in the Recommended Alternative of the Arizona Statewide Wild and Scenic Rivers Final Legislative Environmental Impact Statement. They include:

Aravaipa Creek
Lower San Francisco River
Gila River within the Gila Box RNCA
Bonita Creek
San Pedro River
Cienega Creek

These areas contain about 23,000 acres of public land and are under protective management to protect their outstandingly remarkable values until Congress either includes them in the National Wild and Scenic Rivers System or releases them to management under the appropriate RMP.

Areas of Critical Environmental Concern (ACEC) (15)

The Safford District RMP designated eleven ACECs that contain about 29,000 acres of public lands. ACECs are areas with important natural resource attributes that require special management attention for their protection. Some ACECs are designated as Research Natural Areas (RNAs) while others are Outstanding Natural Areas (ONAs) or National Natural Landmarks (NNLs). The Safford District RMP established guidelines of the management of these areas. Safford District ACECs include:

Turkey Creek Riparian ACEC
Table Mountain RNA ACEC
Desert Grasslands RNA ACEC
Hot Springs Watershed ACEC
Bear Springs Badlands ACEC
Guadalupe Canyon ONA ACEC
Bowie Mountain Scenic ACEC
Dos Cabezas Peaks ACEC
Eagle Creek Bat Cave ACEC
Willcox Playa NNL ACEC
111 Ranch RNA ACEC
St. David Cienega ACEC
San Pedro River ACEC
San Rafael ACEC
Waterman Mountain ACEC

h. Riparian Area Policy and Management in the Safford District

The overall goal for riparian area management in the Safford District is to maintain, restore, or improve riparian values to achieve a healthy functioning condition thus achieving a healthy and productive ecological status for maximum longterm, multiple-use benefits and values.

Riparian areas are classified into four categories: (1) Proper Functioning Condition Riparian areas are functioning properly. (2) Functional-At-Risk Riparian areas are in functional condition but susceptible to degradation. (3) Nonfunctional Riparian areas that clearly are not functioning properly. (4) Unknown Riparian areas that lack sufficient information to make a determination (See Appendix 4 Riparian Inventory).

Managers will ensure that ongoing and proposed uses of the public lands are managed to protect and/or improve riparian areas. Activities occurring within riparian areas will be adequately managed or mitigated to prevent degradation of the unique ecological characteristics of these areas. A holistic view of riparian area management requires that longterm protection of riparian areas must include proper management of the entire watershed. In most cases the Safford District does not control through its management sufficient land within the watershed to influence the condition of the watershed and has to deal with the effect of the upper portion of the watershed. A prime example is the Upper Gila Watershed where the total watershed is 11,470 square miles and Safford District manages approximately 1,886 square miles at the bottom of the watershed, or 16 percent. The Aravaipa watershed is 541 square miles and BLM manages 109 square miles, or 20 percent, at the bottom of the watershed. This is representative of most of the sub-watersheds in the District: Bonita Creek, Eagle

Creek, San Francisco and San Simon.

Riparian areas are managed with an interdisciplinary team approach to ensure all available expertise is used in developing best management practices and plans. When appropriate, an affected land user may be a member of the team. All activity or management plans containing riparian areas should include specific riparian resource management goals and objectives, management prescriptions and actions, proposed improvements, and reasonable inventory and monitoring procedures based on the interdisciplinary recommendations. Existing plans without riparian objectives will be revised to include necessary riparian management objectives. An interdisciplinary concept will also be used in evaluation of existing or past management actions or plans. Management plans will emphasize the significant resource features identified during the inventory, including ethno-ecological values, special status species, areas of critical environmental concern, wilderness, wild and scenic rivers, and other special values. Plans should identify a time sequence for review to identify whether existing management is meeting the objectives of protecting or improving a riparian area. During the review, the interdisciplinary team will conduct a formal evaluation, using the approved District Allotment Management Plan (AMP) evaluation format. If necessary the team will formulate a revised management plan to correct management deficiencies.

i. Animal Damage Control Program in the Safford District

The Safford District and the Arizona Office of the Animal and Plant Health Inspection ServiceAnimal Damage Control (APHISADC) implemented a plan that permits the APHISADC to carry out animal damage control activities on BLMadministered public land within the Safford District. The primary focus of the program is on predator damage to livestock. The plan does not allow ADC to do preventative control work on local coyote populations.

Public lands in the Safford District are placed in one of three categories for procedures governing ADC control activities: planned control areas, special management areas, and undesignated areas.

Planned control areas are areas of the District that have experienced recurring livestock predation problems in the past. In the last decade, all ADC predator control actions on BLMadministered lands in Safford District have taken place in Graham and Greenlee counties. In planned control areas, livestock operators provide information on losses and request control directly from the APHISADC. The APHISADC evaluates requests for control and makes a field examination to determine the cause and the magnitude of the problem. If APHISADC personnel determine that livestock losses have been or are occurring and are likely to continue, predator control actions may commence. Arizona state law (ARS 17239 and 17302) authorizes the livestock operator to conduct predator control on federal, state, or private lands on their own or by

contract if they wish. The law requires them to report losses and take of mountain lions and bears to the Arizona Game and Fish Department.

Arizona also has recently enacted an anti-trapping law, ARS 17-301 (D), that makes it illegal to use leg-hold traps, any instant kill body-gripping design trap, poison, or snare on public lands. These lands include state-owned or state-leased lands, lands administered by the Forest Service, Bureau of Land Management, National Park Service, Department of Defense or lands administered by the State Parks Board and any county or municipality for anti-depredation purposes.

Special management areas include wilderness and wilderness study areas, areas of critical environmental concern, national conservation areas, and wild and scenic rivers. ADC actions in wilderness study areas, areas of critical environmental concern, national conservation areas, and wild and scenic rivers require the Resource Area Manager's approval prior to commencing control activities. ADC activities in wilderness areas must have the State Director's approval and the actions must be consistent with wilderness management policy guidelines.

Undesignated areas include scattered tracts of federal lands not included in a grazing allotment and those allotments where grazing use has been cancelled.

APHIS-ADC has lead agency responsibilities for preparation of the wildlife damage management plans and any associated NEPA documents, decision records, and compliance with the Endangered Species Act. The BLM is responsible for cooperating with APHIS-ADC in the development and annual review of wildlife damage management plans affecting BLM lands and resources and to ensure that those plans are consistent with existing Resource Management Plans or Management Framework Plans including the identification of areas on BLM lands where mitigation or other restrictions may be needed to ensure land use plan conformance.

2. BLM Land Use Planning

Land use planning, for the BLM-managed public lands in Safford District, is completed in three tiers. These tiers include Resource Management Plans (RMP), activity plans, and project plans.

a. Resource Management Plans (RMPs) are BLM's most comprehensive land use plans. The RMP is a programmatic level plan, broad in scope, that establishes a framework for all land management actions in the District. The RMP generally establishes what activities and uses are allowed, where they are allowed and the general level at which they are allowed.

RMPs are prepared to resolve significant issues and management concerns about specific land management programs and conflicts. Issues and concerns are identified

by BLM specialists, managers, and the public at the onset of the planning process. Various alternatives to resolve issues and concerns are developed and analyzed in compliance with the National Environmental Policy Act. The approved Resource Management Plan, that results from this process, will provide the District Manager with solutions to the issues and concerns and provide guidance for management of all resources on public lands throughout the District.

The preparation and implementation of a Resource Management Plan is completed under the planning regulations found in Title 43, Code of Federal Regulations (43 CFR) 1610. An Environmental Impact Statement is prepared in conjunction with the Resource Management Plan to determine effects of implementation on the environment.

b. Activity Plans are prepared to provide integrated management for important resources and/or in response to problems or conflicts identified in a specific areas. The activity plan is more detailed and usually addresses specific programs in specific areas. Activity plans usually decide how activities, authorized by the RMP, will be managed to avoid or mitigate conflicts between different uses and achieve the desired resource conditions established in the RMP. Activity-level plans include allotment management plans (AMPs), habitat management plans (HMPs), interdisciplinary activity plans (IAPs), and wilderness management plans. These plans are prepared by BLM personnel in coordination with allottees, Arizona Game and Fish Department, Arizona State Land Department, other federal agencies, and interested public.

In an activity plan, objectives are developed to meet the specific needs of the resources in the area covered by the plan. Management actions are developed that will achieve the objectives and are developed to solve resource problems and/or conflicts, implement RMP decisions, and implement applicable regulations and policies. Management actions may include use of a prescribed grazing system, range improvement projects, adjustment in livestock number, and site-specific mitigation measures. The plan also provides for monitoring and evaluation of the implemented management action over time in order to assess progress in meeting the objectives.

An Environmental Assessment is prepared to determine the effects of the implementation of the Activity Plan.

c. Project Plans are prepared for specific projects such as a range improvements and are usually construction related. These plans include site-specific planning and design of projects to be constructed, as called for in an activity plan. An environmental assessment is prepared for most project plans to address site specific environmental effects caused by the project. If the project is large, has great public interest, and has potential serious detrimental effects, an environmental impact

statement may be prepared.

d. Application of the Planning System to Grazing. Using the grazing program as an example the following decisions will be made at the RMP (programmatic), activity plan, and project plan levels. See BLM Manual 1622.3, Supplemental Program Guidance, Livestock Grazing Management.

RMP- level grazing decisions include:

(1) Establish where livestock grazing will be excluded considering terrain characteristics, potential of soil and vegetation, presence of undesirable vegetation, or presence of other resources that may require special management or protection.

(2) Establish general management objectives for the use of vegetation resources by livestock considering wildlife, wild horses and burros, and vegetation requirements for watershed protection, visual resources, and other uses.

(3) By allotment or groups of allotments identify the initial stocking levels including the kind of livestock and season of use. Estimate the final stocking rate expected with full implementation of the RMP.

(4) Identify the basic grazing treatments that may be used to meet management objectives. Also, identify the general types, locations, and magnitude of range improvements for allotments or groups of allotments.

(5) Identify the general types of constraints that will affect livestock grazing (e.g. period of use, area of use, and types of range improvements) as needed to protect other resource values such as riparian areas, threatened and endangered species, crucial wildlife habitat, and wild horse or burro habitat. Includes special livestock management activities needed to protect or enhance those values.

(6) Categorize allotments as Custodial, Maintain, or Improve for use in establishing priorities in the distribution of available funds and personnel.

(7) Establish general guidelines or criteria for guiding future adjustments (increases or decreases) in stocking levels, season of use, or other grazing management activities. In general terms, indicate how adjustments in grazing use will be made if monitoring studies show that management changes are needed to meet established management objectives.

Activity plan grazing decisions include:

(1) Allotment-specific grazing formulas and grazing systems
(2) Specific locations of individual projects
(3) Schedules for management actions
(4) Monitoring methods and schedules

Project plan-level decisions include:

(1) Specific project location.
(2) Facility design.
(3) Construction techniques.

3. Safford District Resource Management Plan Decisions Effecting Grazing

Decisions in the final Safford District Resource Management Plan (1991) and Records of Decisions (1992 and 1994) address special management areas, riparian areas, wildlife habitat, outdoor recreation and visual resource management, cultural resources, soil erosion, vegetation, and water resources. These special management areas are priority for management within the District. Some of these decisions have the potential to directly or indirectly impact the District grazing program.
(See Appendix 7 for specific decisions) The following is a short summary of decisions.

a. Special Management Areas

Aravaipa Creek Watershed (70,000 acres)

- In order to increase management flexibility and to provide for accelerated rehabilitation of uplands and riparian areas, initiate an immediate 50 percent suspension (2,898 Animal Unit Months) of the total preference (5,796 Animal Unit Months) on South Rim Allotment #4529. Collect utilization data annually for that portion of the allotment used by allottee until BLM completes carrying capacity determination and first five-year evaluation of the management prescription for the area.

- Develop range suitability criteria and determine range suitability. Evaluate and revise, if appropriate, resource management objectives in the existing South Rim Allotment Management Plan (dated 1989) to ensure that these objectives are measurable.

- Initiate a Coordinated Resource/Interdisciplinary Ecosystem Management Plan for the 70,000 acres of public land in the Aravaipa watershed area. As part of this process, reevaluate existing allotment management plans, and develop a monitoring plan to measure progress toward resource management objectives for the planning

area.

Hot Springs Watershed Area of Critical Environmental Concern (ACEC)
(16,763 acres)

Hot Springs Watershed will be designated as an Area of Critical Environmental Concern. The management prescriptions for livestock grazing will be developed using the procedures described below.

- Muleshoe Ranch livestock grazing was previously suspended for a five-year period by the Eastern Arizona Grazing Environmental Impact Statement. This decision was implemented by the signing of a Cooperative Management Agreement between BLM, The Nature Conservancy, and the Forest Service on December 12, 1988. The purpose of this suspension was to improve riparian conditions and wildlife habitat on the Muleshoe Ranch Cooperative Management Area. In order to continue progress toward the management goals for the Muleshoe, BLM will:

- Continue the suspension of grazing use on the Hot Springs Watershed Area of Critical Environmental Concern with the following management actions to be used to determine the final management prescription for the area.

- Determine range suitability through a range evaluation process. Suitability will not be used to establish carrying capacity.

- Develop a Coordinated Resource Management Plan for the Muleshoe Ranch Cooperative Management Area that includes the Hot Springs Watershed Area of Critical Environmental Concern using a team of BLM resource specialists, landowners, permittees, academia and representatives of other state and federal agencies with management responsibilities in the area.

- The interdisciplinary team will complete the Coordinated Resource Management Plan for the Muleshoe Ranch Cooperative Management Area including the Area of Critical Environmental Concern and propose specific resource allocations and prescriptions for multiple uses to achieve the identified resource objectives.

- Begin implementation of the coordinated plan in FY 1995 including any activation of suspended grazing preference at an appropriate level, and in a prescription consistent with achieving the resource objectives.

- Authorize livestock use on the new Soza Mesa Allotment at an initial stocking rate of 44 cattle year long. Utilization levels will not be permitted to exceed those prescribed in the Eastern Arizona Grazing Environmental Impact Statement (40 percent average over the full grazing cycle). Allottee will be expected to participate in

construction and maintenance of range improvements necessary to facilitate livestock use of allotment.

- Improve watershed conditions on the upland areas by vegetation manipulation and sound range management practices. Details of these management prescriptions will be incorporated into the Coordinated Resource Management Plan for the Area of Critical Environmental Concern which will include the use of prescribed natural fire to achieve the stated resource objectives.

Desert Grasslands ACEC (840 acres)

The management prescription for the exclusion of livestock from the Desert Grasslands Area of Critical Environmental Concern affects only lands not currently accessible to livestock or are not presently being used for grazing.

Bear Springs Badlands ACEC (3,247 acres)

Management goals for the Bear Springs Badlands are designed to protect sensitive Class I fossils and protection of scenic values with impressive erosional features in the area. These goals will be achieved through the following management actions: (1) Allow livestock use in the Bear Springs Badlands area, consistent with a livestock management plan to mitigate the adverse impacts on fossils of the area. (2) Livestock forage use will not be permitted to exceed an average of 40 percent over a full grazing cycle (averaging three to five years duration). Specific livestock management actions will be developed at the activity plan level.

Guadalupe Canyon ONA/ACEC (2,937 acres)

Management goals for the area are to manage riparian habitat, T&E species, scenic and recreation values of the area.

b. Riparian Areas

- Continue to develop grazing systems and modify existing allotment management plans, as necessary, to best manage livestock use for the improvement of riparian areas and reduce non-point source water pollution.

- Livestock grazing will continue on the 6,521- acres of state land which were acquired and added to the added to the San Pedro Riparian National Conservation Area. Allotment management plans will be prepared for all allotments in the 6,521 acre area to protect the riparian values of the area.

c. Wildlife Habitat

- Provide input into livestock Allotment Management Plans to ensure sufficient vegetation in bighorn sheep lambing areas for food and cover.

- Provide input into Allotment Management Plans in oak-woodland habitat to ensure perennial grasses are available to provide adequate cover for priority species.

d. Outdoor Recreation and Visual Resource Management

Continue to exclude livestock from the 159 acres of public land around Fourmile Canyon campground.

e. Cultural Resources

Exclude grazing from the Tres Alamos archaeological site (160 acres).

f. Soil Erosion

Manage livestock grazing in the San Simon flood plain and the Bear Springs Flat area to enhance stability and protect rehabilitation projects and other areas prone to erosion. Continue seasonal livestock grazing in the Bear Springs Flat area.

g. Vegetation

- Upland vegetation on public lands within the Safford District will be managed for watershed protection, livestock use, reduction of non-point source pollution, threatened and endangered species protection, priority wildlife habitat, firewood, and other incidental human uses. Best management practices and vegetation manipulation will be used to achieve desired plant community management objectives. Treatments may include various mechanical, chemical and prescribed fire methods.

- Land treatments (vegetation manipulation) will be used to decrease invading woody plants and increase grasses and forbs for wildlife, watershed condition, and livestock. Treatment areas will be identified in activity plans. Treatments may include various artificial (mechanical, chemical, or prescribed fire) methods.

The following actions will be implemented to accomplish the land treatment objective:

(1) Implement those best management practices and methods that will increase vegetation cover and decrease soil erosion and non-point source pollution to streams from sedimentation.

(2) Study the methods and effects of reducing rodent and rabbit populations on selected upland areas to improve vegetation cover.

h. Water Resources

- BLM resource activities will employ the best selected management practices to reduce non-point source pollution from rangeland management and use activities on the public lands.

4.Upper Gila-San Simon and Eastern Arizona Grazing EIS Decisions Effecting Grazing

These two grazing EISs respond to requirements of the National Environmental Policy Act (NEPA) of 1969 to analyze the impacts of a grazing management program on the environment. The Upper Gila-San Simon Grazing EIS was completed in 1979, and the Eastern Arizona Grazing EIS in 1986. These two EISs cover all public land in the Safford District.

Upland Livestock Utilization Standard

Proper stocking is an essential principle of range management, which should precede or coincide with the initiation of any grazing management system. With stocking rates in balance with the grazing capacities, utilization of key forage species in the key areas would average about 40 percent over a period of years. Studies conducted at the Santa Rita Experimental Range, south of Tucson, Arizona, indicated that use levels should be at about 40 percent to minimize vegetation damage during times of drought. At a given stocking rate during years of high forage production (above normal rainfall) utilization in the use pasture might be as low as 20 percent. During years of low forage production utilization could be as high as 60 percent. Proper stocking thus leaves 60 percent of the forage for watershed protection and other non-consumptive uses. Total use of the key species is measured and any wildlife use is included in the measurement. It doesn't matter whether wildlife or livestock are using the plant, total use is what is important. During abnormal years, whether dry or wet, stocking rates are adjusted. Policy and regulation allow for temporary nonrenewable licensing for increases in use or reductions in use.

a. Permitted Use

The grazing EISs established a sustainable carrying capacity or permitted use in Animal Unit Months (AUMs) for each grazing allotment. Permitted use is the average number of livestock that will to consume an average of 40 percent of the perennial forage production. Depending on the degree of slope, 60 to 100 percent of the

vegetation produced on steep slopes would be left for watershed protection, wildlife and other uses.

Appendix 2 shows the current permitted use for each allotment established by the decisions resulting from both EISs.

Grazing permits/leases are used to authorize livestock grazing on public lands. They can be issued for any length of time but cannot exceed 10 years. These permits/leases contain terms and conditions that describe how livestock grazing will be conducted and must be in conformance with management objectives and constraints for livestock grazing identified in land-use and activity plans. Minimum terms and conditions of a permits/leases include number of livestock and period of use which equate to AUMs. The total AUMs cannot exceed the permitted use for the allotment.

Changes in livestock use from year to year is allowed through grazing applications and billings. Each year, prior to the issuance of grazing bills, livestock operators are allowed the opportunity to apply to change the grazing use from that currently on their permit/lease. The authorized officer (Area Manager) can accept or deny these changes. If the total AUMs exceed the permitted use, the application would be denied and a decision would be issued giving the applicant the right to appeal to an Administrative Law Judge for an evidentiary hearing.

b. Grazing systems

Terms and conditions of grazing permits/leases also come from Allotment Management Plans (AMP). The AMP is an activity-level plan dealing with livestock grazing management on a specific unit of rangeland. An AMP defines goals and objectives and establishes the seasons of use, the number of livestock permitted on the range, grazing system to be followed, monitoring requirements for the allotment and the range improvements needed to implement the plan.

There are different systems of grazing management. The system developed for an allotment is based on multipleuse resource management objectives for the allotment and the preference of the livestock operator. Appendix 2 gives the current grazing system for each allotment.

The various grazing systems are described as follows:

Yearlong Grazing. Yearlong grazing is continuous grazing for the full calendar year. The primary criterion for selecting yearlong grazing is the restriction of management and system options that provide periodic rest or rotation by either grazing unit size or physiography. Yearlong grazing is a common system on semidesert ranges. Proper grazing use under this system is dependent upon stocking rates

consistent with the grazing capacity of the range and upon proper distribution of livestock use. Yearlong grazing is the system used on 106 grazing allotments, covering 365,468 acres of public lands. Many of these are classified as custodial due to the small percent of federal land within the total ranch unit. Some of these allotments may have grazing systems that we do not know about.

Ephemeral Grazing. Ephemeral ranges are areas of low rainfall and low perennial forage production. These areas are grazed infrequently for short periods when favorable precipitation allows the growth of relatively large amounts of short-lived annual forage. Rangelands under ephemeral management generally receive less than eight inches of average annual precipitation and are located in the lower elevations (below 3,500 feet). Ephemeral range plant communities have a minor percentage of perennial forage plants, usually not more than 10 percent of the total plant composition. These ranges annually produce an average of no more than 25 pounds of perennial forage per acre.

To comply with resource constraints of ephemeral range areas, livestock use is authorized only during favorable periods when relatively large amounts of annual vegetation are produced. Such authorized grazing use is based on range inspections following favorable rainfall and growth conditions.

Ephemeral grazing management is practiced on 35 grazing allotments consisting of 82,767 acres of public lands.

Rest-rotation Grazing. The rest-rotation grazing management system is designed to provide for the growth requirements of vegetation valuable for the production of livestock and other resource values. Under this system, each range area is rested from 20 to 50 percent of the time. Under rest-rotation grazing management, the range is divided into pastures. Each pasture is systematically grazed and rested to provide for the production of livestock forage and other resource values and at the same time maintain and improve soil fertility and vegetation.

Resting a unit of range after a period of grazing allows the opportunity for (1) plants to make and store food to recover vigor, (2) seeds to ripen, (3) seedlings to become established, and (4) litter to accumulate between plants.

Rest-rotation grazing includes the following basic treatments: (1) grazing for livestock production, (2) rest after grazing to allow seeds to ripen, followed by grazing for seed trampling, and (3) rest to recover plant vigor, to allow for litter production, and to allow seedling establishment.

Rest-rotation grazing is being applied to four allotments on 160,320 acres of federal lands.

Santa Rita Three-Pasture Rotation. The Santa Rita three-pasture rotation system was developed in southeastern Arizona on semidesert grass-shrub vegetation similar to much of the vegetation in the Safford District. It is similar to the rest-rotation system, the basic difference is in the timing of rest periods and the ability of this system to meet the physiological requirements of preferred forage species.

The Santa Rita system provides three grazing treatments, with rest for 24 months of the 36 month grazing cycle. Each pasture in the three-pasture set is rested March through October, two years out of three. Winter grazing is scheduled between the two successive March-October rest periods. This schedule provides 12 months of rest immediately before each period of spring-summer grazing.

The Santa Rita Rotation system is being used on two allotments for a total of 26,974 federal acres.

Deferred Rotation. The deferred rotation system provides for periodic rest from livestock grazing for various parts of the range in succeeding years during the growing season, usually from July through October. Each allotment using deferred rotation may be unique in the timing and amounts of livestock use or rest provided, depending upon the situation. This system can be used in two, three, four, or five- pasture allotments. It provides for rest from 25 to 50 percent of the time. The Best Pasture system is listed in the tables as deferred rotation since it is a variation of the deferred rotation system. In the best pasture system, one or more pastures are rested, and when 40 percent utilization in the grazed pasture is reached, cattle are moved to the "Best Pasture." This allows operators the flexibility of taking advantage of rainfall variations occurring on an allotment.

The deferred rotation system is used on 93 allotments for a total of 701,638 federal acres.

Seasonal Grazing. Under seasonal grazing, the grazing allotment is used only a portion of the year during a specified period, and livestock are removed for the rest of the year.

The three basic types of seasonal grazing management used are: summer, winter, and winter rotation.

Summer Seasonal Grazing. Summer seasonal grazing occurs on allotments where the predominant forage production and livestock use occurs on privately owned irrigated land. The public lands are grazed lightly during the summer and livestock are returned to private lands. Generally, the public lands are grazed June through August and remain the same each year.

Winter Seasonal Grazing. The allotment is grazed each fall, winter, and early spring and would be rested from livestock grazing for the rest of the year. Typically, the allotments are grazed from November 1 through April each year.

Winter Seasonal Rotation. This system allows livestock grazing in alternating winter seasons. Winter grazing during one or two years is followed by a complete year's rest.

Seasonal grazing is practiced on 33 allotments over 136,065 acres of public lands.

Holistic Resource Management (HRM). HRM is more than a grazing system but a dynamic collaborative management philosophy. The process begins with development of a holistic goal which includes values of the group managing the resources, forms of production that will sustain them, and a description of the resource base that will have to be produced and maintained to sustain that production indefinitely. All decisions pass through seven tests to ensure the goal is reached in the most ecologically, economically and socially sound way. Critical to the process is the final step: before and while decisions are enacted, and despite all the testing, you assume you could be wrong and identify what signs to look for to provide the earliest warning. When your monitoring shows the decision was wrong, you correct it immediately. This process is controversial and uses non traditional management actions that people are uncomfortable with. Allotments where it is being employed are viewed as tests for the process.

HRM is authorized on four allotments on 22,263 acres of federal lands.

Deferment of Grazing

The RMP incorporated the Upper Gila-San Simon Grazing EIS deferment decisions by reference. The EIS deferment of grazing actions included several major riparian areas and one watershed. They are the Gila River, Bonita Creek, Aravaipa Creek and Mescal Creek, and San Simon Watershed. They are summarized as follows:

Approximately 14,050 acres of public land on portions of nine grazing allotments will be deferred from livestock grazing. Areas proposed for this deferment of livestock grazing are critical watershed areas along the San Simon River, and critical riparian and aquatic habitat along Aravaipa Creek, Mescal Creek, Bonita Creek, and the Gila River. Decisions to remove grazing will be issued as soon as fences are constructed.

Gila River, Bonita Creek, Aravaipa Creek and Mescal Creek

The public lands with critical riparian and aquatic habitats, including springs, would be fenced to permit the necessary specialized management. Alternate livestock water sources would be constructed outside these areas. These areas would be deferred from grazing for a minimum of three to five years to allow the propagation and improvement in condition of riparian vegetation.

This decision did not include the deferment of approximately two miles of the Gila River downstream from Bonita Creek and the lower portion of the San Francisco River.

Following an initial deferment period grazing might be allowed under the following conditions: (1) that desirable riparian plants be established and maintained, (2) that grazing not occur more often than one year out of three during the critical March through October growing period, (3) that grazing not occur for longer than an eight-month period at a time, and (4) that utilization of desirable species not exceed 40 percent of the current year's growth. A given water course would be divided with fences, where feasible, to prevent livestock from grazing the entire length at any given time.

San Simon Watershed

The San Simon River channel would be deferred until vegetation and litter production are increased sufficiently to maintain adequate watershed protection while sustaining livestock. Livestock grazing would be authorized on deferred areas whenever significant conflicts with other resource needs are not anticipated or range condition is not expected to deteriorate with grazing.

Severely eroded areas proposed for deferment would be grazed after rehabilitation and revegetation, probably after 15 to 25 years. During the deferment period, habitat and vegetation studies would be implemented. Subsequent management would depend upon the response and improvement of these areas. Where natural revegetation does not occur, desirable species would be planted.

The revegetation would primarily consist of naturally occurring species found within the San Simon channel: 1) mesquite, 2) salt cedar, 3) vine mesquite, 4) Johnson grass, 5) blue panic, 6) alkali sacaton, and 7) four-wing saltbush. Introduced species, such as blue panic, would be used to rehabilitate areas disturbed during construction of the detention dams.

Following an initial deferment period, grazing might be allowed under the following conditions: (1) that desirable riparian plants be established and maintained, (2) that grazing not occur more often than one year out of three during the critical March

through October growing period, (3) that grazing not occur for longer than an eight month period at a time, and (4) that utilization of desirable species not exceed 40 percent of the current years growth. A given water course would be divided with fences, where feasible, to prevent livestock from grazing the entire length at any given time.

Non-use (NU) (eight allotments over 39,427 acres)

Allotments where permitted use is still allocated to the allotment but for management reasons livestock use is not currently being licensed. These allotments may be licensed under the new regulations for conservation use.

Cancelled Allotments (three allotments over 53,336 acres)

On some allotments, permitted use has been cancelled for administrative reasons. At this time, the allotment is unavailable for licensing but may be in the future.

SUMMARY OF GRAZING SYSTEMS IN SAFFORD DISTRICT

GRAZING SYSTEM	NUMBER OF ALLOTMENTS	FEDERAL ACRES	PERCENT OF SAFFORD DISTRICT (ACRES)
YEARLONG	106	365,468	23
EPHEMERAL	35	82,767	5
REST-ROTATION	4	160,320	10
SANTA RITA THREE-PASTURE	2	26,974	2
DEFERRED ROTATION	93	701,638	44
SEASONAL	33	136,065	9
HOLISTIC	4	22,263	1
*DEFERMENT	(9)	(14,050)	*
NONUSE	8	39,427	3
CANCELLED	3	53,336	3
TOTAL	288	1,588,258	100

* DEFERMENT is on portions of grazing allotments. The federal acres and number of allotments are included in other categories of grazing systems.

c. Inventory and Monitoring

Ecological Site Inventory (ESI) is the inventory method BLM uses to determine the condition of rangelands. The procedure recognizes all resource values associated with a particular range site, soils, precipitation, temperature, and elevation. It is a study to determine what is growing on a particular site compared to what could grow there over a long period with no outside disturbances such as livestock grazing. The terms "potential natural community," "late seral," "mid seral," "early seral" are used to describe the relationship of the existing plant community to the potential plant community for the site.

ESI is a time-consuming process, therefore, until ESI can be completed on an allotment, professional judgement is used to describe range condition. The range conservationist, with knowledge of range sites, soils, and vegetation, estimates the range condition for the allotment using his/her best judgement.

Trend is the change in vegetation and soil characteristics directly resulting from environmental factors, primarily precipitation and grazing. Permanent threefoot or five-foot square photo plots are established in key areas of each allotment. Overhead photos of the plot are taken periodically to document changes in ground cover, plant vigor, and species composition.

On some allotments trend studies also consist of 200-point pace frequency plots and/or 100foot line transects.

Appendix 3 gives the range condition and trend for individual allotments.

Utilization is monitored on grazing allotments to determine the level of actual vegetation utilization. The frequency and intensity of utilization monitoring is determined by the selective management category of the allotment. The method used is the Key Forage Plant method described in the BLM Technical Reference 4400 - 3. Data collected is used to map utilization zones on the allotment to create a use pattern map. This data is used to determine livestock carrying capacities for an allotment according to BLM Technical Reference 4400 - 7. The standards for livestock utilization for allotment use was determined through the Upper Gila-San Simon and Eastern Arizona Grazing EISs.

Precipitation data is collected at 54 permanent rainfall collection stations throughout the District. Rainfall data is used during the evaluation of allotments.

Monitoring is used to determine the effectiveness of grazing treatments and new rangeland developments to see if AMP objectives are being met. Monitoring provides information critical to managing and refining the grazing program and provides the basis

for making needed adjustments.

When monitoring reveals that multiple use objectives are not being met, grazing systems will be modified, livestock numbers increased or decreased, kind of livestock changed, or additional rangeland developments built to reach the objectives. In some instances, rangeland management objectives may need to be reevaluated.

If monitoring studies show that trend is static or upward and utilization by livestock and other uses is less than 40 percent on the key species, the stocking rate would be increased. If studies show that trend is static or downward and utilization is more than 40 percent on the key species, the stocking rate would be decreased. Both increases and decreases in livestock numbers will be done in accordance with procedures in the new grazing regulations that became effective August 21, 1995.

d. Evaluations

Allotment evaluations are formal interdisciplinary analysis of the progress towards accomplishing the objectives of an AMP. The evaluation is a detailed analysis of study data. Evaluations determines whether satisfactory progress is being made toward meeting management objectives and, if not, what actions are necessary to correct the situation. AMPs are revised as the result of an evaluation if it indicates that progress toward objective is not being made or objectives are not being accomplished.

e. Selective Management Category

Grazing allotments in the District are managed under three selective management categories: (l) Maintain (M), (2) Improve (I), or (3) Custodial (C). The categorization process groups allotments on the basis of existing resource conditions, potential to improve, or other resource conflicts; and ranks them according to the economic return on monies invested in range improvements. Appendix - 2 gives the management category for each allotment.

It is not necessary for allotments in any of the categories to meet all criteria set forth.

(1.) Maintain Category Criteria

(a.) Present range condition is satisfactory. (b.) Allotments have moderate or high resource production potential, and are producing near their potential (or trend is moving in that direction). (c.) No serious resourceuse conflicts/controversy exists. (d.) Opportunities may exist for positive economic return from public investments. Present management appears satisfactory.

(2.) Improve Category Criteria

(a.) Present range condition is unsatisfactory. (b.) Allotments have moderate to high resource production potential and are producing at low to moderate levels. (c.) Serious resourceuse conflicts/controversy exists. (d.) Opportunities exist for positive economic return from public investments. (e.) Present management appears unsatisfactory.

Allotments in this category have first priority for range improvements, monitoring and Allotment Management Plans (AMP).

(3.) Custodial Category Criteria

(a.) Present range condition is not a factor. (b.) Allotments have low resource production potential, or are producing near their potential. (c.) Limited resourceuse conflicts/controversy may exist. (d.) Opportunities for positive economic return on public investments do not exist or are constrained by technological or economic factors. (e.) Present management appears satisfactory or is the only logical practice under existing resource conditions.

f. Range Improvement Developments

Construction of range improvements (RIs) are often necessary to implement the grazing management program designed to meet objectives of an Allotment Management Plan (AMP). When planning RI projects an interdisciplinary team of resource specialists will review the proposal to ensure the greatest multiple use benefits. For instance, a livestock water can be designed to benefit wildlife also. All proposals will be evaluated in an environmental assessment (EA) of appropriate scope to determine site-specific impacts. As a minimum, the EA will address cultural resources, T&E species, visual resources and wilderness values. Mitigating measures will be developed to reduce or eliminate site-specific impacts, if needed. A project checklist is used by the Safford District during planning and design of a project to ensure all disciplines are considered, documentation is completed, and resources are protected to the extent possible.

In the construction of range improvements on public lands there are certain stipulations that must be followed. They are summarized as follows: (1) permanent roads or trails will not normally be constructed to project sites, (2) disturbance of soil and vegetation at all project sites will be held to an absolute minimum, areas of soil disturbance will be finished to blend into the surrounding soil surface, (3) an archaeological inventory and clearance will be required for each project site before construction, (4) T&E species surveys and clearances will be required for each project site before construction, (5) visual resource management (VRM) will be addressed to

minimize the adverse visual impacts created by the proposed action, and (6) projects constructed in wilderness areas will use the minimum tool necessary.

The most common RI projects needed to implement AMPs on public lands are construction of fences, pipelines, water storage tanks, earthen reservoirs, and rainfall catchments; drilling wells; and developing existing springs.

It is District policy to assign maintenance responsibility for projects which benefit livestock grazing, to the extent possible, to the livestock operator. BLM will normally assume maintenance responsibility for improvements not designed for the benefit of livestock grazing, and all nonstructural improvements. Nonstructural improvements are vegetation manipulation projects such as seedings.

C. LAWS, REGULATIONS, POLICIES AND RMP DECISIONS THAT PROVIDE GUIDANCE FOR AND CONSTRAINTS ON THE GRAZING PROGRAM BUT ARE NOT USED FOR ANALYSIS IN THIS DOCUMENT

The following decisions and actions provide guidance and/or constraints for management of the grazing program and do not in themselves result in direct impacts to resources including T&E species. The goals and objectives articulated in the following areas have resulted in changes in elements of the grazing program that directly impact resources including T&E species and their habitat.

1. Policy and Regulations

    a. Endangered Species Act
    b. National Environmental Policy Act
    c. Grazing Regulation Standards and Guidelines
    d. Ephemeral Grazing Policy
    e. Safford District Drought Policy
    f. Animal Damage Control Program

2. RMP Planning Decisions

    a. Wildlife Habitat
    b. Outdoor Recreation and Visual Resource Management
    c. Cultural Resources
    d. Soil Erosion
    e. Vegetation
    f. Water Resources

3. EIS Decisions

a. Inventory and Monitoring
b. Evaluation
c. Selective Management Category

D. POLICY AND DECISIONS THAT IMPACT RESOURCES, EFFECT GRAZING, AND ARE USED FOR ANALYSIS IN THIS DOCUMENT

Planning decisions, regulation and policy can directly effect resources on the ground or indirectly effect actions. For the purpose of analysis in this Biological Evaluation, the decisions that can have a direct effect upon T&E species are summarized under the following six subject headings. The effects analysis tables are used to present the effect of each decision on each species on each allotment that is occupied by a T&E species or with potential T&E species habitat.

1. Permitted Use
2. Grazing System
3. Range Improvement Policy
4. Utilization Standards
5. Riparian Management Policy
6. Special Management Areas

E. CURRENT SITUATION ANALYSIS

The status of threatened and endangered species on public lands in the Safford District can be enhanced by the successful implementation of land use planning decisions that are consistent with the federal laws, regulations, and policies that address attributes of the environment that are important to these species. Protection of the air, water, soil, and vegetation resources are fundamental to protecting threatened and endangered species. To this end, implementation of management actions that achieve the stated objectives for air quality, water quality, non-point source pollution, watershed condition, erosion prevention and control, upland vegetation communities, riparian vegetation communities, riparian function, and wildlife habitat are critical for maintaining and enhancing populations of these species on public lands.

The Safford District Grazing Program incorporates objectives and includes management actions that are designed to protect these basic resources. The degree to which these grazing management actions have been successfully implemented is the key to understanding impacts to threatened and endangered species that accrue from grazing on the public lands in the Safford District.

The following summarizes the status of implementation of decisions from the Safford District RMP and Grazing EISs which constrain or effect the grazing program and provide protection for basic resource components.

- Permitted use
- Grazing systems
- Utilization standards for uplands
- Range improvement policy and construction
- Riparian policy
- Special management areas

1. Permitted Use Summary

In the 1960s carry capacity surveys (range surveys) were conducted on many grazing allotments. From these surveys, livestock numbers on these allotments were reduced, sometimes as much as 50 percent. Total permitted use for the District was decreased by about 30 percent.

The carrying capacity of allotments was estimated in the Upper Gila-San Simon Grazing EIS. Grazing decisions adjusting permitted use to carrying capacity were issued by March 1, 1986. District-wide there was a decrease in permitted use by another 30 percent.

The Eastern Arizona Grazing EIS was completed in 1986. It covered scattered federal lands in the Safford District, including the Tucson Resource Area. No decrease in permitted use was required from this EIS.

The current permitted use for each grazing allotment is shown in Appendix 2.

Monitoring studies and evaluations, as described earlier, are used to determine if permitted use is correct, based on the 40 percent utilization standard on perennial forage production. If monitoring studies show that trend is static or upward and utilization is less than 40 percent on the key species over a period of time, the permitted use would be increased. If studies show that trend is static or downward and utilization is more than 40 percent on the key species, the permitted use would be decreased.

Fluctuations in permitted use vary from year to year due to many reasons of which drought is a major one in this area. This grazing fee year, March 1, 1996, through February 28, 1996, 40 percent of the livestock operators in the Gila and San Simon Resource Areas have applied for non-use on their grazing allotments because of drought. The Gila and San Simon Resource Areas have authorized 34,851 AUMs of non-use. This is equates to 29 percent decrease in active use for the tworesource areas. The Tucson Resource Area has authorized 12,047 AUMs in non-use, on 21 grazing allotments. This equates to 31 percent decrease in active use in the resource area. Currently the is 46,898 AUMs in non-use due to drought and 98,639 in active use.

2. Grazing Systems Summary

Grazing systems are normally developed as part of an allotment management plan (AMP). AMPs have been developed on all except 35 grazing allotments in the Improve (I) and Maintain (M), management categories. Appendix 2 shows there are 106 allotments with yearlong grazing. These include the allotments where an AMP has not yet been developed and Custodial (C) allotments where federal land is a small (usually less than 20 percent), part of the total acreage in the allotment. There is no schedule for completing AMPs on the 35 allotments without AMPs. Monitoring is used to determine the effectiveness of the grazing system designed for an allotment and to see if AMP objectives are being met. When monitoring reveals that objectives are not being met, AMPs are revised and grazing systems modified, as time permits.

Future AMPs and revisions of existing AMPS will be completed using an Interdisciplinary Resource Management Plan system. These are plans written by a coordinated interdisciplinary team or group of individuals with knowledge, expertise, and experience in specific resource programs, with each individual normally representing one or more programs or specialists in the interaction with other team members. The Gila Box Riparian National Conservation Area draft management plan and Muleshoe Ecosystem draft management plan are currently being developed using this process. The Empire plan is in the beginning stages of this process. New or revised plans in the future will strive to meet objectives of Standards and Guidelines which are being developed for Arizona.

Deferment of Grazing Summary

Gila River and Bonita Creek. This area is within the Gila Box Riparian National Conservation Area. Draft planning has been developed which includes modifications to original EIS decisions. Currently 17 miles of the Gila River are deferred from grazing, four miles grazed yearlong, and one mile grazed winter seasonal. Eight miles of Bonita Creek are deferred from grazing and three miles has winter seasonal grazing.

Fencing and water developments are, for the most part, complete. An Arizona Water Protection Fund Grant has been received to complete improvements to implement full management.

Aravaipa Creek. This area falls within the Aravaipa Canyon Wilderness. It has been removed from livestock grazing since 1974. Livestock trailing two times per year is authorized, but this has not occurred in recent times and is not anticipated to occur in the future.

Mescal Creek. Currently administered by the BLM Phoenix District

San Simon Watershed. The San Simon watershed has been a continuing challenge because of the erodible nature of the watershed and rainfall patterns. The watershed is 2100 square miles of which BLM manages 766 square miles primarily north of Interstate 10. To put this in perspective the San Simon is 18 percent of the Upper Gila Watershed and BLM manages 36 percent of the San Simon. On a good wet year(1993) the San Simon provided 2500 acre feet of water to the Gila or .001 percent of the total 1,363,356 acre feet of water. On a dry year (1989), it provided 1,113 acre feet of water or .003 percent of the total 362,753 acre feet of water. The water production is 1.2 acre feet per square mile (wet year) and .53 acre feet per square mile (dry year). The average acre feet of water produced per square mile for the Upper Gila watershed is 119 acre feet (wet year) and 32 acre feet (dry year). All this to say the San Simon is a minor player as far as water to the Gila River. The concern is sediment loss and resultant non-point source pollution. The good news is the trend in sediment loss by the San Simon is dramatically down. From 1983 to 1995 the sediment yield in acre feet of sediment has show a steady decline from 230 acre feet to 15 acre feet. Flow rates show the same trends. This is a good indication the watershed is improving.

There are seven allotments from Interstate 10 north along the San Simon River channel. These allotments are: 5101, 5103, 5108, 5110, 5114, 5115, and 5118. All have been intensively managed under some type of management plan since the Upper Gila-San Simon Grazing EIS was completed, with the exception of allotment 5110 which has been cancelled, The channel has been managed with a combination of deferment and seasonal grazing.

There have been several major soil-compacted detention dams constructed. Some of the structures have been fenced and livestock excluded entirely, while others are grazed in accordance with allotment management plans during the winter. The major structures include the Fan Detention Dam, Barrier Detention Dam, HX Detention Dam, and 15 smaller erosion control structures and dikes constructed. The BLM has planted cottonwood and willow trees behind many of the structures to enhance plant diversity.

Other areas, in or near the San Simon River, which have been excluded from livestock grazing permanently include Howard Well exclosure, Martin Well exclosure, Posey Pond exclosure, HX Dam exclosure, Ryan Dike, Joy Valley, Sands Draw exclosure, Creosote Detention Dam, and Hot Well Dunes exclosure. All of these exclosure have been enhanced by vegetation manipulation including grass reseeding and planting of cottonwood and willows to improve habitat diversity.

The watershed in general has improved, both the uplands and the channel. An evaluation of the San Simon Project is in progress and data is indicating progress on rehabilitation. In 1990, the BLM estimated that 20,000 acre feet of sediment had been detained by the Barrier and Fan structures since construction. The immediate channel

has been stabilized with vegetation for most of the length. Approximately, 10 miles behind the Fan Structure and two miles behind the Barrier has filled in creating a major flood plain capable of growing a diverse variety of plants and providing excellent wildlife habitat.

Currently an evaluation of the San Simon Watershed is in progress in cooperation with the San Carlos/Safford/Duncan NPS Advisory Group. This effort is in cooperation with the Arizona Department of Environmental Quality's watershed management efforts on the Upper Gila Watershed Management. This effort includes coordination with the portion of the watershed in New Mexico through the Gila Monster (Interstate Watershed Management Program). The goal is to assess the progress of the past 60 years of effort and refine future efforts to improve the watershed and reduce non-point source pollution coming from the San Simon Watershed.

3. Uplands Vegetation Utilization Standard Summary

Since completion of livestock adjustments in 1986, vegetation utilization has been monitored on a regular basis on allotments to tract utilization levels. In the last five years the number of allotments monitored and the intensity of monitoring has declined because of reduced personnel. Focus has changed to problem allotments with spot checking of others. Since 1986, authorized use (combination of active use and non-use) has fluctuated with forage production to maintain the utilization standard.

4. Range Improvement Policy And Construction Summary

Construction of range improvements (RIs) are necessary to implement the grazing management program designed to meet objectives of an AMP. Major RI construction efforts as the result of the grazing EISs in the District are complete. Since the EIS was completed there have been 212 miles of fence, 158 miles of pipeline, 80 storage tanks, 14 earthen reservoirs, seven rainfall catchments, and 15 masonry dams constructed, drilled 10 wells, and developed six springs.

The District receives 50 percent of livestock grazing fees to be expended for range improvements. Range improvement projects will continue to maintained and constructed but, at a much lower rate than in the past..

Construction in the future will be primarily to protect high value resources or projects needed to implement revisions in an AMPs, as the result of evaluations and/or as a result of other activity plans. Much of the current efforts are directed at special management areas, such as the Gila Box Riparian National Conservation Area

5. Riparian Policy Summary

Riparian management in the District has its roots in the first MFPs for the District in the 1960s. Riparian areas were identified as important wildlife habitat. The first AMPs, while not having specific riparian objectives, took into consideration riparian management as part of the pasture design by fencing major riparian areas into separate pastures and fencing springs to control livestock access.

The first riparian inventories were initiated the 1970s as part of the Upper Gila-San Simon Grazing EIS efforts. Much of the range improvement construction during the 1980s took into consideration riparian management in design pasture fencing and water developments to provide for better control of livestock access to riparian areas.

The late 1980s brought to the District Bureau-specific riparian management policy. These policies have been further refined to the present. These polices have been planned for and implemented on major riparian areas in the District through site-specific activity plans such as the Gila Box Riparian National Conservation Area Plan, San Pedro Riparian National Conservation Area Plan, Muleshoe Ecosystem Management Coordinated Activity Plan, Wilderness Area management plans, and Empire-Cienga Coordinated Activity Plan and individual AMPs. Many of these plan have site-specific Section 7 consultation completed or in progress with the FWS. Smaller riparian areas such as springs and short stretches of riparian stream have been dealt with at an AMP level. All of these plans are in the process of being evaluated for the riparian objectives.

Appendix 4 gives the current condition of major riparian areas.

6. Special Management Areas Summary

Special Management areas in the Safford District include Congressional designations such as wilderness areas, National Conservation Areas, and future Wild and Scenic Rivers, as well as agency administrative designations such as Areas of Critical Environmental Concern. Each of these areas is recognized for the quality of its natural resource values and is afforded some level of extra protection to preserve the existing values. In the case of Congressionally designated areas, management direction is provided in the federal laws making the designation. The BLM is required to formulate a management plan for the area that meets the goals and objectives of the law. For administrative designations, BLM also completes a plan that meets the recognized needs of the area. Guidance in federal laws, as well as decisions in the RMP and activity-level plans that provide management direction for these areas often have restrictive effects on grazing. The following is the current situation in each of these areas.

Aravaipa Creek Watershed - 50 percent (2,898 Animal Unit Months) of the total permitted use (5,796 Animal Unit Months) on South Rim Allotment No. 4529 has been suspended from livestock grazing. An Interdisciplinary Coordinated Management Plan for 70,000 acres of public land in the Aravaipa watershed area will be completed in the next few years.

Hot Springs Watershed ACEC - Range suitability has been determined and is part of the Draft Muleshoe Ecosystem Management Plan. The final plan should be completed by the end of fiscal year 1996. This plan includes the Hot Springs Watershed ACEC. The Soza Mesa allotment has been established at an initial stocking rate of 44 cattle year long.

Desert Grasslands ACEC - These lands are not accessible to livestock. The planning has not been initiated and part of the ACEC is currently administered by the BLM Phoenix District.

Bear Springs Badlands ACEC - Planning has not been initiated. Livestock forage use is not permitted to exceed an average of 40 percent. The allotment management plans for allotments will be revised upon completion of the ACEC plan if changes in current management is called for.

Gila Box Riparian National Conservation Area - A draft plan was completed for this area in 1993. The final plan is scheduled for completion by the end of fiscal 1996.

San Pedro Riparian National Conservation Area - The plan was completed in 1993 and is being implemented. There is no livestock grazing permitted on the 47,668 acres of private lands originally acquired by BLM through a land exchange. Legislation that created the NCA in 1988 designated an additional 6,521 acres which were acquired by BLM from the State of Arizona. Although the legislation excluded livestock grazing on the original acquisition for the next 15 years, livestock grazing is permitted on the lands acquired from the state within the NCA. Livestock management plans will be prepared for the four allotments within the NCA to provide for continued livestock grazing and protection of the riparian values. At the end of 15 year moratorium on livestock grazing, a decision will be made to either continue the exclusion of livestock or to permit grazing under certain terms and conditions.

Guadalupe Canyon ONA/ACEC - Planning was initiated in 1996.

Other Areas of Critical Environmental Concern (ACEC) had no decisions affecting the grazing program. Planning for these ACECs have not been initiated: Turkey Creek, Table Mountain, Bowie Mountain, Dos Cabezas Peaks, Willcox Playa, 111 Ranch, Eagle Creek Bat Cave, St. David Cienega, San Pedro River, and San Rafael.

Wilderness Areas

Dos Cabezas Mountains; Plan completed 1995
Peloncillo Mountains; Plan completed 1995
Avavaipa Canyon; Plan completed 1988
Fishhooks; Planning not initiated
North Santa Teresa; Planning not initiated
Redfield Canyon; Planning not initiated
Baboquivari Peak; Planning not initiated
Coyote Mountains; Planning not initiated

Permitted use is established at the point of designation. Livestock forage use is not permitted to exceed an average of 40 percent. Allotment Management Plans are to be revised as needed to incorporate changes in management as the result of wilderness management plans.

Wild and Scenic Rivers

Segments of five rivers and streams in the Safford District have been included in the Recommended Alternative of the Arizona Statewide Wild and Scenic Rivers Final Legislative Environmental Impact Statement. They include the Lower San Francisco River, Gila River within the Gila Box, Bonita Creek, San Pedro River, and Cienega Creek. These areas are under protective management to protect their outstandingly remarkable values until Congress either includes them in the National Wild and Scenic Rivers System or releases them to management under the appropriate RMP.

F. PROGRAMMATIC CONSULTATIONS

Programmatic decisions (RMP Level) that guide grazing in the Safford District are found in five RMP level planning documents. These include: (1) the Safford District RMP; (2) Phoenix District RMP; (3) Upper Gila-San Simon Grazing EIS; (4) Eastern Arizona Grazing EIS; and (5) San Pedro Riparian National Conservation Area Riparian Management Plan.

There are two Biological Opinions (BOs) issued by the Fish and Wildlife Service on RMP-level planning documents that affect the livestock grazing program in the Safford District.

On May 30, 1978, a BO was issued for the Upper Gila-San Simon Grazing EIS. This BO addressed six Federally listed endangered species: Mexican wolf (*C. bailey*i), Mexican duck (*A. diaz*i), bald eagle (*Haliaeetus leucocephalus*), Peregrine falcon (*Falco peregrinus anatum*), Gila topminnow (*Poeciliopsis occidentalis*), and the woundfin (*Plagopterus argentissimus*). The BO concluded that BLM's proposed action

would not jeopardize the continued existence of any of the six species nor adversely modify habitat essential to its survival.

On April 5, 1990, a BO numbered 2-21-88-f-114 was issued on the Draft Safford District Resource Management Plan and EIS. The ten species of concern were the spikedace (*meda fulgid*a), loach minnow (*Tiaroga cobitis*), Gila topminnow , desert pupfish (*Cyprinodon macularius*), peregrine falcon, bald eagle, aplomado falcon (*Falco femoralis septentrionalis*), Sanborn's long-nosed bat (*Leptonycteris sanborn*i), Cochise pincushion cactus (*Coryphantha robbinsorum*), and Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. arizonicus). The BO concluded that implementation of the draft "Safford District RMP and EIS is: 1) not likely to affect the aplomado falcon; 2) not likely to jeopardize the continued existence of the Gila topminnow, desert pupfish, peregrine falcon, bald eagle, Sanborn's long-nosed bat, Cochise pincushion cactus, or Arizona hedgehog cactus; and 3) not likely to jeopardize the continued existence of the spikedace or loach minnow and not likely to adversely modify the proposed critical habitat of the spikedace or loach minnow."

III. ANALYSIS OF AFFECTS AND CONCLUSIONS BY SPECIES

The following analyses are based on the information presented in the description of the proposed action and the following appendices; Appendix 1 - Allotments with no T&E Species; Appendix 2 - Grazing Allotment Information; Appendix 3 - Range Condition and Trend; Appendix 4 - Riparian Inventory; Appendix 5 - Special Management Area Information; and Appendix 6 - Allotments With No Effect Determination. These analyses investigate the ways in which the laws, regulations, policies, and RMP (programmatic) decisions affecting grazing are applied in the Safford District on an allotment-by-allotment basis and draw conclusions about the impacts of the existing grazing program on threatened and endangered species on a species-by-species basis.

AMPHIBIANS

CHIRICAHUA LEOPARD FROG (*Rana chiricahuensis*)

1. SPECIES BACKGROUND INFORMATION:

a. T&E STATUS/CRITICAL HABITAT

Category One. Critical habitat: None proposed.

b. T&E OCCURRENCE REPORTS

Chiricahua leopard frogs have been confirmed in Cienega Creek, Pinal County, AZ (Jeff Simms, pers. comm. 1996). Also occurs in Guadelupe Canyon, Cochise County, AZ; Aravaipa Creek, Pinal County, AZ; and in isolated sites (springs or stock reservoirs) in Sulphur Springs Valley, Cochise County, AZ (Mike Sredl, pers. comm. 1991).

c. T&E SURVEYS

Survey performed by Clarkson and Rorabaugh (1989) revealed *R. chiricahuensis* present at only two of 36 locations where the species had been previously documented. No comprehensive survey of leopard frogs have been performed for public lands in Safford District. Hence seven allotments are considered to contain potential Chiricahua leopard frog habitat.

d. CONSULTATIONS/CONFERENCES

None.

e. REASONS FOR SPECIES DECLINE:

Introduction of non-native fish and bullfrog *(Rana catesbeiana*) into leopard frog habitat is thought to be the cause losing some populations (Clarkson and Rorabaugh 1989). This may be the reason for the lack of native leopard frogs in the mainstem San Pedro River (Mike Sredl pers. comm. 1996).

Past pollution events, such as the 1979 release of mine waste into the San Pedro River, has decimated aquatic communities in the past and remains a major concern (Jackson et al. 1987). Leopard frogs have probably suffered declines due to these events.

Overgrazing of watersheds has caused erosional downcutting of cienegas and loss of aquatic habitats in southeastern Arizona (Hadley and Sheridan 1995, Hendrickson and Minkley 1984). This undoubtedly has had a negative affect on leopard frogs.

Amphibian populations throughout the world have suffered declines over the past two decades (Barinaga 1990). In some cases habitat destruction or modification appears to be responsible. Often populations have declined for readily apparent reason, including some native ranid (frog) populations in Arizona (Clarkson and Rorabaugh 1989). Mechanisms causing declines may include drought, parasites, infectious diseases, biotoxins, acid rain, or some combination of the above (Clarkson and Rorabaugh 1989).

2. RECOVERY PLANS

None

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

Rana chiricahuensis are native to most aquatic habitats in southeastern Arizona. Adults are typically active from April until November, often breeding after seasonal rains (Stebbins 1966, Jennings 1990). Hatching in Genus Rana occurs at 5 to 20 days after egg laying depending on the species (Jennings 1990). The larval (tadpole) period may be as short as three months in *R. chiricahuensis* although tadpoles of some populations are known to over-winter (Jennings 1990). Reproductive maturity occurs two to three years after metamorphosis (Jennings 1990).

b. RANGE OF SPECIES

Santa Cruz, Apache, Gila, Pima, Cochise, Greenlee, Graham, Yavapai, Coconino, and Navajo counties. Elevation ranges from 3000 to 8300 feet (BLM 1996).

c. HABITAT REQUIREMENTS

Chiricahua leopard frogs inhabit a wide variety of aquatic habitats: streams, rivers, backwaters, cienegas, ponds, and stock tanks (with no bullfrog or non-native fish present) (BLM 1996). Permanent (year long) water is preferred. Prolonged drought can result in extirpation of isolated populations (Jennings 1990).

d. RATIONAL FOR POTENTIAL HABITAT:

1. Preferred habitat is aquatic or semi-aquatic in nature. The site may be natural (a stream, spring, seep, or cienega) or man-made (an earthen reservoir or masonry dam which retains water behind it).

2. Water should be permanent or nearly so. Earthen reservoir which hold water in all but extremely dry years are potential sites for leopard frogs.

3. The site should be free of bullfrogs and introduced fish species, especially green sunfish and largemouth bass. If not, the site will not be considered potential habitat, unless exotic predators can be reasonably removed.

e. HABITAT CONDITIONS

Inventory data does not contain information regarding habitat conditions. Some sites appear to have been affected by grazing pressure (Clarkson and Rorabaugh 1989).

f. CURRENT CONDITION OF SPECIES (POPULATION STATUS)

(1.) RANGEWIDE

Leopard frogs have experienced alarming declines in recent years (Clarkson and Rorabaugh 1987). Surveys conducted from 1983 through 1987, found Chiricahua leopard frogs in only two of 36 sites of which the species had previously been recorded (Clarkson and Rorabaugh, 1989). A massive die-off of leopard frogs (*Rana yavapaiensis*), was reported in Redfield canyon in 1985 (Arizona Game and Fish data base, 1991). The species can be described as declining, low in number, and limited to few locations.

(2.) ACTION AREA

A Similar situation exists for that action area as for the entire range. Chiricahua leopard frogs are widely dispersed in a few isolated sites (Arizona Game and Fish data base 1991).

4. DETERMINATION OF EFFECT

a. GENERAL EFFECTS OF GRAZING

(1) DIRECT EFFECTS

In arid southwest cattle concentrate around small isolated springs, streams, ponds, and wetlands to obtain water, shade, and forage. This may result in livestock stepping on the frogs or tadpoles and may also step on or drink frog eggs.

(2.) INDIRECT EFFECTS

Trampling removes excessive amounts of vegetative cover and may cause the frogs to become more vulnerable to predators. Water quality, thermal cover, and breeding habitat can also be degraded.

Overgrazing of watersheds reduces the cover of grasses and other herbaceous vegetation and exposes more bare soil. Trampling of bare soil results in compaction and reduces the capacity of the soil to absorb rainfall. Increased erosion and

downcutting of cienegas and other aquatic habitats of frogs can result following rainfall events (Hendrickson and Minkley 1984; Rinne and Minkley 1991). This reduces habitat quality and quantity for leopard frogs.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION:

(1.) DIRECT EFFECTS

(a.) PERMITTED USE

Not Applicable

(b.) GRAZING SYSTEMS

If the proposed action consists of year-long grazing in and around leopard frog habitat then effect will be a continued degradation of sites.

Due to the xeric nature of the surrounding uplands, cattle will tend to concentrate in springs, seeps and ponds for water. Utilization of aquatic vegetation and trampling in and around these sites will be high. In some cases most vegetation will be removed from the site. This will reduce breeding, escape, and thermal cover. Overall habitat quality for leopard frogs will be degraded. Adults may be more exposed to predators and competitive interaction with non-native species.

Depending on local conditions, grazing systems can provide sufficient recovery of aquatic vegetation to benefit Chiricahua leopard frog. Winter grazing or systems with special provision for resting aquatic vegetation both appear to provide some benefits.

(c,) UTILIZATION STANDARD FOR UPLAND

Setting average livestock utilization at forty percent for a given allotment does not guarantee that aquatic areas will be protected against overuse by livestock. Therefore, as with permitted use, limits on utilization do not, in and of themselves, have an effect, positive or negative, on Chiricahua leopard frog. Limits of forty percent use by livestock in aquatic habitats however, could potentially improve aquatic vegetation and cover for leopard frog.

(d.) RANGE IMPROVEMENTS

Range improvements, fences, wells, reservoirs, etc., are not , in and of themselves detrimental for leopard frog. They may be beneficial under certain circumstances. On the Empire/Cienega allotment, for example, fences and reservoirs have been constructed to provide rest for stream bank vegetation while allowing

livestock sufficient water to graze upland sites. In the arid southwest, fencing is the main tool employed to allow resting of aquatic habitats while livestock graze the remainder of the allotment. Water developments placed in close proximity to aquatic habitats without fencing can increase cattle grazing intensity to the detriment of aquatic species including the Chiricahua leopard frog. Fencing can under certain circumstances contribute to livestock concentration and overuse of aquatic vegetation.

(e.) RIPARIAN POLICY AND MANAGEMENT

BLM's *Riparian Policy and Management Technical Reference* (TR 1737-9) states that the overall objective includes achieving an advanced ecological status, in addition to proper function and condition. Taking into account resource management objectives as stated in BLM planning documents. (P, Sawyer, pers. comm. 1996).

The Safford District policy regarding riparian area management provides the framework for improvement of aquatic vegetation and improvement of leopard frog habitat. Managing to achieve proper functioning riparian areas should also promote healthy leopard frog populations (no specific management objectives relating to leopard frog or its habitat needs have been developed however.)

(f.) SPECIAL MANAGEMENT AREAS

Special management areas appear to provide the best option for recovery of leopard frog habitat, which requires habitat free of exotic competitors/predators such as bullfrog and largemouth bass.

Management of the San Pedro Riparian National Conservation Area (RNCA) provides an example of how Management Actions may impact the Chiricahua leopard frog. Some improvement in cottonwood canopy cover and herbaceous ground cover has occurred since 1988 when livestock grazing was removed from the RNCA. Some species have responded favorably to management and experienced dramatic increases in populations (*R. yavapaiensis*). Chiricahua leopard frogs however, are relegated to a single isolated spring, while bullfrogs continue to dominate the river course.

(2.) INDIRECT EFFECTS

Overgrazing of watersheds has led to downcutting of streams and cienega habitats in the past (Hendrickson and Minkley 1984; Rinne and Minkley 1991).

No comprehensive survey of watersheds in Safford District has been performed to assess the indirect impact of upland grazing practices on riparian and lentic wetlands.

(a.) PERMITTED USE

Adjusting livestock numbers does not guarantee that leopard frog sites within a given allotments will be protected from overuse by livestock. Adjusting permitted use will have little effect in the vicinity of leopard frog sites unless other tools such as fencing and/or grazing systems are employed as well.

Adjusting livestock numbers based on upland carrying capacity should reduce the effect of degraded watersheds on the quality of leopard frog habitat.

(b.) GRAZING SYSTEMS

Grazing systems, if properly designed, can result in increased ground cover on upland watersheds and reduce the negative effects of degraded watersheds on leopard frog habitat.

Rest rotation, Santa Rita rotation, and deferred rotation systems can result in improvement and maintenance of vegetation in and around leopard frog sites. Rest rotation and deferred rotation systems can provide a rest period of sufficient length for recovery of aquatic vegetation from overuse. In some cases it may be necessary to fence aquatic habitats separate from uplands. This has been done on a number of allotments, such as the Empire/Cienega.

Winter grazing and winter seasonal rotation grazing may be somewhat compatible with the habitat needs of leopard frog. When cattle are only in the allotment during the cool season they tend to concentrate less around aquatic sites than during the warmer months. As a result trampling and foraging is of lower intensity and vegetation has an opportunity to recover during the growing season.

(c.) UTILIZATION STANDARDS FOR UPLANDS

Limiting utilization in upland watersheds can maintain sufficient ground cover to reduce erosion and reduce the negative effects of degraded watershed condition on leopard frog habitat.

(d.) RANGE IMPROVEMENTS

Range improvements such as fences, reservoirs, wells, can be beneficial when employed in conjunction with appropriate grazing systems to improve upland watershed condition.

Construction of an earthen livestock reservoir or masonry dams in a natural drainages could create new habitat for leopard frogs. If the reservoir maintains a

relatively permanent supply of water and if not stocked with non-native game fish or bullfrog then it is possible that leopard frogs may migrate from nearby sites and colonize the reservoir. Presumably, this is the process through which current populations were established in man-made habitats.

(e.) RIPARIAN POLICY AND MANAGEMENT

The Safford district riparian policy acknowledges the importance of improving watershed condition in order to improve riparian areas in the long term.

Managing to achieve good watershed conditions promotes improved aquatic habitats indirectly. Improved habitat conditions for Chiricahua leopard frog could ultimately result if the special needs of the species are also taken into consideration.

It may be that levels of livestock grazing in watersheds and at potential leopard frog site s, are within limits set by BLM's riparian policy. If the site has been contaminated with introduced fishes or bullfrogs any positive benefits derived by implementation of the riparian policy would be for naught and the leopard frog population would fail to recover due to predation.

(f.) SPECIAL MANAGEMENT AREAS

Special management areas appear to provide the best option for recovery of leopard frog habitat. It could take a considerable period of time for a given portion of the watershed to respond to livestock rest.

Management of the San Pedro Riparian National Conservation Area provides an example of this delay in watershed response. The strategy for management includes fifteen years of rest from livestock grazing. Some improvement in upland vegetation, particularly perennial native grasses, has occurred since 1988 when the rest period began. These changes, though favorable in terms of watershed condition have not been uniform due to differences in soil type and condition. Arid watershed are slow to respond to management actions. It will likely be sometime before changes in watershed become widespread enough to be reliably correlated to improvement in aquatic habitat.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

Year-long grazing, as currently practiced on public lands on the Empirita, Babocamari, and Brunchow hill allotments, is probably causing a decline in habitat conditions for Chiricahua leopard frog. This is largely due to the concentration of livestock in riparian areas for extended periods and the lack of barriers, either natural or man-made, to exclude riparian areas from over-use. No apparent degradation of the

watershed, on public lands, appears to be occurring on these allotments.

Rest rotation and deferred rotation grazing, as practiced on the Empire Cienega, Soza Wash, and Copper Creek Allotments is probably not reducing the quality of Chiricahua leopard frog habitat. Barriers, either natural or man-made, are present and function in a manner sufficient to provide rest in riparian areas and eliminate livestock over-use. No apparent degradation of the watershed, on public lands, appears to be occurring on these allotments.

Since Guadalupe W.(Az), Hotwell, and Muleshoe allotments are currently in non-use and no grazing is planned for the foreseeable future, the permitted use (none), grazing systems (extended rest), utilization (none), and Range improvements (not applicable)will have no impact on the Chiricahua leopard frog. No apparent degradation of the watershed, on public lands, appears to be occurring on these allotments.

(4.) INTERRELATED AND INTERDEPENDENT ACTIONS

Pollution of aquatic habitat by upstream mining operations,

Ground water pumping, which lowers local water tables and reduces stream flows,

Unauthorized introduction of bullfrog, largemouth bass, green sunfish, or other exotic species.

(5.) INCIDENTAL TAKE

Does not apply to category 1 species.

c. RATIONALE FOR EFFECTS

The rational for determination of effect was based on the best information available in the literature regarding Chiricahua leopard frog coupled with available knowledge of conditions on a given allotment.

Also because this species is not officially listed it has no protection under the Endangered Species Act, "May Effect" etc., determinations are nor appropriate. Instead we will use: AW- Actions probably will not cause the species to be listed; AC- Actions could affect future listing but not adversely; AM- Actions are adverse and may cause the species to be listed.

No allotments having potential leopard frog habitat are subject to summer use or ephemeral grazing systems.

1. If an allotment is currently being rested from livestock grazing then the determination for that allotment is AW- Actions probably will not cause the species to be listed. Permitted use, grazing system (extended rest), utilization, range improvements, riparian policy, and special management areas will not be impacted by these actions.

2. If an allotment is being managed under a rest-rotation system or deferred rotation system, and if (in the opinion of the range specialist most familiar with the allotment) aquatic vegetation is receiving adequate rest from livestock grazing then the determination is, AC- Actions could effect future listing but are not adverse.

   Permitted use, grazing system, utilization, range improvements, and special management combined, allow reduced livestock concentrations or provide sufficient rest for vegetation to recover fully after grazing has taken place.

3. If an allotment is being grazed yearlong by livestock with no system of deferment or rotation, and aquatic vegetation around the leopard frog site(s) is being degraded by livestock grazing, then the determination is that two categories: the grazing system (or more properly the lack of one) and the riparian policy (specifically the delay in implementation of said policy) will cause the determination to be, AM- Adverse actions may cause the species to be listed.

d. EFFECT DETERMINATION

1. Year-long grazing and the Riparian Policy, as currently practiced on public lands in Empirita, Babocamari, and Brunchow hill allotments are likely to cause the species to be listed (AM).

2. Rest rotation and deferred rotation grazing, as practiced on the Empire Cienega, Soza Wash, and Copper Creek allotments are not adverse actions but could affect the listing (AC) of the Chiricahua leopard frog.

3. Since Guadalupe W. (Az), Hotwell, and Muleshoe allotments are currently in non-use and no grazing is planned for the foreseeable future; grazing is an action that will probably not cause the Chiricahua leopard frog to be listed.

5. PROPOSED MITIGATION MEASURES

The following actions are recommended to help prevent the need to list the Chiricahua leopard frog.

a. Develop allotment management plans that will potect potential Chiricahua leopard frog habitat sites on public land in the Empirita, Babocamari, and Brunchow Hill allotments by controling livestock utilization of aquatic vegetation.

b. Manage livestock grazing on the remainder of public lands through implementation of appropriate grazing systems to improve watershed conditions on public lands upstream of leopard frog habitats.

The above mitigation measures may have a beneficial effect on the survival of Chiricahua leopard frog. These measures are not likely to adversely affect the species.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE ACTION AREA

Livestock grazing in upland watersheds, on lands not under BLM management, can cause reduction of herbaceous ground cover and increased runoff during storm events. This can cause increased velocity and amounts of floodwater in aquatic habitats with greater scouring of vegetation and loss of soil. Leopard frog habitat would continue to be degraded irrespective of livestock management practices on public land.

This may be occurring in Empire Cienega allotment (6090) where a headcut has been advancing into the cienega habitat occupied by Chiricahua leopard frog. The upstream watershed is a combination of private, Forest Service, BLM, and state ownership. No assessment of the watershed has been made to determine the reasons for this headcutting. On-going efforts to arrest the headcut with gabion structures, protective riparian fencing, and rotation grazing on BLM lands may prove successful. Grazing, on lands not under BLM management, may be a contributing factor on some portions of the watershed.

7. LITERATURE CITATIONS

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SONORA TIGER SALAMANDER (*Ambystoma tigrinum stebbinsi*)

1. T&E STATUS

Proposed endangered. Santa Cruz and Cochise Counties. Species is found at about 20 sites (Forest Service 1996). Critical habitat: None proposed.

2. LAND STATUS

Forest Service, Fort Huachuca Military Base, Private Land In San Rafael Valley and Huachuca Mountains, and Canelo Hills. May be present in the headwaters of the San Pedro River in Sonora in a natural cienega habitat, Los Fresnos (USFWS 1995).

3. HABITAT

Within its range Sonoran tiger salamander is found in developed springs, modified cienegas (wetlands), and stock ponds. Requires permanent water for breeding, egg laying, and survival of branchiates. Species can survive periodic drying but perish from a pond during prolonged drought (USFWS 1995).

4. EFFECTS OF GRAZING

Grazing is a mixed blessing where Sonoran tiger salamander is concerned. Past overgrazing has caused erosion of watershed and head-cutting of drainages (Hadley and Sheridan 1995). This led to loss of many cienega habitats (Forest Service 1996).

Conversely, Sonoran tiger salamander have benefitted from construction of stock tanks created for livestock watering. Most sites are stock tanks constructed in the 1920 to 1930 period (USFWS 1995). Salamanders appear to persist in these sites despite periodic maintenance, drying, flooding, and heavy livestock use. If tank stays dry for several years the population may be extirpated. Changes in grazing practices, such as converting from stock ponds to well watering of livestock, could cause elimination of a given population.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Populations occur on private land, national forest lands, or Fort Huachuca Military Base. No populations occur on BLM public lands.

6. EFFECT DETERMINATION

The existing grazing management on public lands in the Safford District has no effect on the Sonoran salamander.

7. LITERATURE CITATIONS

Forest Service. USDA. 1996. Sonoran tiger salamander. In: Draft biological assessment for the land management plan. Coronado National Forest. pages 144-154.

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BIRDS

BALD EAGLE (*Haliaeetus leucocephalus*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

This species was listed as endangered with no critical habitat on February 14, 1978, in 43 of the 48 contiguous states, including Arizona. On August 11, 1995, it was down-listed to threatened.

b. T&E OCCURRENCE REPORTS

The bald eagle in the Safford District is a winter migrant or resident. Many occurrence reports exist of wintering or migrating bald eagles in the District. Areas where they have been reported include the Gila River in Morenci Allotment, Eagle Creek in private land by Turtle Mountain Allotment, Bonita Creek in Bonita Creek Allotment, and Cienega Creek.

c. T&E SURVEYS

Wintering bald eagles were surveyed through intensive winter counts from the 1970s to the early 1980s. From 1988-1991, surveys were more localized. State-wide intensive counts were resumed in 1992 (Beatty 1993).

d. CONSULTATIONS/CONFERENCES

The following Section 7 consultations which may involve the bald eagle have been conducted by the Safford District:

NUMBER	NAME
2-21-84-I-022	Safford District Land Sale
2-21-87-I-065	Safford District Land Exchange
2-21-87-I-066	San Pedro River BLM Lands
2-21-87-I-088	Eradication of Exotic Fish
2-21-88-F-114	Safford District RMP
2-21-88-I-109	Safford District Land Exchange
2-21-89-I-007	Renovation of Fairbanks Mercantile
2-21-89-I-121	Peregrine Falcon Surveys
2-21-89-F-018	Big and Cold Springs Pupfish Stocking
2-21-90-F-196	Cienega Creek Diversion

2-21-90-I-150	Cienega Creek Pasture Fencing
2-21-91-F-160	Cienega Creek
2-21-91-I-095	Bonita Creek Allotment Management
2-21-91-I-170	Cienega Creek Earth Day Project
2-21-91-I-270	Peloncillo Habitat Management Plan
2-21-92-F-070	Gila Box NCA
2-21-92-F-450	Dorothy "B" Mine 2700 Acres Copper
2-21-92-I-071	Gila Resource Area, Sanchez Copper Mine
2-21-92-I-108	Prescribed Burns, Aravaipa Creek Tablelands
2-21-92-I-219	Braidfoot Allotment Cattle Grazing
2-21-92-I-584	Phelps Dodge Mining
2-21-92-I-733	Howard Well Water Supply
2-21-93-F-406	Road Construction Bonita Creek
2-21-93-I-430	Cienega Creek Headcut Repair & Fencing
2-21-94-I-053	EA Animal Damage Control Plan
2-21-94-I-213	Muleshoe Cooperative Management Plan
2-21-94-I-543	BLM Acquiring Three Parcels of Land
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-95-I-049	Draft Dos Cabezas Mountains Wilderness
2-21-95-I-081	Morenci & Safford Land Exchange
2-21-95-I-209	Big Spring Supplemental Stocking
2-21-95-I-211	Restoration of Old Gila River Bridge
2-21-95-I-304	Stream Gauge Installation Cienega Creek
2-21-95-I-313	Flood Repairs to Road in Turkey Creek
2-21-95-F-081	Morenci Land Exchange With Phelps Dodge

e. REASONS FOR SPECIES DECLINE

Factors leading to the decline of this species included the destruction, degradation, or modification of its habitat, and its exposure to magnified levels of pollutants such as organochlorides and heavy metals.

2. RECOVERY PLANS

a. NAME

Southwestern Bald Eagle Recovery Plan.

b. REQUIREMENTS/RECOMMENDATIONS

The recovery plan recommended as its primary objectives to: (1) Double the reproductive effort and extend the range to include one or more additional river drainages; and (2) Identify and maintain winter habitat important to migrant or resident

bald eagles.

c. BUREAU STEPS TO ACCOMPLISH

The Bureau of Land Management has been involved in the collection, recording, analyzing and maintaining biological data on breeding and wintering bald eagles in the southwest. It is an active participant in the Arizona Bald Eagle Nest Watch Program.

The Bureau of Land Management is involved in identifying, protecting, and improving existing and potential habitat for bald eagle population continuance and expansion. It has been and is currently inventorying and evaluating riparian areas for proper functioning condition and has set a goal to restore and maintain 75% or more of all riparian areas in proper functioning condition by 1997.

d. SAFFORD ACCOMPLISHMENTS TOWARD RECOVERY PLAN

The Safford District has been actively engaged in the protection of the perennial streams and its associated riparian habitats. Much fencing has been completed to keep livestock out of these areas or to better control their grazing in riparian areas. There has been no livestock grazing in Aravaipa Canyon since it was designated as a wilderness area. The San Pedro Riparian NCA set aside a long stretch of the San Pedro River for the protection and enhancement riparian habitat. The Gila Box Riparian NCA is attempting to do the same with a stretch of the Gila River and Bonita Creek. Livestock have been excluded or are being actively managed in Cienega Creek and the Muleshoe perennial streams.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

In central Arizona, nesting activity begins in November and December, with the peak of nest-building in late December and early January. Eggs are laid from January to March and hatch from February to April. Eaglets are fledged in 10-12 weeks. Young eagles remain on the parental home for 4-6 weeks before dispersing (USFWS. 1982). Greg Beatty, Bald Eagle Program manager for the Arizona Game and Fish Department believes that Southern Arizona is not critical wintering habitat.

b. RANGE OF SPECIES

Bald eagles breed and migrate through northern and central Arizona, but mainly winter and migrate in southern Arizona. Resident nesting sites near the Safford District include the San Carlos Reservoir. Bald eagles, however, are seen migrating through or wintering along the Gila River and some its drainages.

c. HABITAT REQUIREMENTS

Wintering bald eagles are generally found near large bodies of water or major drainages with large trees or cliffs. Smaller drainages and steep-wall canyons receive little use (Busch 1986). They require the availability of prey, these being mainly catfish, carp, Sonoran and desert sucker, and some waterfowl, or carrion for breeding eagles and less fish and more waterfowl for wintering eagles. Communal night roosts can be in protected side canyons.

d. RATIONALE FOR POTENTIAL HABITAT

Potential habitat is that habitat which has the habitat requirements for this species, these being those areas by major drainages with large trees or cliffs and available prey of fish and waterfowl. The Safford District has some areas which meet these requirements. These are marginal, though, and are expected to be used by wintering or migrating bald eagles, and not by breeding bald eagles.

e. HABITAT CONDITION

Habitat for this species in the Safford District is limited. The major drainages, the Gila and San Pedro Rivers have for the most part been excluded from grazing. Their condition has improved since the listing of this species, and is continuing to improve. Side drainages to these rivers are also being protected and their condition is improving. The San Francisco River still has year round grazing, but habitat here is marginal with few large trees and limited cliffs for roosting. The condition of the Gila and San Francisco Rivers is mostly functioning at risk. See Appendix 4 for the riparian condition of the various allotments.

f. CURRENT CONDITION OF SPECIES POPULATION

(1.) RANGEWIDE

This species has been recovering well to the extent that in 1995, it was down-listed from endangered to threatened.

(2.) ACTION AREA

Wintering bald eagles in the Safford District are few and incidental, seen mostly in the Gila River and Bonita Creek.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECT TO SPECIES

(1.) DIRECT

Habitat for the wintering bald eagle in southeastern Arizona includes the riparian forests found near surface waters. These are areas where cattle would also congregate. Many of the historical riparian areas have been destroyed, degraded, or modified by different actions, including grazing. Many of the remaining riparian areas are now being protected through special area designations and improved management, including improved grazing management. These have included complete exclusion from grazing or better control of grazing in these areas through the implementation of grazing systems and range improvements. Grazing in riparian areas can inhibit the replenishment or establishment of riparian tree species which eagles use for roosting and perching. Grazing can also change prey abundance by modifying plant cover or the species composition of the grazed area. Decreasing plant cover through grazing can affect prey vulnerability (Kochert et al. 1988).

(2.) INDIRECT

Overgrazing in the uplands can cause erosion and siltation of the streams where their main prey species would be found. Range improvement projects, structures and programs implemented to support grazing could have indirect effects on the bald eagle. Fences and windmills can provide perches, and stock tanks with fish can provide a food source for transient bald eagles (Kochert et al. 1988).

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

The areas of the grazing program which will be evaluated are: permitted use, grazing systems, utilization, range improvements, riparian management, and special area management. Grazing systems, including yearlong use, have been implemented on most allotments. These have improved the grazing management in riparian areas, although some problem areas still exist. Range improvements facilitate the implementation of the grazing program. Riparian management will improve or maintain in an improved state the riparian areas within the district. This has not been implemented in all riparian areas. The designation of special management areas is to ensure that special features of those areas are protected or improved.

(1.) DIRECT EFFECTS

There are no specific direct effects on wintering bald eagles from livestock grazing when properly managed.

Permitted use and upland utilization standards would have no impacts on their potential wintering habitat.

Impacts can occur as a consequence of grazing systems and range improvements. Yearlong grazing with no range improvements to keep livestock out of riparian areas could cause overgrazing of these areas and prevent the establishment of riparian trees, like cottonwoods, which can provide roosting sites for wintering or migrating bald eagles. The areas of potential or occupied habitat, however, also have cliff habitat to mitigate this. Ten allotments were identified with potential wintering bald eagle habitat. Three of these allotments, Twin C, Johnny Creek, and Bullgap Allotments, have been fenced to exclude grazing on the potential habitat and another, the Morenci Allotment, will be fenced this year or next to exclude grazing in habitat where bald eagles have been seen. In this allotment, grazing is controlled by periodic gathering of cattle from the river bottom. One allotment, the Gila Allotment, has a deferred rotation system and the riparian habitat has been fenced, but grazing occurs year long by 14 cattle in the 5.5 miles of riparian area because of needed water developments in the uplands. This needed range improvement will be constructed this year or next. Funding for these projects will be through an existing grant. These will be done as part of the Gila Box Riparian National Conservation Area Management Plan. Three other allotments, the Smuggler Peak, South Rim, and Bonita Creek Allotments, are operating under a deferred rotation grazing system through which grazing is being controlled for minimal impacts to riparian habitat. The two allotments, the San Francisco and Brandenburg Mountain Allotments, have year-long grazing. Acreage of potential bald eagle habitat is small and habitat is marginal on these two allotments with few large trees or cliffs to provide roosting or perching sites for bald eagles.

Riparian policy and management and special area management can impact this habitat by adding another layer of protection. Potential or occupied habitat in the Morenci, Smugglers Peak, Gila, Twin C, Bullgap, Johnny Creek, and Bonita Creek Allotments is within the Gila Box Riparian National Conservation Area, and South Rim Allotment is in the Aravaipa Canyon Wilderness Area. Both of these designated areas protect the riparian areas within their boundaries. Refer to Appendix 8 for a list of the special management areas.

(2.) INDIRECT EFFECTS

There could be beneficial indirect effects from upland utilization standards and range improvements. Grazing can reduce vegetation cover in areas within or around their habitat, making it easier for them to see their prey and to prey on species like rabbits. The building of stock tanks to provide water for livestock could provide habitat for the bald eagle. Livestock could also provide carrion as a food source.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

There are ten allotments identified with potential or occupied wintering or

migrating bald eagle habitat. Permitted use and upland utilization standards would not impact this habitat. The grazing systems, through the use of range improvements, have eliminated grazing use on Twin C, Johnny Creek and Bullgap Allotments, and reduced grazing on Smuggler Peak, South Rim, and Bonita Creek Allotments. Four allotments, San Francisco, Morenci, Gila, and Brandenburg Mountain, have year long grazing. Of these four allotments, the Morenci and Gila Allotments are within the Gila Box Riparian National Conservation Area and, under this plan and the riparian management plan for the district, will have livestock excluded once on-going range improvements are completed. The two allotments left, the San Francisco and Brandenburg Mountain Allotments, have marginal habitat. San Francisco Allotment has sparse amounts of big trees or cliffs, as well as a small acreage of this marginal habitat, and Brandenburg Mountain Allotment is within a small drainage with limited acreage of riparian habitat. Refer to Table 4 for a list of these allotments. Impacts from grazing on these allotments is expected to be minimal, not adverse.

(4.) INTERRELATED/INTERDEPENDENT ACTIONS

Interdependent and interrelated actions include the livestock improvements needed to support grazing. These could provide habitat or enhance habitat for the bald eagle.

(5.) INCIDENTAL TAKE

None

c. RATIONALE FOR EFFECTS

The permitted use and upland utilization standards would not affect the bald eagle or its habitat. Grazing systems would diminish the effects which grazing could have on its habitat. Most allotments in bald eagle wintering or potential wintering habitat have implemented grazing systems which reduce or eliminate negative impacts from grazing. Those allotments with yearlong grazing would have the most potential for impacting this habitat, which in southern Arizona is not considered critical wintering habitat. Because livestock tend to congregate in these areas, grazing can be much more than the upland utilization standard of 40%. Those grazing systems, other then year long grazing, which allow grazing in potential habitat could also impact these areas. Range improvements are benefiting bald eagles by making possible better management of livestock grazing in wintering or potential wintering habitat. Fences and livestock water developments are being used to keep livestock out of riparian areas or control their use in them. Grazing practices are adjusted to enhance riparian habitat and the regeneration of woody species. The lack of implementation of riparian policy and management can impact wintering habitat for the bald eagle. The management of special management areas would benefit wintering or potential wintering habitat

because their management reduces, improves management, or eliminates grazing in these areas. See Table 4 for a list of these allotments.

d. EFFECT DETERMINATION

Wintering or migrating bald eagles have been seen in the riparian areas of two allotments, the Morenci and the Bonita Creek Allotments. These areas are being protected, or will be, through riparian policy and management and through special area management since both of these areas are located within the Gila Box Riparian National Conservation Area. Grazing on three allotments, the Twin C, Johnny Creek and Bullgap, would have a "no effect" on the continuing existence of the bald eagle because of no grazing in the bald eagle habitat in the riparian areas. Potential wintering habitat in the San Francisco and Brandenburg Mountain Allotments is small, 60 and 25 acres respectively, and marginal. Year long grazing on these two allotments would have a 'may affect, but is not likely to adversely affect' the continuing existence of the bald eagle. Grazing on the potential habitat in three allotments, Smugglers Peak, South Rim and Bonita Creek, is intensively manage and would have a "may affect but not likely to adversely affect" the continuing existence of this species. In the remaining two allotments, Morenci and Gila, grazing will be intensively managed with the construction of two range improvements and would have a 'may affect, but is not likely to adversely effect. The grazing program in the Safford District would have a '**may affect, but is not likely to adversely effect**' the continuing existence of the wintering bald eagle. See Table 4a for a list of these allotments.

5. PROPOSED MITIGATION MEASURES

None

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

No actions on state or private lands within the Safford District are expected to take place which would have an effect on this species.

7. LITERATURE CITATIONS

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CACTUS FERRUGINEOUS PYGMY-OWL (*Glaucidium brasilianum* cactorum)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

The Arizona population of this species was **proposed** for listing as **endangered** on December 12, 1994, with critical habitat, while the Texas population was proposed to be listed as threatened (Federal Register 59 [237] 1994). Proposed critical habitat is found in the Gila River, San Pedro River and Bonita Creek in the Safford District. Critical habitat would include the 100 year floodplain of the stream or river, as well as 100 meters adjacent to this floodplain.

b. T&E OCCURRENCE REPORTS

There have been no recent reports of this species in the Safford District. However, William Hunter documented finding three pygmy-owls incidental to other studies, in 1986. One was found in the Gilliard Hot Springs-San Francisco River area in 1978, the second was found at the confluence of Bonita Creek and the Gila River in 1985, and the third was found in the Aravaipa Creek area in 1985. No specific location was given on the Aravaipa sighting (Hunter 1988). Potential habitat for this proposed species is found in twenty seven allotments within the Safford District.

c. T&E SURVEYS

The Safford District had not done any surveys for the cactus ferruginous pygmy-owl in the past, but started doing surveys this year. Areas surveyed were sections of the Gila River near the mouth of Bonita Creek, Bonita Creek from its confluence with the Gila River and upstream for one mile, Turkey Creek from its confluence with Aravaipa Creek and upstream for 1.25 miles, and Aravaipa Creek from its confluence with Turkey Creek and downstream for 1.3 miles. AGFD began conducting intensive surveys in 1993 in the historical habitat of the owl. The areas surveyed were: the lower San Pedro River from Cascabel to Winkelman; northwest Tucson, between the Oracle highway and the Tortolita Mountains; east Tucson, from Sabino Canyon to Tanque Verde Wash and the lower elevations of the Saguaro National Monument; Rincon Creek from X-9 Ranch to Thunderhead Ranch; and the confluence of the Verde and Salt Rivers. Only one owl was heard, and this was in the northwest Tucson area (Felly 1993). They have continued with their surveys in 1996 and have identified nine separate sightings in the area northwest of Tucson in the Sonoran desertscrub associations of paloverde, ironwood, mesquite and saguaro (Frederick. per. comm.).

d. CONSULTATIONS/CONFERENCES

The following Section 7 consultations and conferences which may pertain to the cactus ferruginous pygmy-owl have been conducted by the Safford District:

NUMBER	NAME
2-21-94-I-053	EA Animal Damage Control Plan
2-21-94-I-213	Muleshoe Cooperative Management Plan
2-21-94-I-543	BLM Acquiring Three Parcels of Land
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-95-I-049	Draft Dos Cabezas Mountains Wilderness
2-21-95-I-081	Morenci & Safford Land Exchange
2-21-95-I-209	Big Spring Supplemental Stocking
2-21-95-I-211	Restoration of Old Gila River Bridge
2-21-95-I-304	Stream Gauge Installation Cienega Creek
2-21-95-I-313	Flood Repairs to Road in Turkey Creek
2-21-95-F-081	Morenci Land Exchange With Phelps Dodge

e. REASONS FOR SPECIES DECLINE

Factors affecting the decline of this species include the destruction, degradation, modification, or fragmentation of its habitat (with livestock grazing being one of the contributors to these), as well as urban and agricultural encroachment, woodcutting, water diversion, channelization, groundwater pumping, and hydrological changes resulting from various land-use practices. Activities that may adversely modify pygmy-owl habitat include: (1) Removing, thinning or destroying vegetation;
(2) Water diversion or impoundment, groundwater pumping, or any other activity which may significantly alter the quantity or quality of surface or subsurface water flow; (3) Overstocking or other mismanagement of livestock; and (4) Development of recreational facilities and other off-road vehicle operation.

2. RECOVERY PLANS

There is no recovery plan for this proposed listed species.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

This owl nests in cavities in trees or large columnar cactus. These cavities may be naturally formed or excavated by woodpeckers. Three to four, and sometimes five eggs are laid on the unlined cavity and incubated for approximately 28 days. The young

fledge 28 days after hatching. Egg laying in the Gila and Salt Rivers occur around April 20 (Breninger 1898). In Arizona, vocalization is most common from September to March (Millsap and Johnson 1985). This is a nonmigratory bird. Diet includes lizards, insects, rodents, small birds, and even frogs and earthworms.

b. RANGE OF SPECIES

The range for the cactus ferruginous pygmy-owl is from lowland central Arizona south to the Mexican states of Colima and Michoacan, and from southern Texas south through Tamaulipas and Nuevo Leon (Johnsgard 1988). Range limit in Arizona is from New River (north) to the Gila Box (east) to Cabeza Prieta Mountains (west). Historical records indicate that this owl was once common throughout much of the southern half of Arizona in the Gila, Salt, Verde, San Pedro and Santa Cruz Rivers and their tributaries.

c. HABITAT REQUIREMENTS

The cactus ferruginous pygmy-owl in central and southern Arizona has as its primary habitat riparian cottonwood forests and mesquite bosques. It also occurs in Sonoran desertscrub associations of paloverde, bursage, ironwood, mesquite, acacia, and giant cacti like the saguaro and organ pipe, but has always been uncommon and unpredictable there. It may also occur at isolated desert oases which support small pockets of riparian or xeroriparian vegetation.

d. RATIONALE FOR POTENTIAL HABITAT

Areas with riparian cottonwood forests and mesquite bosques having tree cavities for nesting, and areas of Sonoran desertscrub with saguaro cacti, can be potential habitat for this species. The Safford District has areas of cottonwood forests and mesquite woodlands in its river and creek riparian habitat which can be potential habitat for this species. Sonoran desertscrub associations would occur in the western part of the district. Proposed critical habitat exists on the riparian areas of the Gila River and Bonita Creek.

e. HABITAT CONDITION

The majority of the area of proposed critical habitat is excluded from grazing or is in the process of being excluded from grazing. Most of this area is fenced off from grazing, except for the Morenci Allotment, which still has livestock in this habitat. Periodic gathering of these cattle help to improve this habitat. The riparian areas where periodic grazing still occurs on potential habitat have implemented grazing systems which, through improved grazing management, are improving this habitat. Potential habitat on riparian areas outside of the proposed critical habitat is also being managed to exclude or reduce grazing. Of the 13 allotments with potential habitat on riparian

areas, only the San Francisco, Morenci and Gila Allotments have year long grazing on this habitat. The Morenci and Gila Allotments will soon be fenced out of the riparian habitat.

Grazing on areas of Sonoran desertscrub is being controlled with numbers of livestock, utilization levels, and grazing systems. These have been adjusted for continued regeneration of the forage species through time. There are 14 allotments with this type of habitat. Two of these are not being grazed.and 83% of the range in these allotments is in fair to excellent condition. All of these allotments have a static or upward trend. Refer to Appendix 3 for range condition and trend of these allotments.

f. CURRENT CONDITION OF SPECIES POPULATION

(1.) RANGEWIDE

Ferruginous pygmy-owls have been declining drastically in the United States since 1900 (Millsap et. al. 1988). The pygmy-owl in Arizona has been declining to the point where it was considered to be nearly extirpated.

(2.) ACTION AREA

Little monitoring for this species has been done in the Safford District until this past year. Although none have been found on Public Land, monitoring by Arizona Game and Fish Department has found this species in areas adjacent to Public Lands northeast of Tucson (Frederick. per. comm.).

4. DETERMINATION OF EFFECTS

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT

Livestock grazing has been one of the most common causes of riparian habitat degradation and modification. These include changes in plant community structure and species composition, and relative abundance of species and plant density (Ames 1977, Carothers 1977, Behnke and Raleigh 1978, General Accounting Office 1988, Forest Service 1979). Grazing can eliminate or suppress the regeneration of riparian tree species which would later become nesting trees for this owl species. In changing plant community structure and species composition, abundance and density, grazing can change the prey abundance for the pygmy-owl. At the same time, grazing, by reducing plant cover, can influence the vulnerability of prey species for this owl (Kochert et al. 1988)

(2.) INDIRECT EFFECTS

Indirect effects of grazing through range improvement projects, structures and programs implemented to support grazing, may benefit this species. Fences can serve as perches for hunting or roosting. Ferruginous pygmy-owl habitat could develop around stock tanks.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

The different areas of the grazing program to be analyzed are: permitted use, grazing systems, utilization, range improvements, riparian management, and special area management. Grazing systems, including year long use, have been implemented in most allotments. This has generally improved grazing management overall, and has allowed for the improvement or maintenance of the riparian habitat of the proposed listed species. Some problems exist with year long grazing in riparian areas of some allotments. Range improvements have facilitated the implementation of the range program. Most of these have been completed. The objective of riparian area management was to improve or maintain in an improved state the riparian areas within the district. Problems exist where this management has not been implemented yet. The management of special management areas adds another level of protection to those areas, and when this falls within potential habitat for the proposed listed species, it would have beneficial effects.

(1.) DIRECT EFFECTS

Grazing has affected the habitat of the cactus ferruginous pygmy-owl in the past through degradation or modification of riparian areas. Present grazing practices are attempting to reverse this trend. The Safford District has been actively involved in management and protection of the riparian habitat that was historically used by this owl. The goal has been set to restore and maintain in proper functioning condition 75% or more of the riparian areas by 1997. Numerous actions have been undertaken for this purpose, including riparian area land acquisition, improving grazing systems, fencing of riparian areas to exclude or better control grazing, better road placement or road abandonment in riparian areas, and protection through legislative or other designations (Aravaipa Canyon Wilderness, San Pedro RNCA, Gila Box RNCA, Turkey Creek ACEC). Many of these areas are in good condition and others are improving.

Permitted use and upland utilization standards are not having an impact on the riparian habitat for this species.

Permitted use, grazing systems, and upland utilization standards affect potential habitat in the Sonoran desertscrub by placing livestock in this habitat and determining the amount of vegetation taken. Livestock may inhibit survival of saguaros, which are important as nesting habitat for the pygmy-owl, by trampling seedlings under nurse

plants (palo verde, ironwood, etc.); by grazing nurse plants and removing protective cover, or by grazing the seedlings themselves (Abouhaldar 1992). This effect is most likely to occur in relatively flat terrain (Abouhaldar 1992). Impacts from these elements of grazing are expected to be minimal because they allow for continued regeneration vegetation.

Range improvements are not impacting the potential habitat in Sonoran desertscrub because no improvements are proposed.

Grazing systems and range improvements are impacting riparian habitat areas. Grazing has been eliminated or is better controlled in many riparian areas with potential or proposed critical habitat for the pygmy-owl through the implementation of grazing systems and the construction of range improvements to implement these systems.

Riparian policy and management and special area management have positive impacts on this habitat by adding another layer of protection to the riparian areas. Refer to Appendix 8 for a list of the special management areas within these allotments.

(2.) INDIRECT EFFECTS

There have been many miles of fence constructed along the potential and proposed critical habitat for this species which can provide perches for hunting or roosting.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

There are 27 allotments with potential or proposed critical habitat for the cactus ferruginous pygmy-owl. None of this habitat has been reported to be occupied.

Thirteen allotments contain riparian habitat, which is considered to be primary habitat for the pygmy-owl. Grazing will not impact six of these allotments because no grazing use is taking place in the riparian habitat. These are South Rim and Muleshoe Allotments with grazing nonuse, Twin C, Johnny Creek, and Bullgap Allotments which have riparian habitat fenced out, and Copper Creek which excludes grazing in riparian habitat through it grazing system. Four allotments have partial exclusion of livestock from riparian habitat through their grazing systems and the use of range improvements. The three allotments left in this group have year long grazing in the riparian habitat which is adversely affecting the riparian habitat. Livestock in these allotments tend to concentrate more in the riparian areas and make more use of these areas than the uplands. The two allotments with grazing nonuse will not be impacted by any of the six elements of the grazing program. The four allotments with no grazing in riparian areas are impacted by grazing systems and the range improvements in place to implement

them, but this would not be adverse because of no grazing. The four allotments with partial exclusion of grazing in riparian areas are impacted by grazing systems and their associated range improvements, by riparian policy and management, and by special area management. Because these limit grazing and control it better in these riparian areas, their impacts would not be adverse.

Fourteen allotments have potential habitat of the Sonoran desertscrub type. Two of these allotments, Hay Hook and Hot Well, have grazing nonuse, three have rotation type grazing systems, and the remaining nine have year long grazing. Permitted use, grazing systems and upland utilization standards would all impact the habitat for the pygmy-owl in these allotments which are grazed. But because these have been adjusted for continued regeneration of forage plant species, the impacts would not be adverse.

Proposed critical habitat is found in 6 allotments in the Gila River and Bonita Creek. These are: Morenci, Smuggler Peak, Gila, Twin C, Bonita Creek, and Bullgap Allotments. Grazing has been fenced out of four of these allotments. Morenci and Gila Allotments still have year long grazing, but this will be eliminated once on-going range improvements are completed. Grazing systems, the lack of range improvements, and the delay in implementation of riparian and special area management are impacting the proposed critical habitat in these allotments. Impacts to the Morenci and Gila Allotments would be adverse because of the lack of riparian tree regeneration.

(4.) INTERRELATED/INTERDEPENDENT ACTIONS

There are no interrelated or interdependent actions from grazing which would affect the cactus ferruginous pygmy-owl.

(5.) INCIDENTAL TAKE

Grazing in most of the riparian areas is now excluded or limited, and well managed. Incidental take could occur in those allotments with potential habitat with yearlong grazing and no improvements to keep livestock out of this habitat. In the Sonoran desertscrub, grazing has been set for minimal effects to the range and is not expected to result in take of this species.

c. RATIONALE FOR EFFECTS

No effects are expected from permitted use or upland utilization standards on the proposed critical or potential riparian habitat for this proposed species and only minimal effects on the Sonoran desertscrub potential habitat. The existing grazing systems on allotments with potential or critical pygmy-owl habitat determine the numbers of livestock and the use they will make on this habitat. The most impacts on riparian

habitat would be from those allotments with yearlong grazing and no improvements to keep livestock out of this habitat. On Sonoran desertscrub, impacts from grazing systems would still be minimal because the livestock numbers and grazing use have been adjusted to the production capacity of each allotment. Utilization and trampling of riparian habitat would generally be more concentrated than in the uplands, which could degrade, modify, or prevent this habitat from improving or being maintained in an improved state. Range improvements have enhanced the management of the grazing use in various allotments with riparian habitat. Fences can help to eliminate or control grazing use in riparian areas and livestock waters can help in keeping livestock in the uplands away from riparian areas. Management of riparian areas, while improving these areas or maintaining in an improved state, are affecting pygmy-owl habitat in a positive manner. Special management areas, if they occur in riparian areas, are affecting pygmy-owl habitat in a positive manner, also, by adding another layer of protection to this type of habitat. Table 5 lists the effects of the grazing elements on the different allotments.

d. EFFECT DETERMINATION

Year long grazing is taking place in three allotments with riparian habitat, two of these, Morenci and Gila Allotments, with proposed critical habitat. The grazing program is not likely to jeopardize the pygmy-owl in the eight allotments with nonuse or excluded use because of no grazing in pygmy-owl habitat. The grazing program is not likely to jeopardize this proposed species on twelve allotments with livestock grazing on Sonoran desertscrub habitat. Grazing in the San Francisco, Gila and Morenci Allotments, which have year long grazing, is likely to jeopardize this proposed species, and in the Gila and Morenci Allotments, it is also likely to adversely modify its proposed critical habitat. impacts will be in the impediment of riparian tree regeneration and the prevention of the improvement of this riparian habitat by continued uncontrolled year long grazing within these areas. The effect determination for the grazing program in the Safford District is that it is **likely to jeopardize** the cactus ferruginous pygmy-owl and is **likely to adversely modify** its proposed critical habitat. For a list of these allotments and their effect determinations, see Table 5a.

5. PROPOSED MITIGATION MEASURES

Implementation of riparian policy and management in the San Francisco Allotment will mitigate the adverse impacts from grazing. In the Morenci and Gila Allotments, implementation of the riparian policy and management, as well as the implementation of the Gila Box Riparian National Conservation Area Management Plan, will also mitigate the adverse impacts from grazing in these allotments.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Several streams with their associated riparian habitats also supply or partially supply water for human consumption and agricultural practices. Population growth of areas adjacent to or near these streams would exert more pressure on these waters in the future. This would affect the riparian vegetation in those areas which could be potential habitat for the pygmy-owl. Urban and agricultural encroachment on private land continue to decrease the potential habitat for this species.

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CALIFORNIA CONDOR (*Gymnogyps californianus*)

1. T&E STATUS/CRITICAL HABITAT

The California condor was listed as endangered on March 11, 1967 with no critical habitat (U.S. Fish and Wildlife Service 1973). an aggressive research and captive breeding program got underway in 1980. In 1985, a small, periodic release program was started through the Condor Research Center in Ventura, California. The majority of the surviving condors are in captive breeding flocks. Efforts are underway to introduce them into the Grand Canyon. It no longer occurs in the Safford District.

2. LAND STATUS WHERE SPECIES OCCURS IN ACTION AREA

The California condor is not found in the area administered by the Safford District.

3. HABITAT REQUIREMENTS

Habitat is high desert canyonlands and plateaus, mainly in the coastal areas from southeast Monterey County to north Los Angeles County.

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

There are no effects from livestock grazing since no condors or suitable habitat are found in this district.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

This species is not being fully analyzed because it is not found in the action area.

6. EFFECT DETERMINATION

There would be a **"no effect"** on the survival of this species because it does not occur in the action area.

7. LITERATURE CITATIONS

Ogden, J. 1985. The California Condor. pp.389-399. Eno, E.A. Audubon Wildlife Report 1985. The National Audubon Society. New York, New York.

U.S. Fish and Wildlife Service. 1973. Threatened Wildlife of the United States. Bureau of Sports Fisheries and Wildlife. Resource Publication 114.

MASKED BOB WHITE QUAIL (*Colinus virginianus ridgwayi*)

1. T&E Status

Endangered. Species in United States extinct except for a reintroduced population. Critical habitat: None.

2. Land status:

Re-introduced population of 300 to 500 individuals maintained on Buenos Aires National Wildlife Refuge with intensive management (Forest Service 1996). Former habitat in Altar Valley and Santa Cruz Valley is too degraded by past grazing to support viable populations. Past re-introduction efforts in Arizona and New Mexico failed (Johnson and Hoffman 1982).

3. Habitat Requirements:

Masked bobwhite prefer desert grassland with a dense cover of native grass species, forbs, and shrubs, especially fern acacia (Brown and Ellis 1984, BLM 1996). Species appears confined to valley bottoms and densely vegetated side drainages (Brown and Ellis 1984, Forest Service 1996). Masked bobwhite are highly intolerant of grazing pressure (Brown and Ellis 1984, Forest Service 1996).

4. Grazing effects:

Masked bobwhite require dense cover for nesting success and survival of young. Grazing, which is typically heaviest along drainages, reduces cover below the level tolerated by bobwhite. Livestock graze forbs and grasses selectively even under the most elaborate management schemes. The diversity of grasses and forbs required by bobwhite is reduced below tolerance levels, even under "moderate" grazing intensities.

5. Reasons why the species is not being fully analyzed:

BLM lands in Altar Valley consist of scattered tracts on rugged hillsides and are not considered suitable masked bobwhite habitat.

6. Effects determination:

Grazing on public lands in the Safford District has no effect on masked bobwhite.

7. LITERATURE CITATIONS

Brown, D.E. and D.H. Ellis. 1984. Masked bobwhite recovery plan. US Fish and

Wildlife Service. Albuquerque, NM. 82 p.

Bureau of Land Management. USDI. 1996. Threatened and endangered species management and consultation. Course 1730-30. Handout - federally listed plants and animals update for Arizona.

Forest Service. USDA. 1996. Lesser long-nosed bat. In: Draft biological assessment for the land management plan. Coronado National Forest. pages 18-24.

Johnson, T.B. and S.W. Hoffman. 1982. (not dated) The masked bobwhite: a critical decision. Arizona Game and Fish Department. Phoenix, AZ. pamphlet. 8 p.

MEXICAN SPOTTED OWL (*Strix occidentalis lucida*)

1. SPECIES BACKGROUND INFORMATION

There are approximately 300 livestock allotments on the Safford District. Two allotments were identified as potential habitat and one allotment contains occupied habitat. Only those allotments that were occupied or possessed the existing habitat requirements for the Mexican spotted owl were identified in the allotment matrix process (Table 6).

Other allotments may be added later as the information gathered from future surveys will undoubtedly yield additional potential or occupied habitats. Any future activities in potential spotted owl habitat will need to conform to the Endangered Species Act (ESA) as amended.

a. T&E STATUS/CRITICAL HABITAT

Federally Threatened. No critical Habitat within the Safford District.

b. T&E OCCURRENCE REPORTS

Chiricahua Mountains: Bonita Canyon, South Fork vicinity, Pine Canyon, Indian Creek, Wood Canyon, Greenhouse Canyon, Rucker Canyon, Pole Bridge Canyon, Mormon Canyon, Wards Canyon, Morse Canyon/Turkey Creek, Rustler Park. Graham (Pinaleno) Mountains: Turkey Flat, southeast of Mt. Graham. Winchester Mountains: Reiley (Riley?) Canyon (Anonymous 1995). (All of these locations are on US Forest Service lands.)

c. T&E SURVEYS

1. Marble Creek, north end of Chiricahua Mountains. (1,500 ac.). Potential habitat on USFS, none identified on Bureau (Public) lands.
2. Dos Cabezas Mountains (11,998 ac). Only marginal habitat identified (B. Bibles unpublished data).
3. Apache Creek (1,500 ac.). Potential habitat identified on Bureau lands. Area is in New Mexico, Las Cruces District BLM .
4. San Pedro Inventories (57,000 ac.). No spotted owls or habitat identified.
5. Simmon's Peak (Dos Cabezas Mountains) Bird Block (10,000 ac.). Potential habitat identified on Bureau lands. Owl night surveys do not reveal any spotted owl territories.
6. Whitlock (Whitlock Mountains) Bird Block (10,000 ac.). No spotted owl habitat.

7. Artesia (southeast of Safford, Az.) Bird Block (10,000 ac.). No spotted owl habitat.

d. CONSULTATION/CONFERENCES

NUMBER	NAME
2-21-84-I-022	Safford District Land Sale
2-21-87-I-038	Wilderness Study Area
2-21-88-F-114	Safford District RMP
2-21-88-I-109	Safford District Land Exchange
2-21-91-I-095	Bonita Creek AMP
2-21-91-I-270	Peloncillo HMP
2-21-92-F-070	Gila Box NCA
2-21-92-I-108	Prescribed burns (Aravaipa)
2-21-93-I-490	Land Exchange (ASARCO)
2-21-94-I-053	EA Animal Damage Control
2-21-94-I-213	Muleshoe Cooperative Management Plan
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-95-I-049	Dos Cabezas Mountains Wilderness Management Plan

e. REASONS FOR SPECIES DECLINE

Even-aged timber management (logging) and catastrophic wildfires. (Anonymous (Recovery Plan) 1995).

2. RECOVERY PLANS

a. NAME: "RECOVERY PLAN FOR THE MEXICAN SPOTTED OWL (*Strix occidentalis lucida*) ADVANCE COPY. DECEMBER 1995."(Anonymous 1995)

b. REQUIREMENTS/RECOMMENDATIONS

1. Maintain or enhance prey availability.
2. Maintain potential for beneficial ground fires.
3. Promote natural and healthy riparian plant communities.
4. Preserve process to provide future spotted owl habitat (old growth).
5. Monitor grazing by livestock and wildlife in key spotted owl habitat areas; riparian areas, meadows and oak encinal types.
6. Map Protected, Restricted and Other Forest and Woodland types on the District. Establish Protective Activity Centers (PAC) for all known Mexican spotted owl sites.

c. BUREAU STEPS TO ACCOMPLISH RECOVERY

The Recovery Plan step-down outline emphasizes five areas or programs:

1. Resource Management Program. Recovery recommendations to be a part of Resource Management Plans.
2. Active Management. Actively implement Recovery Tasks.
3. Monitoring. Monitor spotted owl populations and habitat.
4. Research. Research on spotted owl life history and study the effects of land management activities on the spotted owl.
5. Oversight, Review, Evaluation, and Revision. Pertains to Recovery Plan revisions.

d. SAFFORD ACCOMPLISHMENTS TOWARD RECOVERY PLAN

1. In the process of providing a natural and healthy riparian plant community with the adoption of the District's Riparian Area Policy.
2. Monitoring grazing by livestock in key spotted owl habitat; riparian areas, meadows and oak encinal type).
3. Implemented grazing utilization standards to obtain good range conditions within key grazing areas.
4. Monitoring areas to determine presence or absence of spotted owls.

Safford District's responsibilities are primarily covered by the first three programs (Resource Management Program, Active Management, and Monitoring). Research and Oversight, Review, Evaluation and Revision, do not directly relate to this Biological Assessment.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

The first spotted owl record in Arizona (1872), was located near Tucson in a dense stand of cottonwoods (*Populus* spp.) (as cited in Anonymous 1995; Bendire 1893).

Woodhouse reported barred owls in New Mexico and Texas in 1853. Most "experts" believe Woodhouse actually recorded spotted owls. The spotted owl diet is varied but indicates the owls prey mostly on small mammals, birds, insects and reptiles.

A large portion of the spotted owl diets in northern Arizona were composed of

wood rats (*Neotoma* spp). These wood rats occupy rocky or cliff-like habitat. Spotted owls hunt in varied habitats at night as evidenced by examining their prey remains. Many of these prey species occupy open or semi-open grasslands indicating spotted owls hunt in habitat atypical to their roosting/nesting habitat. Prey remains also indicate these owls sometimes forage during the early dawn hours and at dusk.

Courtship begins in March and may continue through April. Incubation occurs in early to late April. The owls usually hatch in early to late May. Spotted owls fledge 34-36 days later (early to late June). The owlets flight feathers are not fully formed however, and the owlets hop along the ground and climb trees for safety and roosting. Dispersal of fully fledged young usually occurs in late September to early October.

Reproduction rates for the Mexican spotted owl are notoriously low. These low rates may be attributed to the fact these owls may not nest every year. Evidently, most spotted owls breed during "good" years but only a small portion breed during "bad" years. This may be related to the fact these owls do not migrate and are at the mercy of winter. In some areas, survival rates for spotted owls have been reported to be 0.80 to 0.90 for adults and 0.06 to 0.26 for juveniles. Forsman (1984) reported a 65 percent survival rate (35 percent mortality) of 29 juvenile northern spotted owls (before dispersal).

Mexican spotted owls do not construct their own nests but use abandoned nests, caves, canyon ledges and tree cavities.

b. RANGE OF SPECIES

Mexican spotted owl range extends from south-central Colorado west through southern Utah, south and east through Arizona, New Mexico, and west Texas and into interior Mexico (Peterson 1995; Anonymous 1995).

c. HABITAT REQUIREMENTS

Preferred spotted owl habitat consists of dense stands of mixed conifer forest, madrean pine-oak forest, ponderosa pine-gambel oak forest, Arizona cypress forest, encinal oak woodlands, rocky canyons and riparian forests.

These forests typically have an understory of the above mentioned species as well as broadleaf tree species such as oaks, maples and locust. The forests are usually dominated by an overstory of Apache or Chiricahua pines.

Habitats likely to be found on the Safford District are madrean pine-oak forest, encinal oak woodlands, rocky canyons and riparian forests.

Spotted owls roost/nest primarily in dense forest areas and/or cool, moist, rocky canyons. Literature searches indicate the majority of nest sites in the southwest are in trees. In the northern part of their range however, these owls nest primarily along steep canyons in caves or on cliff ledges.

Home ranges of the spotted owl vary by geographic region. Home ranges vary from 261 ha (645 ac.) to 1,487 ha (3,672 ac.).

Elevations where spotted owls have been found,range from 1,130 meters (3,700 ft.) to 3,050 meters (10,000 ft.). All known breeding sites have been found below 2,500 meters (8,200 ft.) however.

d. RATIONALE FOR POTENTIAL HABITAT

Typical potential habitats are dense stands of madrean evergreen forest, oak woodlands, rocky canyons or riparian areas. These dense stands of trees or rocky canyons etc., seem to be the limiting factors for spotted owls. Therefore, potential habitat are those areas possessing these types of habitats.

e. HABITAT CONDITIONS

Rangewide, spotted owl habitat has been significantly reduced due primarily to catastrophic wildfire and logging activities.

Habitat for the Mexican spotted owl is very limited on a local basis. Most potential habitat is located on USFS lands in the Pinaleno Mountains, Chiricahua Mountains, and Galiuro Mountains. The Bureau has only one known area where spotted owls have been reported.

Locally, as with most desert and semi-desert areas, water is often a limiting factor for wildlife. In the case of the spotted owl, water is also necessary to provide an environment that is capable of producing dense stands of underbrush and trees. These factors limit the amount, location and quality of spotted owl habitat. Habitat conditions for spotted owl habitats are marginal. During periods of drought these areas may not be used by nesting owls.

f. CURRENT CONDITION OF SPECIES POPULATION

(1.) RANGEWIDE

Historically, approximately 150 spotted owl nest sites were recorded in New Mexico. From 1980 through 1985, 43 nesting sites were identified in New Mexico.

The "RECOVERY PLAN FOR THE MEXICAN SPOTTED OWL (*Strix occidentalis lucida*)" (Anonymous 1995), states the "US" nest records before 1990 were approximately 600 nest sites. From 1990 through 1993, 758 nest sites were recorded.

(2.) ACTION AREA

On a local level, only one area has reported spotted owls in the analysis area. In addition, the USFS has over 30 reported nest sites in the Pineleno and Chiricahua Mountains.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT EFFECTS

Livestock management, may affect spotted owl habitat. Prescribed fire may remove habitat parameters necessary for the spotted owl. As with natural fire, prescribed fires have some risk in escaping prescription and developing into a catastrophic fire. This could remove nesting trees as well.

(2.) INDIRECT EFFECTS

The Recovery Plan listed four primary, indirect effects of livestock grazing to spotted owl habitat.

(a) Grazing alters prey availability.
(b) Alters spotted owl habitat in its susceptibility to catastrophic wildfires.
(c) Degeneration of riparian plant communities
(d) Impaired ability of plant community to develop into spotted owl habitat.

Heavy grazing may remove ground cover and make some prey species more vulnerable to owls and also prevent replacement of existing old growth habitat parameters necessary to spotted owl survival.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

Guadalupe West, Sycamore and Muleshoe allotments were evaluated for potential conflicts with the grazing program, and its effect on the Mexican spotted owl and its habitat.

(1.) DIRECT EFFECTS OF PROPOSED DIRECTION

The only conceivable direct effect to spotted owls from livestock grazing would be the accidental trampling of partly fledged owlets as they forage along the ground before they are able to fly.

Another more realistic effect may be from prescribed fires (to improve range forage conditions) in spotted owl habitat that become catastrophic and kills owls and destroys their habitat.

Six actions were identified in the grazing EIS's that typify the Range Management Program on the Safford District. These actions are: Permitted Use, Grazing Systems, Utilization levels, Range Improvements, Riparian area management and Special Management Areas (wilderness areas, wilderness study areas, Areas of Critical Environmental Concern (ACEC's) and National Natural Landmarks). None of these actions directly affect spotted owl habitat.

(2.) INDIRECT EFFECTS OF PROPOSED ACTION

Grazing does remove herbaceous ground cover that may impact prey species vulnerability to predation by owls. This prey vulnerability over the long term however, is not expected to be significant.

The Spotted Owl Effect Analysis Table (Table 6) indicated there would be no effect to the spotted owl, its habitat or its prey species/habitat by the six actions identified above.

(3.) DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

Only one allotment (Muleshoe) contained occupied spotted owl habitat. Currently there is no grazing on this allotment by the permittee, The Nature Conservancy. There will therefore, be no effect to the spotted owl on the Muleshoe Allotment from livestock management.

The Guadalupe West Allotment is also in long term non-use from livestock grazing. There will be no effect to the spotted owl on this allotment.

Sycamore Allotment contains marginal spotted owl habitat. Permitted Use, Grazing systems, Utilization levels, Riparian area management and Special Management Areas will not effect the spotted owl, its habitat or the prey species/habitat. Permitted Use is commensurate with proper use on the allotment, utilization levels reflect good management by the permittee, and Riparian areas are improving and are in

Proper Functioning Condition and management of the Baker Canyon Wilderness Study Area requires good range management which can readily be identified on-the-ground.

Range Improvements may be significant. The Malapais Borderland Group plans many large scale prescribed fires to improve rangeland conditions to favor early successional plant communities. The Sycamore allotment is part of this group. This action was considered a no effect because it has already been considered under the Malapais Borderland Group's Biological Evaluation written by the Douglas Ranger District of the Coronado National Forest.

(4.) INTERRELATED/INTERDEPENDENT ACTIONS

None.

(5.) INCIDENTAL TAKE

None

c. RATIONALE FOR AFFECTS ANALYSIS

There are six major action items contained in the two grazing EIS'S tierred under the Safford District RMP. These action items are: Permitted Use, Grazing System(s), Utilization, Range Improvements, Riparian Areas and Special Management Areas (SMA'S)(Table 6).

All of the Safford District's allotments were evaluated with these six action items. This exercise indicates where problems may exist and the size and scope of potential conflicts.

All six of the action items are interrelated with each other. Some relationships are subtle and some are obvious. For example, there is a direct relationship between Permitted Use and Utilization.

Utilization (uplands) may also be linked to Riparian Area management if riparian areas exist on those allotments with spotted owl habitat.

Numbers do not impact spotted owls but utilization levels may. In some cases, permitted use may exceed the number of Animal Unit Months (AUM'S) available. Should this occur then permitted use may be a conflict. Usually, permitted use reflects livestock reductions and grazing systems that were implemented 20 years previously. If these reductions are finalized and grazing systems are implemented; then permitted use should be proper use and this item will not be significant in the analysis.

Grazing Systems, Range Improvements, and Special Management Areas, may also be insignificant when compared to the specifics of the allotment and where the spotted owl habitat is in relation to the above mentioned action items.

Most of the potential conflicts should occur under Grazing Systems, Utilization levels, and Riparian Areas.

d. EFFECT DETERMINATION

Only the Muleshoe allotment was identified as occupied spotted owl habitat. Currently, this allotment is not grazed by domestic livestock. Therefore, no impacts from the grazing program will occur.

Both the Guadalupe West and Sycamore allotments contain potential owl habitat but the owl has not been reported there. Therefore, there will be no effect to the owl because the owl is not presently there. In addition, the Guadalupe allotment is in long term non-use and is not being grazed by livestock.

The Mexican Spotted Owl Affect Analysis (Table 6) compares the potential and occupied allotments with the six major action items: permitted use, grazing systems, utilization, range improvements, riparian areas and special management areas. This analysis determined that the six action items would not preclude the potential habitat from becoming occupied habitat in the future. The analysis therefore, determined that there would be **no effect** to the spotted owl.

5. PROPOSED MITIGATION MEASURES

None

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Proper grazing will not affect existing owl nesting tree habitat and should not affect future establishment of old growth oak. This concept holds true for state and private lands as well.

Most prescribed fires on state and private lands occurs in the spring, preparing fields for planting crops. These areas are not spotted owl habitat.

One area does have an active plan for prescribed fire and is located within the potential owl habitat. This is the "Malapais Borderland Group" located at the Gray Ranch in the Animas Valley, NM. These fires however, are directed at stopping brush invasions of grasslands and are not directed at dense stands of trees in typical spotted

owl habitat. These activities should not impact spotted owl habitat.

7. LITERATURE CITED

Anonymous. 1995. RECOVERY PLAN FOR THE MEXICAN SPOTTED OWL (*Strix occidentalis lucida*). Advance Copy. USDI. FWS. Southwestern Region. (Copy from USDI. FWS. Bethesda, MD.)

Anonymous. 1995. Special Status Species on the San Simon RA and Vicinity, Arizona AGFD Phoenix, AZ. (S.S. Schwartz)

Peterson, Roger T. 1990. Western Birds. Houghton Mifflin Company. Boston, MA 432 pp.

NORTHERN APLOMADO FALCON (*Falco femoralis septentrionalis*)

A medium sized falcon about the size of a peregrine falcon. Has a moustache similar to the peregrine but has a white line through the eye that the peregrine does not have. When viewed from below, the aplomado falcon has a black belly contrasted by a pale throat and a orange-brown thigh.

1. T&E STATUS/CRITICAL HABITAT

Endangered (Extirpated in the USA)

The reasons for the decline of the aplomado falcon in the USA are, pesticides (DDT/DDE), over-collection of eggs, and habitat alterations that increase the shrub component of the grassland plant communities.

May winter in southeast Arizona, as most of the reports are during the winter.

2. LAND STATUS WHERE SPECIES OCCURS IN ACTION AREA

Historical habitat includes USFS and BLM lands in southeastern Arizona. (Not sighted in Arizona since 1940.)

3. HABITAT REQUIREMENTS

Aplomado's prefer open grasslands with scattered yuccas and mesquites. Will also be found in oak savannas, pine savannas, desert grasslands, and riparian woodlands.

Do not construct their own nests but use old, abandoned nests of hawks and ravens. They are found nesting in small trees such as mesquite and catclaw. Available nest sites may be a factor determining aplomado distribution and reproduction.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Livestock grazing directly effects the habitat preferred by the aplomado falcon. Heavy grazing removes grasses to the point where shrub invasion is ecologically encouraged. This in effect increases the shrub component of the grassland, and through time may change the grassland community into a half-shrub community; a less desirable habitat for the aplomado falcon.

Heavy grazing may also change the habitat for prey species. This could have an indirect effect to the aplomado falcon.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The falcon has been extirpated from Arizona.

Should the falcon be reintroduced into the action area, existing livestock utilization averages of 40 percent should be adequate to protect falcon habitats.

Most livestock management actions are to promote open grassland conditions which are beneficial to the aplomado falcon.

6. EFFECT DETERMINATION

The aplomado falcon has been extirpated from Arizona. Therefore, a **No Effect** determination is appropriate.

The "Northern Aplomado Falcon Recovery Plan" , recommends reintroducing aplomados back into historical habitats found on the Safford District BLM. If aplomado falcons are reintroduced into these historic habitats then livestock grazing may effect this species.

Livestock grazing is not necessarily detrimental to the aplomado falcon. In fact, the "Northern Aplomado Falcon Recovery Plan" indicates it is not necessary to eliminate livestock grazing from aplomado habitat. The "Plan" recommends using grazing as a tool to promote habitat diversity as well as prey species abundance and diversity. Livestock grazing may be used as a tool to promote grasslands and eliminate or significantly slow down plant succession in these areas. In Addition, prescribed natural fires or prescribed burns could also promote this retardation of plant succession.

It is the heavy use or overuse by livestock that will be detrimental to the habitat of the aplomado falcon.

The Bureau will manage allotments in aplomado falcon historical habitats by not exceeding the 40 percent average utilization levels identified in the RMP and the Grazing EIS. This should ensure adequate residual forage to retard shrub/brush invasion. The Bureau will also consider prescribed fire and other tools to perpetuate the grassland communities in potential aplomado habitat.

Although livestock grazing has the potential to effect aplomado habitat, these actions will result in a **May Effect-Will Not Adversely Effect** the aplomado falcon in potential, historical, habitats. This in turn will not adversely effect reintroduction of the aplomado falcon on historical habitats on the Safford District.

7. LITERATURE CITATIONS

ANONYMOUS. 1990. Northern Aplomado Falcon Recovery Plan. USDI/FWS Region 2 Office. Albuquerque, NM. 58 pp.

Anonymous. 1995. Special Status Species on the San Simon RA and Vicinity, Arizona. AGFD. Phoenix, AZ. (S.S. Schwartz)

Anonymous. 1996. Draft Biological Assessment Coronado National Forest Land and Resource Management Plan March 1996. USDA Forest Service. Southwest Region. Albuquerque, NM

Peterson, Roger T. 1990. Western Birds. Houghton Mifflin Company. Boston, MA. 432 pp.

PEREGRINE FALCON (*Falco peregrinus anatum*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT ENDANGERED

No critical habitat

b. T&E OCCURRENCE

In 1890, Mearn's reported the first observation of peregrine falcons in Arizona. Brant reported peregrine falcons nesting in the Chiricahua Mountains in 1947 and 1948.

More recently, peregrine falcons have been reported in the following areas of Arizona's BLM Safford District; Peloncillo Mountains south of Duncan; Dos Cabezas Mountains near Willcox; Apache Creek area north of Duncan; Chiricahua Mountains north of Douglas; Black Rock wash near Ft. Thomas; Galiuro Mountains northeast of Benson; Aravaipa Canyon southeast of Winkelman; Dragoon Mountains east of Benson (Anonymous 1995).

There are approximately 300 livestock allotments on the Safford District. Table 7, Peregrine Falcon Affect Analysis, identifies five Safford District grazing allotments with occupied habitat and an additional 32 allotments with potential habitat. The District Base map and the peregrine falcon overlay presents the location of these grazing allotments in Safford District.

c. SURVEYS

The BLM has cooperated with the Arizona Game and Fish Department in an on-going statewide peregrine falcon survey/site occupancy study (Anonymous 1989).

District records of this survey date back to 1989. In 1989, 36 potential peregrine eyries were inventoried on the Safford District. Eleven of these sites showed indications that peregrine falcons used the area. Five peregrine pairs and one individual were observed and recorded. These five peregrine falcon pairs produced eight young in 1989.

In 1994 and 1995 four of these sites were revisited. In 1994 four pair of falcons with and four young were observed. In 1995 three pair of falcons with one young were observed.

BLM surveyed the Peloncillo Mountains in 1990. No eyries were identified but several potential nesting cliffs were identified.

Other surveys:

1. Marble Creek (1,500 ac), north end of Chiricahua Mountains. No peregrine habitat identified.
2. Dos Cabezas Mountains (11,998 ac) Active peregrine falcon eyrie reported
3. Peloncillo Mountains (34,560 ac) Suitable habitat identified. No peregrine activity observed.
4. Simmons Peak Quad (Dos Cabezas Mountains) breeding bird atlas (10,000 ac) No peregrine habitat.
5. Artesia Quad (southeast of Safford, Az.) breeding bird atlas (10,000 ac). No peregrine habitat.
6. Guadalupe Canyon (near Mexican border) (320 ac). No peregrine habitat.
7. Baker Canyon (near Mexican border) (1,920 ac) Peregrine habitat available. Occupied by nesting prairie falcons.
8. Whitlock Peak Quad (Whitlock Mountains) breeding bird block (10,000 ac). No peregrine habitat.

d. CONSULTATIONS AND CONFERENCES

2-21-84-I-022	Safford District Land Sale
2-21-87-I-038	Wilderness Study Area
2-21-88-F-114	Safford District RMP
2-21-88-I-109	Safford District Land Exchange
2-21-91-I-095	Bonita Creek AMP
2-21-91-I-270	Peloncillo HMP
2-21-92-F-070	Gila Box NCA
2-21-92-I-108	Prescribed burns (Aravaipa)
2-21-93-I-490	Land Exchange (ASARCO)
2-21-94-I-053	EA Animal Damage Control
2-21-94-I-213	Muleshoe Cooperative Management Plan
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-95-I-049	Dos Cabezas Mountains Wilderness Management Plan

e. REASONS FOR SPECIES DECLINE

Decline of peregrine falcon populations in the United States have been attributed to eggshell thinning caused by DDT/DDE contamination. Some researchers believe climate change may also be responsible (Anonymous 1984; Anonymous 1989). It is worthy to note the "American Peregrine Falcon Recovery Plan (Rocky Mountain

Southwest Populations)" (Anonymous 1984) does not list habitat loss, habitat modification, or grazing as a significant cause for the decline of peregrine populations.

2. RECOVERY PLANS

a. NAME: American Peregrine Falcon Recovery Plan (Rocky Mountain Southwest Populations)

b. REQUIREMENTS/RECOMMENDATIONS

"Increase *anatum* populations in the Rocky Mountain and Southwest Regions to a minimum of 100 effective breeding pairs by 1995.

c. BUREAU STEPS TO ACCOMPLISH THE ABOVE REQUIREMENTS

1. Determine, maintain and protect existing and potential habitat for population continuance and expansion.
2. Determine critical habitat.
3. Identify non-nesting habitat.
4. Maintain and upgrade suitable habitats to insure they remain attractive to peregrines.
5. Provide protection of occupied and suitable habitat (critical habitat).
6. Monitor and increase productivity of wild pairs.

d. SAFFORD ACCOMPLISHMENTS TOWARD RECOVERY PLAN

The Bureau and cooperators (ie. Arizona Game and Fish Department) are directly responsible for the following items listed by the recovery plan: 1.; 3; 4; And 5. Items 2 and 6 are not usually the responsibility of Resource Agencies (which includes the Bureau).

Item 2 "Determine critical habitat", is the responsibility of the US Fish and Wildlife Service (FWS). Critical habitat is determined by the FWS after publication and review in the Federal Register and consequent final approval. Potential and occupied habitat in this case, will be used in place of "critical" habitat.

Item 6, "Monitor ...wild pairs.", is usually the responsibility of state game and fish agencies. The Bureau however, is a cooperator in the monitoring program.

The Bureau and the Arizona Game and Fish Department are part of an on-going peregrine falcon survey for the state of Arizona. This survey "determines...existing and potential habitat for population continuance and expansion". Nest productivity stated above is from this study. (This survey fulfills part of step number 2, "Monitor and

increase productivity of wild pairs". Increased production is beyond the scope of this document however (Anonymous 1989)).

Maintenance and protection of occupied and potential habitat is an on-going process and has been handled on a case-by-case basis using the National Environmental Policy Act (NEPA) and Section 7 of the Endangered Species Act (ESA). Several surveys have been used to determine peregrine falcon occupancy and/or potential. Peregrine eyries are protected from disturbance during the nesting/fledgling period (between February 1 and August 15). The Bureau and its cooperators have determined, maintained and protected existing habitat. Potential nesting habitat (cliffs etc.) is also maintained and any actions taken on these potential areas must comply with NEPA and ESA requirements. (Step 1., 4., 5., are partially filled with these actions.)

Migration corridors and wintering areas (i.e. riverine systems, wildlife refuges) are located along major rivers such as the Gila River, San Pedro River, and Santa Cruz River. The large majority of these corridors are in private ownership. Banding studies have shown most peregrines migrate south to Mexico and Panama. Other banding studies have shown some peregrines winter in New Mexico and south-central Colorado.

Foraging areas may be "protected" by managing livestock utilization levels. Personnel in the Bureau believe the utilization requirement brought forth in the approved RMP (Resource Management Plan) from the grazing EISs' (average forty percent per year) will not diminish the areas value as a peregrine falcon hunting area (Step 3).

As mentioned above, proper livestock utilization levels should be adequate to maintain suitable habitat for the peregrine (Step 4).

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

Peregrine falcons are predators that prey on flying animals. Thus the primary food sources are birds and occasional bats. Peregrines hunting tactics usually require open habitat and they secure prey by "divebombing" from above (Bent 1962). As with most predators, killing or capturing prey species may require several dives.

Peregrine pairs are usually found at the eyries in mid-March. Breeding usually occurs in March and the eggs are laid in early April. Both sexes incubate although the male does less incubating and more hunting than the female. Sexual dimorphism is obvious. Gestation for peregrines takes approximately 33 days. The young are then born in early to mid-May. The young fledge in mid-June to mid-July and are vigorously defended by the adults.

Juveniles usually leave their parent's territory after the first year, although family groups have been reported returning to the breeding territory the following year. Then as breeding season approaches, the juveniles are forced to less favorable habitats. This "weaning" of juveniles and inexperience at hunting may account for their higher mortality rates. Natural mortality of juveniles is approximately 40 percent as compared to 25 percent for adults.

b. RANGE OF SPECIES

Breeding range extends from northern Alaska through the Rocky Mountains into central Mexico (Peterson 1990) . In addition, the range extends east to New England. The lower Midwest and the south have not been identified as historical habitat.

Migration corridors and wintering areas (i.e. riverine systems, wildlife refuges) are located along major rivers such as the Gila River, San Pedro River, and Santa Cruz River. Banding studies have shown most peregrines migrate south to Mexico and Panama. Other banding studies have shown some peregrines winter in New Mexico and south-central Colorado.

c. HABITAT REQUIREMENTS:

Peregrine habitat requirements in the southwest, consist of three major factors: 1) adequate nest sites on steep cliffs in close proximity to water, 2) an adequate prey base relatively free of pesticide contamination, 3) open habitat for hunting.

Peregrine falcons require nesting sites on cliffs over 135 feet high that provide a good view of the surrounding terrain and are usually within 1.5 miles of water.

An adequate prey base is also required, but may be located up to 17 miles from the nest site (Anonymous 1984). The primary prey species are other birds and an occasional bat. Most of these prey species are associated with woodlands, riparian areas, oak woodlands and desert washes. In addition, most of the prey species nest in trees and/or shrubs (excluding woodlands).

It is also important that peregrine falcon breeding/hunting habitat and prey species be relatively free of pesticides particularly DDT and DDE.

Open foraging habitat for hunting is required for successful prey capture. Foraging habitat does not appear to be as important as nesting habitat due primarily to the fact the peregrine ranges large distances while hunting and can select preferred habitat over a large foraging area.

d. RATIONAL FOR POTENTIAL HABITAT

A suitable prey base for peregrines is found in many areas across the district. Prey species populations are available in reasonable proximity to most potential nest sites. This is especially true when it has been documented that peregrines will fly up to 17 miles to their hunting habitat.

Suitable open hunting habitat is also widely available across the District.

Since a suit falcon habitat on the Safford District are relatively good.

Nesting cliffs are not impacted by livestock management practices. Therefore no impacts are expected to nesting cliffs. Water sources within 1.5 miles of eyrie sites are usually small seeps and springs. Livestock stock tanks and wildlife waters are also plentiful around occupied habitat. In general, these areas are better watered now than 100 years ago due to development of livestock waters and, to a lesser extent, wildlife water projects.

The prey base is also benefited by livestock stock tanks and wildlife waters by providing water during the breeding season which requires more water than other times of the year. The 40 percent average utilization requirement, ensures good future habitat and forage conditions for the prey species.

Open foraging areas are a natural part of the ecosystem. Livestock grazing may move existing plant communities to more advanced plant communities which is a speeding up of natural processes (early successional grasslands to shrub lands to trees). Livestock management however favors more early successional plant communities (grasslands). Management for livestock will provide these open foraging areas for the peregrine.

f. CURRENT CONDITION OF SPECIES POPULATION

(1.) RANGEWIDE

Historically (before 1900), Arizona recorded 15 peregrine eyries.

In 1975 there were three (3) eyries reported, in 1976 there were 10 eyries and in 1977 there were 11 eyries.

The draft "Arizona Peregrine Falcon 1995 Reproductive Survey Results" document indicates there were 172 confirmed breeding areas in 1992; 181 in 1993; 198 in 1994 and 206 in 1995.

The total young produced per successful breeding area, for the years 1992 through 1995 were as follows: 2.0; 2.0; 2.2; And 2.0.

The peregrine falcon population is doing so well throughout the western U.S., that downlisting and/or delisting the species is being considered.

(2.) ACTION AREA

Of the 36 eyries reported on the Safford District, BLM, only five sites have known peregrine activity. These five sites are considered occupied habitat (Table 7). Other areas may have reports of peregrine falcons but nesting activities have not been observed. Areas in which peregrines have been observed and/or contain the necessary cliff habitat are listed as Potential Habitat (Table 7).

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

Livestock grazing does not directly affect peregrine falcon nesting habitat since nesting habitat is predominately located on cliffs or steep rocky areas. These areas are historically not grazed by livestock.

Suitable hunting/foraging habitat is widely available. Livestock grazing and management may modify the vegetation component of this habitat by removing ground cover for ground nesting animals; some of which may be part of the prey base for the peregrine.

Availability of water for peregrines within 1.5 miles of eyries is increased through livestock management. This type of management encourages distribution of waters for livestock management. Presumably, these waters would also be available to peregrines.

(2.) INDIRECT EFFECTS

No indirect effects on peregrine nesting habitat, as a result of livestock grazing, have been identified. The location of these sites on steep cliffs insulates them from potential impacts.

Indirect impacts to prey populations may result from habitat modifications associated with the improper management of livestock grazing. Excessive grazing use has the potential to cause changes in vegetation density, species diversity, and species

composition of upland and riparian vegetation communities.

Overgrazing of vegetation in upland and riparian areas may decrease plant species diversity which in turn reduces "niche" capability of the plant community (habitat). The loss of "niches" may result in the degradation or loss of suitable habitat for prey species and a decline in their populations. The decline in populations of prey species could impact populations of the peregrine falcon.

Improper grazing management in the uplands may have impacts on the vegetation communities of these areas. Degradation, loss, or significant shifts in the composition of these communities may have effects on watershed function. Vegetation changes can affect infiltration of precipitation and storm runoff volume. Degraded watershed function may contribute to larger more frequent flood events that remove vegetation from riparian areas thus contributing to the degradation of this habitat. Changes in vegetation communities may also contribute to soil erosion and degradation of water quality. These indirect impacts may effect the habitat for prey species.

Reducing ground cover may enhance the ability of the peregrine to capture prey and thus be beneficial in the short term. The long term effects of this scenario however, will be a reduction in the prey species populations.

Attributes of foraging/hunting habitat of the falcon could be indirectly affected by improper grazing practices. This potential impact would be the same as mentioned above under changes to the vegetation from over use.

b. ANALYSIS OF EFFECT BY THE PROPOSED ACTION

Six elements of the proposed action are analyzed as to their affect on the three primary attributes of the peregrine falcon's habitat in the following sections. The elements of permitted use, grazing systems, utilization levels, range improvements, riparian area management, and special management areas are analyzed for affects on peregrine falcon nesting habitat, prey species availability, and availability of suitable hunting habitat.

(1.) DIRECT EFFECTS

Livestock grazing will not directly effect peregrine falcon nesting habitat because livestock grazing does not occur on cliffs or very steep, rocky areas in Safford District. None of the six elements considered in the analysis have direct affects on nesting habitat.

The availability of prey species is not directly affected by the six elements of the grazing program.

Suitable hunting habitat is also not directly affected by the six elements of the grazing program under consideration here.

(2.) INDIRECT EFFECTS

No indirect impacts to nesting habitat are caused by the grazing program as implemented on Safford District. There are no known ways that elements of the livestock grazing program could be translated to indirect impacts on nest site habitat.

Indirect impacts to prey species availability may accrue through habitat modification caused by elements of the grazing program. Improper or faulty grazing systems, excessive utilization, improperly designed and constructed range improvements, improper riparian area management, and improper management of Special Management Areas have the potential to cause a decline in prey species populations through habitat modification.

High utilization and poor riparian management may cause affects on several allotments in Safford District. Improper livestock grazing may lead to high utilization levels by livestock which reduces prey species habitat as well as reduces the capability of the plant community to provide niches needed for good biodiversity. Riparian areas are the most important communities of the grassland desert ecosystem. These ribbons of habitat attract wildlife like a magnet. Year long grazing does not adequately control livestock use of riparian areas. Livestock therefore, have the potential to adversely affect the riparian communities under the year long grazing system. This in turn has the potential to affect the peregrine prey base.

Indirect affects to prey species populations may also accrue from modification of upland vegetation communities that result in changes in watershed hydrology. Improper levels of permitted use, faulty grazing systems, and excessive utilization have the potential to cause hydrologic changes in the watershed.

Water distribution and availability for peregrines is increased through the livestock management program.

(3.) DIRECT AND INDIRECT AFFECTS BY ALLOTMENTS

Thirty-seven grazing allotments on Safford District have been determined to have occupied or potential habitat for the falcon. Five allotments have occupied habitat and 32 allotments have potential habitat.

The Safford District Grazing management program will have no effect on the peregrine falcon on 29 of the 37 allotments with occupied or potential habitat (Table 7).

Riparian areas are in Proper Functioning Condition (PFC) on 6.7 miles, Functional at Risk on 10.85 miles, and Non Functioning on 2.5 miles (appendix 4). (Riparian condition classes are related to watershed stability which is in turn is related to the vegetation density and plant production).

Grazing management actions on eight allotments may effect the peregrine falcon, its habitat, or its prey species/habitat. These actions are grazing systems, utilization levels and riparian area management. These eight allotments are Little Doubtful, High Lonesome, Simmon's Peak, Cement Canyon, Apache Springs, San Francisco, Morenci, and Brandenburg Mountain.

The High Lonesome Allotment may effect the peregrine falcon or its habitat or prey base by the grazing system and associated high utilization levels. These areas intensively grazed by livestock under the guidelines of Holistic Resource Management (HRM) are located in the tobosa flats and foothill areas adjacent to the Peloncillo Mountains Wilderness Area. These locations are located quite a distance from the potential, but unoccupied, nesting cliffs in the wilderness area.

The only realistic impact would be to the prey species/habitat (peregrine foraging/hunting areas). It has been estimated that no more than one-half of the total allotment will be utilized during the nesting/fledgling period of ground nesting birds. This will be sufficient to protect the habitat for potential prey species for the potential peregrine falcon. (Peloncillo Mountains wildlife surveys (unpublished data 1990) did not identify any peregrine activity in this area).

Cement Canyon allotment contains occupied peregrine falcon habitat. As such, utilization levels and riparian area management may effect the peregrine or its prey species. The significance of these impacts are low. Most of the Cement Canyon allotment is on the north side of the Dos Cabezas mountains in the oak woodland community with stringers of riparian areas. Overall utilization here is and has been historically high. Riparian areas are also impacted and regeneration of cottonwood and ash trees has been reduced. Large open areas are scarce and avian prey species do not seem to be affected by the high utilization levels. Most of the peregrine foraging/hunting areas are on the ridgetops and are not in the oak woodlands (closed encinal).

Riparian stringers are very narrow, steep, ribbons of habitat that do not provide very much habitat for potential prey species. Should potential prey species come from these areas, the amount (biomass) of prey would be quite small due to lack of any significant habitat size.

The Little Doubtful and Simmon's Peak allotments historically have had high utilization levels. Currently, there are no permitted livestock allowed on these

allotments. There are however, trespass cattle utilizing these allotments. The Bureau is taking definitive steps to resolve this trespass problem. Currently the trespass problem in is litigation. These high utilization levels in the Little Doubtful allotment are located in the bottom of the canyons and the uplands adjacent to rock outcrops and cliffs. Impacts to the potential peregrine habitat and its prey base are largely insignificant because of the remoteness of the peregrine habitat. The ability to measure any impacts to the peregrine or its prey base is very slight. Measuring the effects on 40 acres of peregrine nesting habitat would be almost impossible. Wildlife surveys in the Peloncillo Mountains (unpublished data 1990) did not record any peregrine activity in the area and occasional monitoring of the area yearly since 1990, has not indicated peregrine activity.

High utilization levels on the Simmon's Peak allotment may affect prey species for the peregrine falcon such as ground nesting birds. In 1992 and 1993, wildlife surveys were conducted on this allotment and no peregrine activity was observed even though this allotment is adjacent to the Cement Canyon allotment; which has occupied peregrine habitat. There are locations that have cliffs suitable for the peregrine but thus far none have been occupied.

San Francisco, Morenci and Brandenburg Mountain, are all year long allotments and as such, impact riparian areas. This indicates the livestock will be found in the riparian zone quite often to shade-up or to drink.

The San Francisco allotment allottee manages the allotment in conjunction with his USFS permit. As such, livestock are kept near the USFS boundary using salt stations and waters to keep the cattle up high. This effectively keeps his/hers livestock out of the San Francisco River. Morenci allotment is part of the allotments being considered under the Gila Box Plan currently under T & E review by the FWS. The actions brought forth in this plan will mitigate potential impacts to the riparian areas in peregrine habitat, by fencing the Gila River to keep livestock out. Brandenberg Mountain allotment corners in Aravaipa Creek but cattle do not actively graze in the riparian area. The topography (cliffs) is such as to prevent the livestock from moving from the uplands to the riparian zone along Aravaipa Creek.

(4.) INTERRELATED AND INTERDEPENDENT ACTIONS

1. Vehicular traffic, discharging of firearms etc., near peregrine eyries during the nesting/fledgling seasons.

2. Vandals harassing peregrines at eyries or in hunting areas.

3. Low flying aircraft near peregrine eyries during the nesting/fledgling season.

4. State, Federal and private grazing actions are closely interrelated. The private

landholder grazes his lands while leasing federal and state areas. Private, state and federal lands may be the sum total of his or her ranching operation.

(5.) INCIDENTAL TAKE

None

d. RATIONALE FOR EFFECTS ANALYSIS

There are six actions the Bureau will analyze in this BE: permitted use; grazing systems; utilization; range improvements; riparian areas; and special management areas . Each allotment was analyzed to determine how these six actions effect the peregrine falcon and its habitat. (Table 7)

Permitted use was determined to be a no effect on all allotments. This was due largely to the fact that permitted use does not of itself affect the peregrine, its prey base or its habitat. What does affect the peregrine are the results of permitted use such as grazing systems, utilization levels, and range improvements.

Two grazing systems on five different allotments were thought to affect the peregrine falcon. One allotment is managed under the philosophy of Holistic Resource Management (high intensity grazing for short time periods)(HRM-Savory System) while the other four were year long permits.

Utilization levels affected prey and prey habitat on four allotments: High Lonesome, Little Doubtful, Simmon's Peak and Cement Canyon.

Range improvements such as fences, stock ponds, pipelines etc., should not effect the peregrine falcon, its habitat, or its prey species and their habitat. Improvements already in place will have no effect on the peregrine. Future improvements will be analyzed on a case-by-case basis and will comply with NEPA and ESA requirements. None of the allotments considered as occupied or potential habitat, listed Grazing Systems as an effect to the peregrine, its prey base or its habitat.

Riparian areas are of special concern because livestock tend to shade up or congregate in these areas. Grazing systems designed to fence out livestock from major riparian areas or rotate livestock so as to avoid riparian areas during crucial periods for listed species will benefit the peregrine falcon. Six allotments however, do not specifically manage livestock in riparian areas during these crucial periods. These allotments are Simmon's Peak, Cement Canyon, Apache Springs, San Francisco, Morenci and Brandenburg Mountain. Most of the other allotments, listed as potential or occupied peregrine falcon habitat, do not have a grazing system that effects the

peregrine or the allotment does not contain riparian habitat.

Special Management Areas (SMA'S) within potential or occupied peregrine habitat allotments will not affect the peregrine. Most of these SMA'S provide additional beneficial, protection for listed species by altering livestock management practices more favorable to wildlife including the peregrine. Examples of SMA's are wilderness areas, Areas of Critical Environmental Concern (ACEC's), wilderness study areas and National Natural Landmarks.

e. EFFECT DETERMINATION (SUMMARY)

See table 7a for determination by allotment.

The peregrine falcon has been verified in the Black Rock, Soza Wash, Hell Hole, South Rim and Cement Canyon allotments.

Safford District analysis has determined there will be no effect to the peregrine in the Black Rock, Soza Wash, Hell Hole and South Rim allotments. Nesting habitat (cliffs), distance to water and prey species habitat will not be impacted by Permitted Use, Grazing Systems, Utilization levels, Range Improvements, Riparian Area management of Special Management Areas.

The South Rim allotment is currently not grazed by domestic livestock so there will not be any effects to the peregrine.

Hell Hole allotment is grazed by 14 head of cattle. Riparian areas are not grazed, permitted use is commensurate with the carrying capacity utilization levels are proper, range improvements are in place, and there is no effect from Special Management Areas.

Black Rock allotment has been in a deferred rotation grazing system for the last 30 years. The permitted use and utilization levels are within proper limits, riparian areas are deferred in some areas until after the growing season allowing for proper riparian management. Permitted use has been reduced from past management levels and is now commensurate with the resource. Special Management Area does not effect peregrine falcons, their habitat nor their prey species and prey species habitat.

The Soza Wash allotment does not effect the peregrine because the part of the allotment containing the peregrine nesting, foraging/hunting habitat is not grazed by livestock. In addition, the Muleshoe side is not grazed reducing the chances of livestock trespass.

Cement Canyon allotment however, may be affected by management of

utilization levels and riparian areas. The riparian areas here are marginal and meet only the minimal requirements. A complete rest from grazing would probably show very little improvement in these riparian areas as far as being in "Proper Functioning Condition". It is unlikely utilization levels or riparian areas within the Cement Canyon allotment will adversely affect the peregrine or its habitat or its prey base.

The effect determination for the peregrine falcon, its habitat and prey species and habitat is a may effect, because of the impacts from riparian area management, utilization levels and their potential impact to the prey species, and grazing systems that were determined to have an effect to the peregrine its prey base and/or the prey species habitat.

It was also determined these impacts will **may effect but, not adversely effect** the peregrine falcon its prey base or the prey species habitat because these impacts, from the six actions, were not significant and would not measurably change the prey species habitat nor the prey abundance. (Table 7A).

5. PROPOSED MITIGATION MEASURES

None

6. CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE ACTION AREA

Livestock operations on state and private lands should not directly impact the peregrine falcon. Livestock grazing on federal lands is closely related to grazing on state and private lands due to the fact that state leases are incorporated into federal permits and the private landowners are the recipients of both "leases". Cliffs and steep rocky areas on state and private lands will not be significantly used by livestock as is the case with the federal lands (BLM).

There are however, private landowners, grazing livestock, that do not have federal leases. Most of these private lands are located in areas of scattered public, private or state ownership, along major rivers (i.e. Gila River) and major tributaries (i.e. San Pedro River), or in broad expansive flats along the urban interface. Effects to peregrine falcons from these state and private lands not associated with federal (public) leases are insignificant and are not measurable.

Of the eight allotments that may effect, not likely to adversely effect, the peregrine falcon, two allotments are under Custodial Management (Morenci and Brandenberg Mountain), one is classified as Maintenance (Apache Springs) and five are under Intensive Management (San Francisco, Little Doubtful, High Lonesome, Simmon's Peak, and Cement Canyon). In Addition, both the Simmon's Peak and Little

Doubtful allotments have cancelled grazing privileges and are in litigation.

7. LITERATURE CITATIONS

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SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*)

1. SPECIES BACKGROUND INFORMATION:

a. T&E STATUS/CRITICAL HABITAT:

Listed as an Endangered, 1995.

Critical habitat: In Arizona, portions of the San Pedro, Verde River, Wet Beaver Creek, West Clear Creek, Colorado River below Lee's Ferry, Little Colorado and tributaries near Greer, Apache County (USFWS 1993).

b. T&E OCCURRENCE

Observed as migrating individuals during spring season during the San Pedro Avian Inventory (Krueper and Corman 1988). Thirty nesting pairs were documented on the lower San Pedro River in 1994 (Sferra, et al. 1995). No complete survey of public lands on the Gila River, San Francisco River, or Bonita Creek have been made. There are nesting pairs on the Gila River on private land near the Solomon Bridge and near Ft. Thomas, AZ

c. T&E SURVEYS

The southwestern willow flycatcher is difficult to distinguish from other Empidonax flycatchers. A sampling protocol has been developed by USFWS, AGFD, and BLM. It consists of playing taped calls in riparian habitats to elicit a response from territorial birds (Tibbits et al. 1994). This method has been used in the Tucson Resource area for three seasons.

In 1994, during the partners in flight survey, 18 willow flycatcher nests were located along the lower reach of the San Pedro River (Sferra et al. 1995). No breeding birds were observed on public land in the upper San Pedro, Cienega Creek, or riparian areas within the Muleshoe Ranch TNC Preserve despite three years of call survey (Whetstone 1996). One breeding bird was observed near Cascabel along the San Pedro River in 1995 (Whetstone 1996).

d. CONSULTATION/CONFERENCES

Empire/Cienega Interimin Grazing Plan 1995

e. REASONS FOR SPECIES DECLINE

Southwestern willow flycatcher is endangered by extensive loss of habitat, brood parasitism, and lack of adequate protective regulations (USFWS 1995).

2. RECOVERY PLANS

None.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

The southwestern willow flycatcher is a migratory, riparian obligate species. Its distribution within range restricted to riparian corridors.

The species is insectivorous, usually making short flights from a perch to intercept flying insects (Ehrlich et al. 1988).

Southwestern willow flycatcher typically occupies its breeding habitat from late April to September (USFWS 1993). Males begin singing to attract mates and defend their territories in mid-June (Whetstone 1996). Nests are built in shrub or trees three to fifteen feet above ground (US Fish and Wildlife Service 1993). The female broods young for about one week (Ehrlich et al. 1988). By mid-July breeding is complete and young are fledged. Willow flycatchers are frequent host for cowbird parasitism (Tibbits et al. 1994, Ehrlich et al. 1988).

b. RANGE OF SPECIES

Yavapai, Gila, Maricopa, Mohave, Coconino, Navajo, Apache, Pinal, La Paz, Greenlee, Graham, Yuma, Pima, Cochise, Santa Cruz. Restricted to riparian corridors within range (BLM 1996).

c. HABITAT REQUIREMENTS

Cottonwood/willow, tamarisk communities along rivers, marshes, and streams is considered suitable habitat. Perennial flow and surface water is considered an important component of nesting habitat (Tibbits et al. 1994). Flycatchers most often select dense thickets of willow or tamarisk, usually over water, for nesting. Low gradient rivers and streams seem to be preferred over high gradient streams (Tibbits et al.1994).

Tamarisk is considered poor nesting habitat because it may not provide sufficient thermal cover (Tibbits et al. 1994). This may explain why willow flycatchers are not

found nesting in tamarisk (despite its abundance) at low elevation river courses.

d. RATIONAL FOR POTENTIAL HABITAT:

The following broad criterion was used to identify potential habitat:

The habitat is primarily riparian in character with or have the potential for dense tickets of willows, cottonwood and/or tamarisk, with perennial or surface water, at minimum for the nesting season (April - September).

e. HABITAT CONDITIONS:

Habitat conditions for willow flycatcher have not been determined on public lands in the Safford District. Major riparian areas have been inventoried using an assessment of proper function and condition was performed using guidelines in BLM publication TR 1737-9 (Prichard et al. 1993). (See Appendix 4 Riparian inventory)

Historically willow flycatcher ranged along most major rivers and streams in Arizona (USFWS 1993). Historic willow flycatcher habitat has been altered by grazing, water diversion, exotic plant introduction, ground water pumping, urban expansion, conversion of bottomlands to agriculture, beaver elimination, etc. (Tibbits et al. 1994, USFWS 1993). Areas such as the San Pedro River appear to provide nesting habitat for small numbers of flycatchers. (Whetstone 1996).

f. CURRENT CONDITION OF SPECIES POPULATION

(1.) Rangewide

Present at very low numbers throughout range (USFWS 1993).

(2.) Action area

Results of surveys along the lower San Pedro River indicate that local populations are severely depressed and may consist of only scattered breeding pairs at best (Sferra et al. 1995). Very few individual birds found along the Gila River and its tributaries in the Safford area (Sferra et al. 1995). There are no known breeding flycatchers on public land on the Gila river, Bonita Creek, San Francisco River, Upper San Pedro, Cienega Creek, Muleshoe riparian area and Aravaipa Creek. See table 8 for allotment with potential habitat and acreage.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT EFFECTS

The overuse of riparian areas by livestock has been a major factor in degradation and decline of willow flycatcher habitat (Tibbits et al. 1994, USFWS 1993). Livestock grazing reduces the diversity and density of riparian plant species especially, cottonwood and willows. Livestock can reduce the suitability of riparian areas by reducing canopy cover especially at the lower levels preferred by flycatchers. When cattle grazing is reduced or eliminated willow flycatcher numbers can rebound (USFWS 1993).

Direct destruction of nests, eggs, and nestlings by foraging cattle has been documented (Tibbits et al. 1994).

(2.) INDIRECT EFFECTS

Livestock grazing indirectly affects willow flycatcher by improving conditions for nest parasitism by cowbirds (Tibbits et al. 1994). Cattle grazing and man-made pastures creates bare ground and open areas preferred by cowbirds (Molothrus sp.). Brown cowbirds, historically associated with bison, have adapted to expansion of agriculture and have experienced rapid population growth and range expansion in this century (Ehrlich et al. 1988). Cowbirds are nest parasites of willow flycatchers, laying eggs in the nests of flycatchers. Flycatcher adults feed and care for the larger more aggressive cowbird chick at the expense of their own young. This has resulted in lower reproductive success by flycatchers and is probably part of the cause of the decline of the species.

Livestock grazing initiates changes the structure, composition, and ground cover in the upland plant community. These changes are linked to widespread changes in watershed hydrology which may be detrimental to flycatcher (USFWS 1993).

b. ANALYSIS OF EFFECT BY PROPOSED ACTION.

(1.) DIRECT EFFECTS

Direct modification to fly catcher habitat may be caused by permitted use, grazing system, range improvement policy and riparian policy

Permitted Use: Livestock tend to concentrate in riparian areas for forage, water, and shade, due to the aridity of the surrounding uplands. Riparian areas often comprise

a small percentage of the total acreage of a given allotment livestock resulting in a tendency to cause degradation of riparian areas regardless of the stocking rate. Adjusting livestock numbers does not in of itself guarantee that riparian areas within a given allotments will be protected from overuse by livestock. Therefore adjusting permitted use alone will have little beneficial effect on changes in modifying willow flycatcher habitat.

Grazing Systems: Year-long grazing in riparian areas can depress willow flycatcher populations by modification of habitat. Cottonwood and willow seedlings may be grazed or trampled thus reducing survival rates. Established vegetation may be hedged to a height of six to seven feet. This can alter available vegetation structure within the preferred range of willow flycatcher.

Rest rotation, Santa Rita rotation, and deferred rotation systems do not, in and of themselves, improve riparian areas in terms of willow and/or cottonwood cover. Seedlings of willow and cottonwood trees may emerge on favorable sites during periods of livestock rest. These systems may not provide a long enough rest period to allow sufficient establishment time for seedlings. Cattle can concentrate in riparian areas under these systems and allow for excessive use or trampling of seedlings. thus reducing survival rates and modification to habitat. Livestock can concentrate in riparian zone under these system and modify the structure of the habitat. This can be avoided by riparian pastures which can provide positive control of livestock use in riparian areas, thus allowing for sufficient time for growth and recovery. This has been done on a number of allotments, such as Empire/Cienega, Bonita Creek, Aravaipa and portion of the Gila River.

Winter grazing and winter seasonal rotation: These may be compatible with the habitat needs of willow flycatcher. Livestock are only in the allotment and/or pastures during the cool season and they tend to concentrate less in the riparian zone, than during the warmer months. Vegetation is dormant and has limited grazing use, thus reducing the hedging effect by livestock use during warm seasons. Use by livestock is a lower intensity and vegetation has an opportunity to recover during the growing season. Winter grazing or systems with special provision for resting riparian areas both appear to provide benefits through reducing modification to habitat.

Range Improvements: Range improvements, fences, wells, reservoirs, can be beneficial or detrimental for willow flycatcher depending on the circumstances. The proper placement of improvements can allow for control of livestock so as to minimize impacts to riparian area and modification of habitat. Improper placement may increase modification of habitat.

Riparian Policy: The Safford District riparian area management policy provides the framework for improvement of riparian areas by giving them a special status for

management. The policy directs the Safford District to prescribe combination of management actions to maintain, improve and enhance these areas. Managing to achieve proper functioning riparian areas should promote willow flycatcher survival and nesting success.

(2.) INDIRECT EFFECTS

Watershed Conditions: are effected by , permitted use, grazing system, upland utilization standards, riparian policy and special management area.

Permitted Use: Adjusting livestock permitted use to proper carrying capacity should reduce the effect of the watersheds on the quality of riparian areas.

Grazing Systems: Grazing systems, properly designed, can result in increased ground cover on upland watersheds and reduce the negative effects of degraded watersheds on the quality of riparian areas.

Utilization Standards for Uplands: Limiting utilization in upland watersheds can maintain sufficient ground cover to reduce erosion and reduce the negative effects of degraded watershed condition on riparian areas.

Riparian Policy: The Safford District riparian policy acknowledges the importance of improving watershed condition in order to improve riparian areas in the long term.

Managing to achieve good watershed conditions promotes improved riparian areas indirectly. Improved habitat conditions for willow flycatcher could ultimately result if the special needs of the species are also taken into consideration.

Special Management Areas: Special management areas appear to provide the best option for recovery of willow flycatcher habitat. These areas are high priority area that are managed on a watershed basis. All actions are coordinated to improve the watershed condition while managing other resources. There are delays in the result of the management of these area because of the time and complexity of developing and implementing the plans, the time it take for the basic resource to respond to management. The results are directly related to the portion of the watershed that is managed under any plan.

Management of the San Pedro Riparian National Conservation Area provides an example of this delay in watershed response and effect of ownership. The strategy for management includes 15 years of rest from livestock grazing. Some improvement in upland vegetation, particularly perennial native grasses, has occurred since 1988 when the rest period began. These changes, though favorable in terms of watershed

condition have not been uniform due to differences in soil type and condition. Arid watershed are slow to respond to management actions. It will likely be sometime before changes in watershed become widespread enough to translate into improvement in riparian conditions.

Cowbird Parasitism can be effected permitted use, grazing system, range improvements and riparian policy..

Permitted Use: Concentrations of cattle in riparian areas could still occur with proper permitted use. These concentrations increase cowbird densities and lead to increased incidence of brood parasitism of willow flycatcher nests.

Grazing System: Concentrations of cattle in or near riparian areas could occur even with implementation any of the grazing systems mentioned in the proposed action. These livestock concentrations result in increased cowbird densities and increased incidence of brood parasitism.

Range Improvements:. Water developments placed away from riparian areas may reduce densities, while those placed in close proximity to riparian areas may increase cow bird densities in riparian areas

Livestock watering developments can result in a denuded area due to the concentration of livestock. These sites sometimes become favorable forage sites for cowbirds, which can travel up to 7 kilometers (4.2 miles) between breeding and feeding areas (Robinson et al. 1995). These sites on public lands are less attractive for cowbirds due to that fact that supplemental feeding is not authorized on public land. Hence a prime cowbird food source, spilled feed grains and seeds in leftover hay, are not available in and around livestock corrals.

Riparian Policy: The riparian policy does not address the problem of nest parasitism. No mechanism currently exists for determining the severity of this problem. The policy directs the District to construct and/or move livestock waters and corrals out of riparian area, where feasible.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS See table 8

Bonita Creek, Smuggler Peak, Gila, Johnny Creek, and Empire/Cienega: These allotment have permitted use set at carrying capacity, implemented grazing systems, seasonal riparian or no use of riparian, range improvements for the most part are located outside or some distance from the riparian areas, riparian policy is implemented and are within special management areas with the exception of the Empire/Cienega. No assessment of cowbird parasitism of willow flycatcher nests has

been made at this time. It is likely that the permitted use and 40 percent utilization upland limits on all allotments, having willow flycatcher habitat, has resulted in a reduction in erosion and runoff into the riparian zone and has reduced the erosive force of flooding to some degree. There may be a slight, indirect, beneficial effect although it may be difficult to measure.

Deferred grazing systems are combined with protective fencing to exclude livestock from riparian areas, or allow for winter grazing and rest for the remainder of the year. These conditions may result in improved riparian habitat in the long run, and have a beneficial affect, but are not likely to adversely affect willow flycatcher or its habitat. Incidental take is probably not occurring on these allotments since livestock are not present in the riparian zone during the nesting cycle.

Range improvements on all allotments may have an effect on willow flycatcher since there is the potential for range improvements to affect willow flycatcher either directly or indirectly. At present, it does not appear that range improvements on any allotments with potential willow flycatcher habitat are, in and of themselves resulting in an adverse impact. Gila allotment fences and upland water are in place but are not fully functional.

The riparian policy may be having a beneficial effect on those allotments where riparian areas are fully protected from livestock grazing or where cattle are limited to grazing in the winter dormant season.

Special management areas may have a beneficial effect

South Rim, Twin C, Soza Wash and Bullgap: permitted use is set at carrying capacity, livestock are fenced out of the riparian area, range improvements are out of the riparian area, riparian policy is implemented and they are within a special management area. No assessment of cowbird parasitism of willow flycatcher nests has been made at this time.

Muleshoe and Hotwell: these allotment are currently not grazed. No assessment of cowbird parasitism of willow flycatcher nests has been made at this time.

Riparian policy is also considered to have a beneficial effect on Hot Well and Muleshoe which are closed to grazing at this time.

San Francisco, Morenci, Gila, Empirita, Babocomari, and Brunchow Hill: These allotments have yearlong grazing in the riparian areas which have potential willow flycatcher habitat. Yearlong grazing may result in a decline in riparian vegetation and nesting habitat or in the failure of riparian vegetation to recover. Incidental take of willow flycatcher nestlings and chicks could be occurring since livestock are present in

the riparian zone during the nesting season. No assessment of cowbird parasitism of willow flycatcher nests has been made at this time.

On allotments where cattle graze yearlong in the riparian areas the riparian policy (or more properly the delay in its implementation) is considered to have an adverse impact on willow flycatcher and its habitat.

(4.) INTERRELATED/INTERDEPENDENT ACTIONS:

Construction of roads and rights of way through willow flycatcher habitat, and unauthorized clearing of riparian vegetation on public land.

(5.) INCIDENTAL TAKE

Livestock are known to pull down nests while foraging in riparian areas. Incidental take of willow flycatcher chicks is a likely effect of grazing in riparian areas during the nesting season.

c. RATIONALE FOR EFFECTS (See Table 8)

The rational for determination of effect was based on the best information available in the literature regarding southwestern willow flycatcher, coupled with available knowledge of conditions on a given allotment.

If livestock were permitted on an allotment, in the riparian zone or in close proximity to the riparian zone then it was determined that permitted use may have an effect on willow flycatcher but that this use, in and of itself was not likely to have an adverse impact.

If livestock were permitted on an allotment, but not in or in close proximity to riparian areas, then permitted use is considered to have no effect on willow flycatcher.

If year-long grazing is occurring in the riparian zone of an allotment then it was determined, for that allotment, that the grazing system is likely to have an adverse impact on willow flycatcher.

If grazing is occurring on an allotment under a rest rotation system with protective riparian fencing or under deferred rotation with grazing of the riparian zone only during the winter dormant period then it was determined, for that allotment, that the grazing system is may affect, but is not likely to adversely affect, willow flycatcher.

Utilization limits of 40 percent for uplands is considered acceptable to willow flycatcher habitat needs hence for all allotments it was determined that upland

utilization has no effect on willow flycatcher.

If the riparian policy is implemented on an allotment in a manner that provides the riparian zone with sufficient rest from livestock grazing, and if, in the opinion of the range specialist most familiar with the allotment, the apparent trend of riparian vegetation is upward then it was determined that the riparian policy may affect, but does not adversely affect willow flycatcher.

If the riparian policy has not yet been implemented on an allotment then it was determined that the lack of implementation of the riparian policy may have an adverse impact on willow flycatcher.

If an allotment is within the special management area then it was determined that the special management may affect but is not likely to adversely affect willow flycatcher.

If an allotment is not within a special management area then it was determined that special management has no effect on willow flycatcher.

No assessment of the indirect effect of any of the above categories on cowbird parasitism can be made at this time.

d. EFFECTS DETERMINATION (See Table 8a)

Grazing yearlong in riparian areas on public land **may effect, likely to adversely affect** southwestern willow flycatcher and its proposed critical habitat (as applicable) on the following allotments: San Francisco, Morenci, Empirita, Babocomari and Brunchow Hill

Grazing under deferred rotation or rest rotation systems with special protection for riparian areas **may affect, but is not likely to adversely affec**t willow flycatcher, or its critical habitat (as applicable) on the following allotments :Smuggler Peak,Twin C, Quintana, South Rim, Johnny Creek, Bonita Creek, Bullgap, Empire cienega, Soza wash.

Hot well and Muleshoe are closed to grazing hence grazing will have **no effec**t on willow flycatcher on those allotments.

5. PROPOSED MITIGATION MEASURES

Implement Safford district riparian policy on southwestern willow flycatcher habitats on: San Francisco, Morenci, Empirita, Babocomari and Brunchow Hill Allotments.

Modify grazing systems so livestock are not present in willow flycatcher habitats

during the breeding period (May 1 through August 31). At other times, manage livestock grazing by controlling timing or/and numbers to enhance survival of willow and cottonwood seedlings. Establish limits of grazing use on terminal buds of willow or cottonwood seedlings to allow for seedling survival and establishment if riparian area are grazed. Remove livestock when limit is reached.

Determine whether range improvements are causing increased cowbird parasitism of willow flycatcher nests, on an allotment by allotment basis. Use the annual monitoring protocol developed by Tibbits et al. (1994). Implement cowbird trapping programs as necessary. Relocate range improvements on public lands at least one mile from willow flycatcher nesting areas, if they are found to provide favorable conditions for cowbird feeding, and if trapping is not feasible.

The above mitigation measures may have a beneficial effect on the survival of southwestern willow flycatcher. These measures are not likely to adversely affect southwestern willow flycatcher or its proposed critical habitat.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Diversion of streamflow for agriculture and pumping of groundwater occurs along all major stream courses within the action area, usually on private land. This activity can result in lower stream flows or complete drying of the stream course for all or part of the year. The result is reduced survival of cottonwood and willow which must have water available to their root zones throughout the year. This activity combined with high grazing levels in the riparian zone can further reduce the quality and availability of nesting habitat for willow flycatcher.

Pasture development and livestock developments (corrals, wells, etc.) on private land adjacent to riparian areas can increase habitat for cowbirds thereby increasing the incidence of cowbird parasitism. This activity can combine with high grazing levels within the riparian zone whether public or private, can depress willow flycatcher nesting or eliminate nesting entirely.

7. LITERATURE CITATIONS

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Whetstone, J. 1996. Tucson resource area willow flycatcher survey results 1993 -1995. San Pedro NCA office files. Sierra Vista, AZ. 6 pp.

THICK BILLED PARROT (*Rhynchopsitta pachyrhyncha*)

This species is a stocky green parrot, about 15-16.5" long, with a longish tail, a heavy black bill, and dark red forehead.

1. T&E STATUS/CRITICAL HABITAT

The thick-billed parrot is listed as **endangered**, but listed only for Mexico. In Arizona, it was extirpated prior to the 1900's. It is presently not found in the Safford District.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

None are found in areas managed by the Safford District. It was last recorded in the wild in 1922. It used to be a sporadic visitor to southeast Arizona and southwest New Mexico.

3. HABITAT REQUIREMENTS

The habitat for this species in Arizona was probably the pine-covered mountains of the southeast.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Livestock would not have any effects on it because it is not found here.

5. REASONS WHY THIS SPECIES IS NOT BEING FULLY ANALYZED

This species is not being fully analyzed because it is not found in the action area.

6. EFFECT DETERMINATION

Grazing would have a '**no effect**' on the continuing existence of this species

7. LITERATURE CITATION

Peterson, R.T. 1990. Western Birds. Third Edition. Houghton Mifflin Company, Boston.

WHOOPING CRANE (*Grus americana*)

1. T&E STATUS/CRITICAL HABITAT

Endangered

2. LAND STATUS WHERE SPECIES OCCURS IN ACTION AREA

Only one known report on Arizona State lands on, or near, the Willcox Playa.

3. HABITAT REQUIREMENTS

Requires wetland habitat and nearby grain fields as part of its annual seasonal migration patterns. The only areas that meet the wetland criteria are the Willcox Playa, Empire Cienega and St. David Cienega (Peterson 1990).

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

The Empire Cienega is grazed by livestock while the St. David Cienega and the Willcox Playa do not have livestock grazing on public lands in the wetland areas.

Habitat for the whooping crane on the Empire Cienega is marginal. Some use by sandhill cranes has been observed but no reports of whooping cranes are known. Basically, the cranes use the wetlands for resting areas and forage in the nearby fields.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Only one report in the near vicinity (state lands ?). Highly unlikely to occur here. Habitat used during migration is usually not on Bureau lands and is usually on non-grazed lands.

6. EFFECT DETERMINATION

Only one unsubstantiated report from the action area in 1985 (Gacey pers. communication).

It is a remote possibility whooping cranes occur in the action area. Livestock grazing occurs on the drier areas of the cienegas and will not directly effect the cranes.

Based on this information, livestock management **will not effect** Whooping Cranes.

7. LITERATURE CITATION

Peterson, R.T. 1990. A Field Guide to Western Birds. Houghton Mifflin Company. Boston, MA. 359 pp.

YUMA CLAPPER RAIL (*Rallus longirostris yumanensis*)

1. STATUS: ENDANGERED

Known to occur in Yuma, La Paz, Maricopa, Pinal, and Mohave Counties in Arizona (BLM 1996). Critical Habitat: None designated.

2. LAND STATUS

Private, state, and public land.

3. HABITAT

Fresh water and brackish marshes associated with major rivers, such as Gila and Colorado (BLM 1996). Species requires dense emergent vegetation, with a wet substrate, for foraging (BLM 1996). Nests are typically elevated on firm banks or occasionally on shrubs (Ehrlich et al. 1988). Most affected by channelization, water diversion and destruction of wetland habitat (BLM 1996).

4. EFFECT OF LIVESTOCK GRAZING: Heavy overgrazing of cattail marshes and other riparian wetlands reduces escape and nesting cover for the species. Generally habitats preferred by clapper rail are so wet that cattle cannot enter them without becoming mired. Cattle usually graze the edge of such habitats.

5. REASONS WHY SPECIES IS NOT BEING FULLY ANALYZED:

Within the Safford District Yuma clapper rail has been recorded from Picacho Reservoir in Pinal County (Arizona Game and Fish Dept. Heritage Data Management System 1996). This area is closed to livestock grazing.

6. EFFECT DETERMINATION

Since Picacho Reservoir is closed to grazing the current grazing management on public lands in Safford District will have **no effect** on Yuma clapper rail.

7. LITERATURE CITATIONS

Bureau of Land Management. USDI. 1996. Threatened and endangered species management and consultation. Course 1730-30. Handout - federally listed plants and animals update for Arizona.

Ehrlich, P.R., Dobkin, D.S., and Wheye, D. 1988. The birder's handbook. Simon and Schuster Inc. NY. 785 pp.

Fish

APACHE TROUT (*Oncorhynchus apache*)

1. T&E STATUS/CRITICAL HABITAT

Threatened without Critical habitat.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Found in high mountain streams on the Apache-Sitgreaves, Kaibab and Coronado National Forests. Also found on the Fort Apache Indian Reservation.

3. HABITAT REQUIREMENTS

Cold high-gradient streams.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of habitat leaving it less suitable or unsuitable for Apache trout (Platts 1991, Taylor et al 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to native fish. (Courteney and Moyle 1992, Miller 1961, Velasco 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

This species is located at locations on the watershed well above that managed by the Bureau. None of the streams in the district can support salmonids.

6. EFFECT DETERMINATION

No effect

7. LITERATURE CITATIONS

Courtenay, W.R. and P.B. Moyle 1992. Crimes against biodiversity; the lasting legacy of fish introductions, in Special Session 6 - Biological Diversity in Aquatic Management, J.E. Williams and R.J. Neves eds. Tans. 57th N. Am Wild. and Nat. Res. Conference. Wildlife Management Institute, Washington D.C.

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Platts, W.S. 1991. Livestock Grazing, pages 389-424, In Meehan, W.R. editor, influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society,
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U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Species of Arizona, U.S. Fish and Wildlife Service, Ecological Services Field Office, Phoenix, AZ

Velasco, A.L. 1994. Fish population sampling: Aravaipa Creek, Graham and Pinal Counties, Arizona. Report to U.S. Bureau of Land Management under Assistance agreement A950-A1-0010.

BEAUTIFUL SHINNER (*Cyprinella formosa*)

1. T&E STATUS/CRITICAL HABITAT

This fish was listed as endangered in 1984 with critical habitat (49 FR 34490). Critical habitat is within the boundaries of the San Bernardino NWR except for Leslie Creek.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

It is found in Leslie Creek, Swisshelm Mountains. This fish can also be found in ponds on the San Bernardino NWR (USFWS 1995, San Bernardino NWR files).

3. HABITAT REQUIREMENTS

Specific information on the habitat requirements of this fish is very limited. This species occurs mainly in small to medium streams with sand, gravel and rock substrates. It also will inhabit man-made ponds (USFWS 1991) where It is a mid-water column species which avoids roving into plant beds along pond margins, instead, preferring to stay in open water (USFWS 1995).

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of habitat leaving it less suitable or unsuitable for beautiful shiner (Platts 1991, Taylor et al 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to native fishes (Courteney and Moyle 1992, Miller 1961, Velasco 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Only a small fraction (<10%) of the watershed is land managed by the Bureau. In addition, no watershed degradation issue exists for Bureau lands that belong to the watershed that feeds Leslie Creek or Black Water Draw (Kevin Cobble, Pers. Comm. USFWS Refuge Manager). **No perennial stock tanks that could harbor non-native fishes occur on Bureau managed lands.**

6. EFFECT DETERMINATION

The proposed grazing management **may affect but is not likely to adversely affect** the beautiful shiner nor adversely modify or destroy critical habitat.

7. LITERATURE CITATIONS

Courtenay, W.R. and P.B. Moyle 1992. Crimes against biodiversity; the lasting legacy of fish introductions, in Special Session 6 - Biological Diversity in Aquatic Management, J.E. Williams and R.J. Neves eds. Tans. 57th N. Am Wild. and Nat. Res. Conference. Wildlife Management Institute, Washington D.C.

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COLORADO SQUAWFISH (*Ptychocheilus lucius*)

1. T&E STATUS/CRITICAL HABITAT

Endangered with Critical habitat.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Not in Safford District. Located in the upper Colorado River basin and re-established experimental non-essential populations in the Salt and Gila Rivers.

3. HABITAT REQUIREMENTS

This large minnow occurs in warm, swift, turbid waters of large to medium rivers in the Colorado River basin

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of habitat leaving it less suitable or unsuitable for squawfish (Platts 1991, Taylor et al 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to native fishes (Courteney and Moyle 1992, Miller 1961, Velasco 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Not located on Bureau managed lands nor with in watersheds affected by Safford District grazing allotments.

6. EFFECT DETERMINATION

No effect

7. LITERATURE CITATIONS

Courtenay, W.R. and P.B. Moyle 1992. Crimes against biodiversity; the lasting legacy of fish introductions, in Special Session 6 - Biological Diversity in Aquatic Management, J.E. Williams and R.J. Neves eds. Tans. 57th N. Am Wild. and Nat. Res. Conference. Wildlife Management Institute, Washington D.C.

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Velasco, A.L. 1994. Fish population sampling: Aravaipa Creek, Graham and Pinal Counties, Arizona. Report to U.S. Bureau of Land Management under Assistance agreement A950-A1-0010.

DESERT PUPFISH (*Cyprinodon macularius*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

The desert pupfish was listed as Endangered with critical habitat in 1985. Critical habitat was designated for the Quitobaquito pupfish population in Arizona and three streams in California (USFWS 1986).

b. T&E OCCURRENCE

Desert pupfish are known to occur in Howard Well in Graham Co., Cold Spring Seep in Graham Co., on BLM managed lands and Finley tank on the Audubon Research Ranch in Santa Cruz Co (Table 9).

Several ponds have been created at the source of natural springs located at the foot of the Gila Mountains including Tom Nephew Pond, Tom Niece Pond, and the 2 ponds at Porter Wash. These ponds are considered potential habitat.

c. T&E SURVEYS

No specific surveys are conducted to locate new populations of Desert pupfish. Most BLM waters have been surveyed for fishes in the past by universities, AGFD, USFWS and the BLM.

d. CONSULTATIONS AND CONFERENCES

Number	Name
2-21-88-F-114	Safford District RMP
2-21-89-F-018	Big Spring/Cold Spring Seep Stocking

e. REASON FOR SPECIES DECLINE

The introduction and spread of non-native predatory and competitive fishes, water impoundment, diversion, and pollution, ground water pumping, stream channelization, livestock grazing, and other forms of habitat modification have lead to the demise of this species (USFWS 1993, USFWS 1991).

2. RECOVERY PLANS

a. NAME

The Desert Pupfish Recovery Plan (USFWS 1993).

b. REQUIREMENTS/RECOMMENDATIONS

The objective of the recovery plan is to downlist the Colorado River form of desert pupfish and protect the other two subspecies. Delisting this species or any of the subspecies is not considered feasible in the foreseeable future.

In order to attain this objective the following actions are necessary: protection of natural populations, re-establishment of new pupfish populations, establishment of a refugium population of Quitobaquito pupfish, development of protocols for the exchange of genetic material between re-established pupfish populations, determination of factors affecting population persistence, and information and education to foster recovery efforts (USFWS 1993).

c. BUREAU STEPS TO ACCOMPLISH THE REQUIREMENTS

The recovery plan recommends that the Bureau be involved in the following actions: 1) identify ownership of natural habitats, 2) acquire natural habitats, 3) secure natural populations and habitats, 4) monitor and maintain populations, 5) re-establish populations, 6) develop habitat criteria for re-introductions, 7) acquire life history information, 7) provide information and education to general public about pupfish conservation. Actions concerning "natural" habitats and populations is largely directed to the BLM in California.

d.SAFFORD DISTRICT ACCOMPLISHMENTS TOWARD RECOVERY PLAN

The Bureau has been actively supporting the recovery plan activities outlined above in several ways. The BLM has a representative on the Recovery Team that wrote the recovery plan for this fish. Both Howard Well and Cold Spring Seep have been stocked with pupfish on BLM managed lands. The poor water conditions at Howard Well have been supplemented by restricting other uses of the water at the artesian source. Several ponds have been created at the source of natural springs located at the foot of the Gila Mountains including Tom Nephew Pond, Tom Niece Pond, and the 2 ponds at Porter Wash. Other sites for re-establishment of the desert pupfish exist and can be stocked once there is joint agreement between the AGFD, USFWS, and the BLM.

An MOU has been drafted to facilitate pupfish and topminnow reintroductions on Bureau lands in Arizona.

The Bureau holds water rights or is in the process of acquiring water rights for these pupfish populations.

Finley Tank is located on the Appleton-Whittell Biological Research Sanctuary in close proximity to BLM managed lands. The Phoenix RMP designated the BLM lands adjacent to the Sanctuary as an ACEC to be managed for research and to maintain the areas biologic integrity. The area is not grazed nor is it open to mineral or oil/gas location, leasing or sales. The BLM has entered into a cooperative agreement with the Audubon Society through a Memorandum of Understanding to manage the area for "the protection of the land and its ecological communities from disturbance." The research and resource protection on Public and private lands will benefit the pupfish and its habitat at Finley Tank.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

Much is known about the life history of this fish. This section and the habitat requirements section rely on reviews in Deacon and Minckley (1974), Schoenherr (1988), Moyle (1976), pupfish recovery plan (USFWS 1993), and the Services T&E species of Arizona, handbook (USFWS 1991). There are three subspecies of desert pupfish of which only two have been described. *Cyprinodon macularius* which occurs in the Colorado River Drainage and *Cyprinodon macularius eremus* which occurs in the Rio Sonoyta drainage (Quitobaquito Spring). This fish can live 1-2 years and is typically 1.5 inches in length. They are considered opportunistic omnivors in their food habits, eating small crustaceans, insects and other invertebrates; worms; mollusks; aquatic macrophytes and algae; and detritus. This fish may reach sexual maturity in as little as six weeks. Reproduction occurs when water temperatures exceed 20oC. Males are territorial and may spawn with several females. Care for eggs and young occurs inadvertently as a consequence of this fish's relentless habit of driving other male pupfish and other fish species from its territory.

b. RANGE OF SPECIES

The historic range for this fish encompassed the Rio Sonoyta, lower Gila River and extreme lower Colorado River drainages in Arizona, California and Mexico. The present range of natural populations in Arizona consists of Quitobaquito Spring on Organ Pipe Cactus National Monument. Reintroduction into their former range has been limited (USFWS 1991, 1993).

c. HABITAT REQUIREMENTS

This fish occupies shallow water of desert springs, creeks, small streams, cienegas, and the margins of large bodies of waters such as ponds, lakes and rivers. Natural habitats were typically, shallow and clear with soft bottoms. Aquatic vegetation and small invertebrates were abundant in such habitats. Desert Pupfish can tolerate abrupt changes in temperature and salinity that most other desert fishes cannot. It holds the record for surviving in the highest water temperature (112oF) and lowest oxygen level (<1 ppm). It can inhabit water with salinities nearly three times that of sea water. They can bury themselves in the muddy river bottom under severe environmental conditions or to escape predators. Pupfish eggs can survive dry weather by resting in the moist mud of a drying habitat for days, hatching when surface water returns. In locations with harsh water quality conditions, few other fishes shared their habitat. Under milder conditions this fish was likely separated from the adult fish of most other species due to its preference for shallow microhabitats. Desert pupfish and other native fish populations have been negatively impacted by exotic and non-native fish species (Minckley and Deacon 1991, Miller 1961, Minckley 1968).

To summarize the desert pupfish habitat requirements, this fish needs:
1) unpolluted water that can have wide variation in temperature and salinity,
2) shallow water with aquatic plants including algae which supports aspect of cover and food production, 3) channel morphology that prevent habitats from scouring severely which will remove this weak swimmer from its habitat, 4) habitat areas free of nonnative competitiors and predators, and 5) areas with slow currents and soft bottoms.

d. RATIONALE FOR POTENTIAL HABITAT

No unsurveyed potential habitat has been identified in the District. All potential habitat in Safford District is identified in section 1.b. T&E Occurrence in this document.

e. HABITAT CONDITION

No formal evaluation of riparian an aquatic habitat condition have been completed for these three sites.

At Howard Well the invasion of cattails and the purported decrease in the outflow of the artesian wells poses a risk to that pupfish population. Riparian development is lush and proceeding largely unaffected by human disturbance. The habitat also supports bullfrogs which are known to harm native fish populations.

One of the pools at Cold Spring Seep appears to be foul (stagnant and brackish) and does not support fish any longer. The cause of the failure of this pond is unknown. This is of concern since there is only one small pool left, and it is in close proximity to the one that failed. Riparian development at this site is a marsh or "cienega type" that appears stable and healthy.

The current habitat status at Finley Tank is unknown.

f. CURRENT CONDITION OF SPECIES AND POPULATIONS

(1.) RANGEWIDE

The desert pupfish, Colorado River subspecies, has been drastically reduced. This subspecies occurs naturally in only about 12 localities in the U.S and Mexico. None of these remaining natural populations are in Arizona. There are over 20 transplanted and aquaria populations including a population held at Dexter National Fish Hatchery for future re-establishment operations (USFWS 1993).

(2.) ACTION AREA

At Howard Well the population status is largely unknown but appears to be declining. Likely causes include the increased density of cattails, predation by bullfrogs and the decrease in the outflow of the artesian wells.

Cold Spring Seep is stable and supports a self-sustaining population of pupfish in one of the two ponds. The other now appears to be foul (stagnant and brackish). The cause of the failure of this pond is unknown.

The population status at Finley Tank is unknown. It is thought to be a population with fish from Quitobaquito, Organ Pipe National Park. Finley Tank is outside the historic range of this subspecies (Bagley et al. 1991).

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

The direct effects of cattle grazing are few. Fish eggs and Larvae can be damaged by trampling (Roberts and White 1992). Most fish larvae use shallow water along the margins of aquatic habitat and are weak swimmers at hatching. They are not likely to avoid being stepped on or ingested by livestock drinking water. Due to the fact that fish generally produce an abundance of eggs and larvae this impact is

likely to be negligible. Adult fish are generally more mobile and can avoid danger (Moyle and Cech 1982).

(2.) INDIRECT EFFECTS

Livestock grazing in the southwestern U.S. has been demonstrated to alter the species composition of communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main direct impacts from cattle are the grazing of plants and trampling of vegetation and soil (Platts 1991, Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands (Fleischner 1994, Platts 1991).

Water quality can be impaired by livestock grazing from nonpoint source pollution and at locations where large numbers of animals congregate. Cattle waste products can deteriorate water quality resulting in alteration of fish communities or fish kills. The impact generally comes from increased levels of ammonia (NH3) and Nitrite (NO2) and decreased levels of dissolved oxygen (O2) (Taylor et al.1989, Cross 1971). The effects of this type of pollution are increased under conditions of limited water supply such as in small ponds and springs. Sedimentation from erosion caused by livestock can impair spawning areas and reduce aquatic productivity which can affect food production (Ward 1992, Meehan 1991).

Riparian areas are important in providing quality habitat for this fish. Increased riparian vegetation has been documented to increase instream cover, overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and terrestrial invertebrate prey for fish (Platts 1991).

The soils along streams are vulnerable to erosion. Factors thought to be important to the destabilization of streams in the southwest are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Platts 1991, Fleischner 1994). Riparian soil and bank stability should be greater where more intensive management such as riparian fencing and rotational grazing are implemented (Skovlin 1984, Kovalchik and Elmore 1992, Platts 1991). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel destabilization is reduced significantly (Hendrickson and Minckley 1984, Meehan 1991, Kovalchik and Elmore 1992). This is important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream destabilization and concomitant loss of floodplain function (Hastings 1959, Bahre 1991).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney *et al*. 1993). The extent of watershed disfunction which is

induced or exacerbated by grazing or is, instead, the product of past management or natural climatic/geologic conditions is uncertain (Masters et al 1991, Bahre 1991, Hastings and Turner 1965). However, it is generally accepted that Watershed distubances from grazing have the potential for negative impacts which can affect fish habitat through excess sedimentation, lowered base flow, altered channel geometry, and erosion from exacerbated flood peaks (Meehan 1991, Debano and Schmidt 1989). Continuous yearlong livestock grazing can affect hydrologic function by reducing protective vegetation and litter and by soil trampling (Fleischner 1994, Platts 1991, Gifford and Hawkins 1976). Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates (Gifford and Hawkins 1976, Blackburn 1984, Orodho *et al*. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). These authors conclude that continuous yearlong grazing may result in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations.

Intensive grazing systems can lessen some of these impacts. The following primary benefits of better grazing systems include, less water erosion and sediment yield, increased water retention, and decreased soil erosion. The anticipated increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991).

Improved range condition due to improvement in plant density and vigor, hence potential production, 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 (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). Implementation of intensive grazing management such as rest rotation, Santa Rita and other systems is likely to improve range condition and watershed function but may not maximize them.

Even with an intensive grazing system, water infiltration rates on the watershed are likely to be impaired. Gifford and Hawkins (1976) found in their review of infiltration studies associated with grazing in the western U.S. that light to moderate grazing caused an average of 25 percent decline in infiltration on moderately porous soils and 65 percent decline with heavy grazing. They suggested that recovery of infiltration rates may exceed 10 years after rest from livestock activity (Gifford and Hawkins 1976). Studies by Dadkhah and Gifford (1980) 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. With a reduction in infiltration, it can be anticipated that increased run off volume and decreased recharge to local aquifers will occur (DeBano and Schmidt 1989). However, the work of Rich and Reynolds (1963) in

central Arizona indicated that 40 percent (moderate) utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing. The effects of grazing apparently vary by site according to such variables as soil type, non-forage related ground cover, cattle loading (number of livestock and grazing duration), long-term history of cattle use in the area, season of use, and time and space distributions of cattle (Gifford and Hawkins 1976).

The aggregate effects of other activities is likely to be additive to or magnify the effects of grazing to the watershed and the stream channels. These activities include, recreation, road placement and extent, past watershed degradation, loss of beaver activity, mining, pollution from abandoned mines, water diversions, past and present introductions of non-native fishes, off-road vehicle travel, riparian roads, ground water pumping, surface water diversion, and construction of diversion structures that act as barriers to fish migration.

Many watershed impacts (including grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by managers. Over 200 hundred years of human activity have resulted in an altered hydrograph and generally lowered water tables, disrupting the original flow conditions (Rabini 1992).

Finally, the loss of native fish may occur from the close proximity of stock waters contaminated with non-native fish and frogs to uncontaminated native fish habitats. Such permanent waters facilitate the easy transport of non-native fish and frogs to these habitats by recreationists attempting to expand fishing opportunities on their own initiative. Flooding can also move non-native fish and frogs from upstream impoundments to downstream habitats occupied by native fishes. This contamination of native fish habitat with non-native fish and frogs often results in the loss of individual native fish or, possibly, entire populations through predation or competition (Minckley and Deacon 1991, Miller 1961, Minckley 1968).

Most introductions of non-native fish have been done legally by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson Wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

There are six aspects of the proposed grazing management analyzed with relation to effects on desert pupfish and their habitat. permitted use; grazing systems;

utilization level; range improvements; riparian area management; and special management areas. The Results of this analysis are presented in Tables 9 and 9a for allotment occupied by desert pupfish.

(1.) DIRECT EFFECTS

Activities related to the grazing system could result in some limited direct effects. Stock watering or grazing could result in the loss of eggs or larvae from trampling or ingestion through consumption of water. Adult pupfish are likely to avoid direct injury from livestock. These direct effects are most likely to occur on the Day Mine Allotment. The other five activities are not likely to have a direct adverse effect on desert pupfish.

(2.) INDIRECT EFFECTS

While the possibility for damage to habitat and pollution from livestock waste does exist from permitted use and the grazing system employed, the present control of cattle at all three sites will largely prevent the possibility of any significant adverse effects to pupfish. No permanent stock ponds exist on the allotments with desert pupfish. The nearest allotment that has perennial water and fish is located over ten miles away on the Tanque allotment. No groundwater pumping or other grazing related activities occur near these pupfish sites. Watershed effects are likely to be very limited due to the naturally low cover that occurs, sandy soil type and presence of artesian water source.

Aggregate effects of other Bureau activities in these areas primarily come from recreation and roads. The potential impacts of these activities to pupfish include watershed disturbance, habitat degredation, trampling with the possibility of injury to pupfish, introduction of polluting substances, and movement of nonnative fishes into pupfish habitat.

(3.) DIRECT AND INDIRECT AFFECTS ON ALLOTMENTS

Only two grazing allotments on Safford District have been determined to have occupied habitat or otherwise affect desert pupfish. One population of pupfish in close proximity to BLM land may be affected by BLM grazing activities. One allotment may affect and is likely to adversely affect desert pupfish to a small extent (Tables 9 and 9a).

Finley Tank is located on private land with adjacent federal land managed for research. Finley Tank is excluded from grazing entirely, and there is no grazing on adjacent BLM managed lands. Therefore there is a beneficial effect to pupfish at Finley Tank.

On the **Day Mine Allotment** Cold Spring seep was stocked with pupfish after the

BLM had consulted with the USFWS in 1989. Grazing operations that may affect the pupfish population and habitat were analyzed in detail at that time. The grazing management has not changed since the consultation was completed.

The possible impacts of cattle grazing to pupfish at Cold Spring Seep include pollution from cattle wastes, consumption and trampling of plants that support a diverse and productive pupfish habitat, and the direct trampling of pupfish or ingestion of young fish by cattle. The likelihood of this occurring is small due to the very limited ephemeral grazing that occurs within the pasture with Cold Spring Seep. Past monitoring has shown little sign of cattle in or around Cold Spring Seep. This suggests that the present grazing system is having relatively small adverse effect on pupfish or pupfish habitat. Because the spring at this site has hydrobiid snails, it is almost certain that watershed effects from grazing and range improvements has not caused the spring to go dry in the past even when former stocking rates were much higher than today's permitted number. Furthermore, the spring is not located in a drainage that can be scoured by flood events. Therefore, the present impacts to the watershed from grazing are anticipate to have little effect on spring discharge or other habitat features. No permanent stock ponds or ground water pumping occurs on this allotment.

The pond at Howard Well (**Fan Allotment**) is fenced to exclude livestock and fed by an artesian water source. The pond is not connected to any surface drainages and does not collect surface runoff from storm events. Therefore the pond is isolated from any adverse impacts of cattle grazing to the watershed. Impacts from livestock grazing are likely to occur should cattle gain access to the exclosure around Howard Well by accident. In this case, an array of minor direct and indirect adverse effects are likely to occur to pupfish; these potential effects may occur from water quality degradation due to cattle waste products, habitat degradation from trampling and consumption of aquatic plants, and injury to pupfish from trampling and water consumption.

Aggregate effects of other activities include the maintenance of artesian ponds for sport fishing at Posey and Martin Well. The pond at Martin Well contains mosquito fish and sunfish but is not used for watering livestock. Roads that allow public access to pupfish habitat may present an adverse effect depending on the activities that the public engages in at the particular site (e.g. wading, transfer of non-native fish, bathing, etc.).

(4.) INTERRELATED AND INTERDEPENDENT ACTIONS

In theory, range improvements in the form of stock ponds may affect desert pupfish through the activity of fishing which is interrelated and interdependent with ponds in the area. However, no stock ponds with permanent water exist in close proximity to pupfish habitats. The Tanque allotment has permanent stock ponds on BLM lands located over 10 miles from Howard Well. These ponds capture runoff and discharge from Hot Well which is an artesian spring. The outflow of these ponds is

directed onto a flat away from existing drainages that feed the San Simon River. Due to the long distance and shallow unfishible nature of Howard Well, the BLM determined that there is no effect from range improvements for grazing on the Tanque allotment or other allotments with stock ponds. There are no known perennial stock ponds on BLM lands within 10 miles of the other pupfish populations and none of them drain into pupfish habitat.

(5.) INCIDENTAL TAKE AS APPLICABLE

A small amount of incidental take is possible should livestock walk through or drink from Cold Spring Seep. The take is likely to occur in the form of harassment, habitat disturbance that may impair cover and food production, and the loss of eggs and larval fish.

d. RATIONALE FOR EFFECTS ANALYSIS

There are six actions analyzed in this BE: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The results of this analysis are presented in Tables 9 and 9a for allotments occupied by desert pupfish.

Permitted use and utilization level were found not likely to adversely affect the continued existence of desert pupfish due to the fact that the grazing system allows cattle to use Cold Spring Seep for water and forage on an ephemeral basis. Site visits indicate that the riparian habitat is stable and healthy under the present grazing system and that few trampling impacts to riparian or aquatic habitat are apparent. Riparian development is lush at Howard Well which is excluded from grazing livestock.

Range improvements on the Fan Allotment have no effect on the water source or habitat at Howard Well. Range improvements at Cold Spring Seep may affect watershed function which ultimately affects spring discharge, but this is not likely to have a measurable or significant adverse effect.

There are no special management designationS on the Day Mine or Fan Allotments. The BLM adjacent to Finley Tank are designated as an ACEC.

The goals of the riparian policy are being met at both Cold Spring Seep and Howard Well which likely benefits habitat quality at Cold Spring Seep for desert pupfish but may result in reduced habitat quality at Howard Well through high densities of cattails which limits open water.

e. EFFECT DETERMINATION (SUMMARY)

The desert pupfish is known to occur at TWO locations (Cold Spring Seep, Howard Well) on the Safford District and may be affected by BLM actions at a third location (Finley Tank). The grazing system at Cold Spring Seep allows for livestock to access pupfish habitat during time when ephemeral grazing is permitted.

Through this evaluation it is the Bureau's determination that the proposed grazing management **may affect and is likely to adversely affect** the continued existence of the desert pupfish in the Safford District due to the activities on the Day Mine Allotment. Activities on the remainder of BLM allotments on the District pose no real threat to the continued existence of desert pupfish due to their remoteness from occupied pupfish habitats.

5. PROPOSED MITIGATION MEASURES

Follow the Biologic Opinion written for the stocking of Cold Spring Seep in 1989 (2-21-89-F-018). Build future stock ponds such that they are not maintained as perennial in order to discourage the spread of non-native fishes. Survey stock waters for non-native fishes and permanence. Where practicable, work with the USFWS and AGFD to replace non-native fish in ponds with pupfish or other native fishes in perennial stock ponds on Bureau managed lands. Maintain the Howard Well exclosure to minimize accidental cattle entry.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE ACTION AREA

Fishing ponds of various sizes and fish compositions occur on both private and State owned land. Some of these ponds are in close proximity to Desert pupfish habitat. These ponds pose a continual threat of contamination of pupfish habitat with exotic fishes. The draft of ground water in the region may be affecting artesian discharge in the San Simon Valley.

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New York

GILA TOPMINNOW (*Poeciliopsis occidentalis occidentalis*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

The Gila topminnow was listed as endangered in 1967 without critical habitat (USFWS 1967).

b. T&E OCCURRENCE

Populations occur at Cienega Creek, north east of Tucson, Pima County; Cold Spring Seep located near the town of Eden, Graham Co.; Big Spring and Watson Wash both located north of Thatcher, Graham Co. Martin Well, Graham Co.; Little Nogales Spring, Pima Co.; Nogales Spring, Pima Co. These topminnow sites are located on 6 different allotments (table 9).

Several ponds have been created at the source of natural springs located at the foot of the Gila Mountains including Tom Nephew Pond, Tom Niece Pond, and the 2 ponds at Porter Wash. These ponds are considered to be potential habitat.

c. T&E SURVEYS

No specific surveys are conducted to locate new populations of Gila topminnow. Most BLM waters have been surveyed for fishes in the past by universities, AGFD, USFWS and the BLM.

d. CONSULTATIONS/CONFERENCES

Number	Name
2-21-89-F-018	Stocking of Cold Spring Seep and Big Spring
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-90-F-196	Cienega Creek Diversion
2-21-93-I-430	Cienega Creek Headcut Repair and Fencing
2-21-90-I-150	Cienega Creek Pasture Fencing
2-21-90-f-196	Cienega Creek Diversion Dam and Repair
2-21-91-I-170	Cienega Creek Earthday Project

e. REASON FOR SPECIES DECLINE

The reasons for decline of this fish include past dewatering of springs and marshlands, impoundment, channelization, diversion, regulation of flow, land

management practices that promote erosion and arroyo formation, and the introduction of predacious and competing non-native fishes such as mosquitofish (Minckley 1985, Miller 1961). The recovery plan cites livestock grazing on Public lands a threat to the topminnows continued existence (USFWS 1983).

2. RECOVERY PLANS

a. NAME

Gila and Yaqui topminnow recovery plan. A revised plan has been drafted and is forthcoming from the USFWS.

b. REQUIREMENTS/RECOMMENDATIONS

The goal of the plan is remove the Gila and Yaqui topminnow from the Federal list by restoring them as secure, stable, self-sustaining species through out a significant portion of their range.

Actions needed include monitoring and management of natural, reclaimed and reintroduced populations; removal of Gambusia affinis and other exotic fishes from topminnow habitats, and prevention of their reintroduction; reintroduce topminnow into their historic range; acquisition of management rights or protective agreements for natural populations located on privately owned land; and research into topminnow/mosquitofish, and topminnow/multiple use management relationships.

c. BUREAU STEPS TO ACCOMPLISH THE REQUIREMENTS

The recovery plan recommends that the Bureau be involved in the following actions: 1) develop habitat management plans that include the conservation of Gila topminnow, 2) conduct law enforcement concerning the ESA and land protection, 3) obtain cooperative agreements for reintroduction on BLM land in AZ and NM, 4) survey for and select potential reintroduction sites, 5) prepare selected sites for reintroduction, 6) develop habitat guidelines for reintroductions, and 7) study topminnow/ multiple use management relationships.

d.SAFFORD DISTRICT ACCOMPLISHMENTS TOWARD RECOVERY PLAN

An MOU has been drafted to facilitate pupfish and topminnow reintroductions on Bureau lands in Arizona.

Legal reintroduction have occurred in Cold Spring Seep and Big Spring. An illegal reintroduction has occurred in Watson Wash. Several reintroduction sites stand

ready for stocking with topminnow should agencies become able to coordinate their efforts. Several ponds have been created at the source of natural springs located at the foot of the Gila Mountains including Tom Nephew Pond, Tom Niece Pond, and the two ponds at Porter Wash. Other sites for re-establishment of the Gila topminnow exist and can be stocked once there is joint agreement between the AGFD, USFWS, and the BLM.

In 1992 approximately 1/4 mile of Upper Empire Gulch was fenced from livestock grazing and revegetated with riparian trees. This perennial stream segment is located about three miles from Cienega Creek and has a high potential for supporting a new population of topminnow.

An aquarium is set up in the Tucson office which supports a back-up population of topminnow from Cienega Creek and provides public information that aids in public support of recovery efforts.

The public lands within the Empire-Cienega Resource Conservation Area were acquired through private land exchange in 1988. Interim management guidelines for this area were developed to preserve, protect, and enhance the multiple-use values of the Empire-Cienega RCA properties, including the extensive riparian areas along Cienega Creek.

Additional lands in the Empire -Cienega RCA were acquired in 1992. This resulted in Nogales Spring, Little Nogales Spring and another quarter mile of perennial flowing Cienega Creek coming into Federal ownership and management.

In 1990, the BLM constructed a temporary sand bag dam to prevent base flow of Cienega Creek from going down a diversion canal built in the 1970's.

In 1990, 4 pastures were fenced to exclude livestock from the central portion of Cienega Creek and its tributary Mattie Canyon. It was determined to be beneficial for the Gila topminnow informal consultation.

A riparian stabilization project was prepared in consultation with the Service and executed in 1991. This project included the stabilization of upland areas with erosion problems. The area was disturbed by past road construction where the road crosses the creek. The area was planted with riparian trees and seeded with native grasses.

Plans to return flows to an interrupted stream segment along Cienega Creek were developed but have not been implemented. The BLM and the USFWS agree that rehabilitation of the approximately 2 mile segment would better be served by re-establishing the original creek function by mimicking conditions found in old aerial photos rather than building a concrete control structure as formerly proposed.

Ultimately, this will add 2 miles of habitat for the Cienega Creek population to colonize which will expand the population.

The Bureau holds water rights or is in the process of acquiring water rights for these topminnow populations and is currently attempting to convert the water right for Cienega Creek to an instream flow type right.

In 1994 the BLM implemented a project to stabilize an erosion head-cut on Cienega Creek near Spring Water Canyon. The erosion was started during the winter flooding of 1993. The use of log spreaders and check dams has not completely stopped the progress of this erosion which poses a threat to 2.5 miles of topminnow habitat.

The BLM continues to pursue land acquisitions in the watershed which will benefit the ecosystem by improving its ability to better manage the watershed to benefit fish and wildlife. The acquisition program has put new lands into public ownership with aquatic resources that provide opportunities for expanding the distribution of the Cienega Creek population of Gila topminnow.

A stock pond survey of the watershed was conducted in 1991 to determine the potential threat nearby sources of non-native fishes.
This was done to propose steps to increase the security of The Cienega Creek population.

A stream gage was installed in 1995 to get accurate base flow records and to monitor flood events. This will help the agencies understand flood/fish habitat relationships.

In consultation with the Service, the Bureau implemented an interim grazing plan that excluded 3.5 additional miles of creek. Only lower Empire Gulch is grazed during the growing season. All other portions of Cienega Creek on the Empire-Cienega allotment (6090) are grazed only during the winter. This provides maximum habitat stability for this valuable topminnow population by eliminating the heavy impact to banks and vegetation from summer grazing along the creek.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

Gila topminnow belong to a group of live-bearing fishes within the family POECILIIDAE which includes the familiar guppy. Males are smaller than females, rarely greater than 1 inch, while females are larger, reaching 2 inches. Body coloration is tan to olivaceous, darker above, lighter below, often white on the belly. Breeding

males are usually darkly blackened, with some golden coloration of the midline, and with orange or yellow at base of the dorsal fin. Fertilization is internal and sperm packets are stored which may fertilize subsequent broods. The brood development time is 24 to 28 days. Two to 3 broods in different stages develop simultaneously in a process known as superfetation. Gila topminnow give birth to 1-31 young per brood (Schoenherr 1974). Larger females produce more offspring (Minckley 1973).

Gila topminnow mature a few weeks to many months after birth depending on when they are born and water temperature. They breed primarily from March to August, but some pregnant females occur throughout the year (Schoenherr 1974). Some young are produced in the winter months. Minckley (1973) and Constantz (1980) reported that Gila topminnow eat bottom debris, vegetation, amphipods, and insect larvae when available.

b. RANGE OF SPECIES

In the United States, the Gila topminnow has a historic range that included the Gila River and tributaries from New Mexico to the Colorado River. Current distribution includes seven populations found with in the Safford District (USFWS 1984, Bagley et al. 1991).

c. HABITAT REQUIREMENTS

Gila topminnow and many other poeciliids can tolerate a wide variety of physical-chemical conditions. They are good colonizers in part because of this tolerance and in part because a single gravid female can start a population (Meffe and Snelson 1989). Minckley (1969a, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists. Simms and Simms (1992) found the densities of Gila topminnows in Cienega Creek, Pima Co., Arizona, to be greater in pool, glide and backwater habitats and less dense in marsh, riffle, chute, cascade and fall habitats. They occurred more frequently over sand substrates than over other categories of substrates.

Gila topminnows are known to occur in streams fluctuating from 6 to 37oC, pH from 6.6 to 8.9, dissolved oxygen levels of 2.2 to 11 mg/l, and can tolerate salinities approaching those of sea-water (Meffe et al. 1983). Topminnows can burrow under mud or aquatic vegetation when water levels decline (Minckley and Deacon 1974, Meffe et al. 1983). Sonoran topminnows regularly inhabit spring heads with high loads of dissolved carbonates and low pH (Minckley et al. 1977, Meffe 1983b, Meffe and Snelson 1989). This factor has helped protect small populations of topminnows as mosquitofish are usually rare or absent under these conditions. Topminnow and other native fish populations have been negatively impacted by exotic and non-native fish species (Minckley and Deacon 1991, Miller 1961, Minckley 1968).

To summarize the Gila topminnow habitat requirements, this fish needs 1) unpolluted water that can have wide variation in temperature, pH and salinity, 2) shallow water with abundant aquatic plants including algae which supports aspect of cover and food production, 3)channel morphology that prevent habitats from scouring severely which will remove this weak swimmer from its habitat, 4) habitat areas free of nonnative competitors and predators, and 5) areas with slow currents and soft bottoms.

d. RATIONALE FOR POTENTIAL HABITAT

No unsurveyed potential habitat has been identified in the District. All potential habitatin Safford District is identified in section 1b. T&E Occurrence of this document.

e. HABITAT CONDITION

Habitat conditions are generally good at Cienega Creek as indicated by a habitat inventory in 1989 and subsequent annual population sampling. Riparian area function ranges from Not functioning where a diversion re-routes water to proper functioning condition (BLM 1993). The quantity of riparian habitat in proper functioning condition is 8.1 miles or 41 percent of the stream and its tributaries (Appendix 4). Riparian Area Condition Evaluations in 1989 and 1994 indicate that riparian area health is improving and banks are generally stable. The Creek has areas that are not functioning well such as the erosion associated with a headcut that threatens to channelize 2.5 miles of creek and the dewatering of a two-mile reach due to an old diversion canal. The watershed was evaluated for erosion and ground cover in 1974 and 1991. The watershed was found to be in satisfactory condition on both occasions. Vegetative ground cover comprised 49 and 57 percent while bare ground was 17 and 23 percent in 1974 and 1991 respectively. However, livestock grazing on the Empirita allotment (62100) is largely uncontrolled in riparian and aquatic habitats for about a quarter of a mile of topminnow habitat at the tail end of the perennial portion of upper Cienega Creek. The condition of this habitat is tenuous due to disturbance of stream banks and warm season grazing of riparian plants.

Nogales and Little Nogales Springs are subject to grazing. Water in the area is limited to these and other natural springs which receive impacts from grazing. Habitat conditions are largely unknown and not monitored. No topminnow have been detected at these sites since 1989 (Doug Duncan, USFWS, pers. comm.).

Martin Well is used as a water source for livestock. The habitat is large and deep enough to limit impacts to the shoreline. The largest habitat problem stems from sunfish and mosquitofish contamination. No Gila topminnow have been detected a Martin Well since 1989 (Doug Duncan, USFWS, pers. comm.).

One of the pools at Cold Spring Seep appears to be foul (stagnant and brackish)

and does not support fish any longer. The cause of the failure of this pond is unknown. This is of concern since there is only one small pool left, and it is in close proximity to the one that failed. This is of concern since there is only one small pool left, and it is in close proximity to the one that failed. Riparian development at this site is a marsh or "cienega type" that appears stable and healthy.

Watson Wash is an artesian outflow from drilling that occurred several decades ago. No formal riparian evaluation has been completed for proper functioning condition; however, the riparian development is diverse and lush. The outflow is used by bathers for wading and washing. The stream is less than 1/4 mile long and is contaminated by soaps and other assorted cleaning agents. In addition both red shiners and guppy occur with topminnow. These fish can prey on, displace or spread disease to Gila topminnow. The bathers have built an unauthorized hot tub at the outflow of the spring which has increased its popularity with the local public.

Big Spring was washed out by a large monsoon flood event in 1990. The large pool habitat behind the small concrete dam is largely filled in with sediment. The remaining few hundred yards of habitat is very shallow and lacks much habitat diversity as it is mainly shallow riffle. The watershed is flashy and sends scouring floods down the incised channel. Riparian development is sparse and unstable at this site. The remaining habitat appears to be of marginal value to topminnow as it is extremely shallow and unstable.

f. CURRENT CONDITION OF SPECIES AND POPULATIONS

(1.) RANGEWIDE

Currently, there are nine remaining natural topminnow sites (Bagley et al 1991) plus two others that are likely extirpated (AGFD 1994). Only three sites remain uncontaminated by mosquitofish (Abarca et al. Jan. 1993 Draft Gila Topminnow Recovery Plan, Arizona Game and Fish Department). Of the 300+ reintroductions conducted by the AGFD and others, only 21 remain extant (AGFD 1994, Brown and Abarca 1992). The prognosis for this species is not good (Hendrickson and Brooks 1991).

(2.) ACTION AREA

Cienega Creek is one of the last places in Arizona supporting an intact native fish fauna which is uncontaminated by exotic fish. The creek provides habitat essential for the survival for the Gila topminnow. In addition, Cienega Creek supports by far the largest population of topminnow in the United States. A fall population estimate for Cienega Creek was approximately 2.5 million topminnow, conservatively, for 6.5 miles of perennial habitat sampled. Another 1.1 miles of topminnow habitat in Mattie Canyon

and 0.9 miles in Empire Gulch, tributaries to Cienega Creek were not included in this estimate. Some areas where warmer groundwater discharged held extremely high densities of topminnow (566/sq. meter) (Simms and Simms 1992).

The stream segment below the narrows has not been part of the annual monitoring, but topminnow are usually observed there in abundance.

Surveys for fish at Nogales and Little Nogales Springs have not produced any Gila topminnow since 1989 (Doug Duncan, USFWS, pers. comm.). An on-site visit shortly after the Bureau acquire these springs indicate that habitat appears to be in good condition.

At Martin Well, no topminnow have been detected since 1989 when a single topminnow was caught. The source of these fish is unknown (Doug Duncan, USFWS, pers. comm.). It is likely that this illegally introduced population has been extirpated by the large mosquitofish population.

Despite the contamination of its habitat with exotic fishes and pollutants, the Gila topminnow at Watson Wash continue to thrive. Visits to the area have revealed large numbers of topminnow readily visible along the water course.

Topminnow have not been detected at Big Spring since 1991.

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

The direct effects of cattle grazing are few. young fish can be damaged by trampling (Roberts and White 1992). Small and adult Gila topminnow use shallow water along the margins of aquatic habitat and are weak swimmers at birth. These newborn, and perhaps, even adult topminnow are not likely to totally avoid being stepped on or ingested by livestock drinking water. Due to the fact that topminnow generally produce an abundance of liveborn young, this impact is likely to be negligible.

(2.) INDIRECT EFFECTS

Livestock grazing in the southwestern U.S. has been demonstrated to alter the species composition of communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main direct impacts from cattle are the grazing of plants and trampling of vegetation and soil (Platts 1991, Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands (Fleischner 1994, Platts 1991).

Water quality can be impaired by livestock grazing from nonpoint source pollution and at locations where large numbers of animals congregate. Cattle waste products can deteriorate water quality resulting in alteration of fish communities or fish kills. The impact generally comes from increased levels of ammonia (NH_3)and Nitrite (NO_2) and decreased levels of dissolved oxygen (O_2) (Taylor et al.1989, Cross 1971). The effects of this type of pollution are increased under conditions of limited water supply such as in small ponds and springs. Sedimentation from erosion caused by livestock can impair spawning areas and reduce aquatic productivity which can affect food production (Ward 1992, Meehan 1991).

Riparian areas are important in providing quality habitat for this fish. Increased riparian vegetation has been documented to increase instream cover, increase overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and increase terrestrial invertebrate prey for fish (Platts 1991).

The soils along streams are vulnerable to erosion. Factors thought to be important to the destabilization of streams in the southwest are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Platts 1991, Fleischner 1994). Riparian soil and bank stability should be greater where more intensive management such as riparian fencing and rotational grazing are implemented (Skovlin 1984, Kovalchik and Elmore 1992, Platts 1991). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel destabilization is reduced significantly (Hendrickson and Minckley 1984, Meehan 1991, Kovalchik and Elmore 1992). This is important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream destabilization and concomitant loss of floodplain function (Hastings 1959, Bahre 1991).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney *et al*. 1993). The extent of watershed disfunction which is induced or exacerbated by grazing or is, instead, the product of past management or natural climatic/geologic conditions is uncertain (Masters et al 1991, Bahre 1991, Hastings and Turner 1965). However, it is generally accepted that watershed disturbances from grazing have the potential for negative impacts which can effect fish habitat through excess sedimentation, lowered base flow, altered channel geometry, and erosion from exacerbated flood peaks (Meehan 1991, Debano and Schmidt 1989). Continuous yearlong livestock grazing can affect hydrologic function by reducing protective vegetation and litter and by soil trampling (Fleischner 1994, Platts 1991, Gifford and Hawkins 1976). Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates

(Gifford and Hawkins 1976, Blackburn 1984, Orodho *et al*. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). These authors conclude that continuous yearlong grazing may result in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations.

Intensive grazing systems can lessen some of these impacts. The following primary benefits of better grazing systems include, less water erosion and sediment yield, increased water retention, and decreased soil erosion. The anticipated increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991).

Improved range condition due to improvement in plant density and vigor, hence potential production, 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 (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). Implementation of intensive grazing management such as rest rotation, Santa Rita and other systems is likely to improve range condition and watershed function but may not maximize them.

Even with an intensive grazing system, water infiltration rates on the watershed are likely to be impaired. Gifford and Hawkins (1976) found in their review of infiltration studies associated with grazing in the western U.S. that light to moderate grazing caused an average of 25% decline in infiltration on moderately porous soils and 65% decline with heavy grazing. They suggested that recovery of infiltration rates may exceed 10 years after rest from livestock activity (Gifford and Hawkins 1976). Studies by Dadkhah and Gifford (1980) show that trampling by livestock causes a decline in infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50 %. With a reduction in infiltration, it can be anticipated that increased run off volume and decreased recharge to local aquifers will occur (DeBano and Schmidt 1989). However, the work of Rich and Reynolds (1963) in central Arizona indicated that 40% (moderate) utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing. The effects of grazing apparently vary by site according to such variables as soil type ,non-forage related ground cover, cattle loading (number of livestock and grazing duration), long-term history of cattle use in the area, season of use, and time and space distributions of cattle (Gifford and Hawkins 1976).

The aggregate effects of other activities is likely to be additive to or magnify the effects of grazing to the watershed and the stream channels. These activities include, recreation, road placement and extent, past watershed degradation, loss of beaver

activity, mining, pollution from abandoned mines, water diversions, past and present introductions of non-native fishes, off-road vehicle travel, riparian roads, ground water pumping, surface water diversion, and construction of diversion structures that act as barriers to fish migration.

Many watershed impacts (including grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by managers. Over 200 hundred years of human activity have resulted in an altered hydrograph and generally lowered water tables, disrupting the original flow conditions in many areas(Rabini 1992).

Finally, the loss of native fish may occur from the close proximity of stock waters contaminated with non-native fish and frogs to uncontaminated native fish habitats. Such permanent waters facilitate the easy transport of non-native fish and frogs to these habitats by recreationists attempting to expand fishing opportunities on their own initiative. Flooding can also move non-native fish and frogs from upstream impoundments to downstream habitats occupied by native fishes. This contamination of native fish habitat with non-native fish and frogs often results in the loss of individual native fish or, possibly, entire populations through predation or competition (Minckley and Deacon 1991, Miller 1961, Minckley and Deacon 1968).

Most introductions of non-native fish have been done legally by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

b. ANALYSIS OF EFFECTS BY PROPOSED ACTION

There are six aspects of the proposed grazing management analyzed with relation to effects on Gila topminnow and their habitat. permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The Results of this analysis are presented in tables 10 and 10a for allotments occupied by Gila Topminnow.

(1.) DIRECT EFFECTS

Activities related to the grazing system and range improvements could result in some limited direct effects to topminnow. Stock watering or grazing could result in the loss of topminnow from trampling or ingestion through consumption of water. Adult topminnow are more likely to avoid direct injury from livestock than newly born fish.

These direct effects are most likely to occur on the Day Mine, Empire-cienega, and Empirita. The other 5 activities are not likely to have a direct adverse effect on Gila topminnow.

(2.) INDIRECT EFFECTS

While the possibility for damage to habitat and pollution from livestock waste does exist from permitted use and the grazing system employed, the presence of flowing water, limited stocking levels or control of cattle will largely prevent the possibility of severe adverse effects such as a fish kill. However, some small level of fish mortality from trampling and water consumption can be anticipated at some sites which can be attributed to the grazing system. Stock ponds with perennial water exist on the Empire-cienega allotment. Watershed effects are likely to be very limited due to the naturally low cover that occurs, sandy soil type and presence of artesian water source in most cases and by adequate ground cover on the watershed in others. However, Some loss of soil infiltration may have occurred from past and present grazing. The draught policy has been implemented when necessary which protects plant cover from overgrazing during extended drought periods.

Soil disturbance would increase in several ways as a result of the past and proposed development of the range improvements in the Cienega Creek Watershed. Initial minor disturbance caused by vehicle movement to and from the range improvement sites could occur. The actual construction of earthen reservoirs, and water pipeline would create a temporary disturbance through soil movement and compaction. 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 (months) or long periods (years). The disturbance of these sites would increase the opportunity for erosion and sediment transport. This impact would affect up to 2 acres per existing and proposed water development. Approximately two acres would be disturbed for every mile of water pipeline constructed. Construction of the stock tanks would disturb about five acres of surface soils. The disturbance associated with the pipelines has been temporary, and has naturally revegetated. About half the disturbance associated with the stock tanks would be permanent due to water storage, soil compaction, and trampling of vegetation by livestock (Andrew 1988). This impact to the Cienega Creek watershed would be largely continuous and hard to evaluate. Small amounts of water would be pumped from the local aquifer which may have a small effect on surface flows in topminnow habitat.

Aggregate effects of other Bureau activities in these areas primarily come from recreation and roads. Vehicle travel in Cienega Creek and road maintenance can affect fishery resources. Topminnow can be injured or displaced or crushed by vehicle activity. Recreation activity along Cienega Creek and Watson Wash such as wading,

bathing, swimming and walking up and down the creek probably displace fish. Recreationist sometimes release pollutants while bathing or move nonnative fish to topminnow sites (e.g. Watson Wash). These activities have an adverse impact of unknown extent.

Adjacent National Forest Lands are managed for multiple use. The primary activities that might affect topminnow habitat are recreation, roads for travel and grazing which can affect watershed function which, in turn, can affect topminnow habitat, especially in Cienega Creek.

(3.) DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS

Six grazing allotments on Safford District have been determined to have occupied habitat or otherwise affect Gila topminnow. One allotment may affect and is likely to adversely affect topminnow(table 10 and 10a).

On the **Empire-Cienega Allotment**, the USFWS has already been consulted concerning grazing management. The Cienega Creek watershed was surveyed for watershed condition and found to be in satisfactory condition. The present stocking rate and 20-60% utilization standard is providing enough watershed vegetative cover to produce a satisfactory rating. However, in this allotment which has desert grassland, range condition and hydrologic function may not improve without fire disturbance. Shrubs may increase at the loss of grass cover (McClaran 1995). This change in vegetation coupled with some anticipated reduction in soil infiltration rates may affect watershed function which could have adverse impact to fish habitat through increased flood peaks and decreased base flow. If these effects do occur in this watershed, the impact is anticipated to be small. While the possibility for damage to habitat and pollution from livestock waste does exist from the winter grazing system employed on the north end of Cienega Creek; riparian fencing, and the presence of flowing water in Cienega Creek will largely prevent the possibility of severe adverse effects such as a fish kill. Range improvements including Water gaps and crossing lanes on Cienega Creek will likely result in some small level of fish mortality from trampling and ingestion of fish with water consumption; similar effects are anticipated from the winter grazing at the north end of Cienega Creek. Minor pumping of ground water occurs adjacent to Cienega Creek with little likelihood of affecting surface water flows in Cienega Creek.

On the **Empirita Allotment** some small level of fish mortality from trampling and water consumption can be anticipated on the one quarter mile of Cienega Creek, Nogales and Little Nogales springs which are exposed to warm season grazing. While the possibility for damage to habitat and pollution from livestock waste does exist from permitted use and the grazing system employed, the presence of flowing water on Cienega Creek, Nogales and Little Nogales springs will largely prevent the possibility of severe adverse effects such as a fish kill. The Empire-cienega portion of the Cienega

Creek watershed was surveyed for watershed condition and found to be in satisfactory condition. The Empirita allotment appears to be in similar condition. Watershed impacts are likely to be similar to those described for the Empire-cienega allotment.

On the **Day Mine Allotment,** Cold Spring seep was stocked with topminnow after the BLM had consulted with the USFWS in 1989. Grazing operations that may affect this topminnow population and habitat were analyzed in detail at that time. This Biological Opinion covers the grazing effects on Gila topminnow. The grazing management has not changed since the consultation was completed. The Day mine allotment was judged to be in satisfactory condition. Where data is lacking range condition is determined by a combination of range condition and professional judgement.

The possible impacts of cattle grazing to topminnow at Cold Spring Seep include pollution from cattle wastes, consumption and trampling of plants that support a diverse and productive topminnow habitat, and the direct trampling of Gila topminnow or ingestion of young fish by cattle. The likelihood of this occurring is small due to the very limited ephemeral grazing that occurs within the pasture with Cold Spring Seep. Past monitoring has shown little sign of cattle in or around Cold Spring Seep. This suggests that the present grazing system is having a relatively small adverse effect on topminnow or topminnow habitat. Because the spring at this site has hydrobiid snails, it is almost certain that watershed effects from grazing and range improvements has not caused the spring to go dry in the past even when former stocking rates were much higher than today's permitted number. Furthermore, the spring is not located in a drainage that can be scoured by flood events. Therefore, the present impacts to the watershed from grazing are anticipated to have little effect on spring discharge or other habitat features. No permanent stock ponds or ground water pumping occurs on this allotment.

Bryce Allotment was judged to have unsatisfactory watershed conditions. Where data is lacking range condition is determined by a combination of range condition and professional judgement (See table). The habitat at Big Spring may be affected to a greater extent from watershed impacts until watershed conditions improve. Watershed effects from grazing are likely to be very limited due to the naturally low cover that occurs, sandy soil type. Big spring is located inside a livestock exclosure which limits livestock impacts. No direct or indirect impacts from livestock grazing are likely to occur unless cattle gain access to the exclosure accidentally. In this case, an array of minor direct and indirect adverse effects are likely to occur to Gila topminnow habitat; these potential effects may occur from water quality degradation due to cattle waste products, habitat degradation from trampling and consumption of aquatic plants, and injury to young topminnow from trampling and water consumption. Future springbox repair at Big Spring is likely to disturb topminnow habitat.

The **Kimball Community Allotment** is not grazed but is permitted for

ephemeral use by livestock. Watershed effects of livestock grazing are likely to be very limited due to the naturally low cover that occurs, sandy soil type and presence of artesian water source.

Martin Well on the **Fan Allotment** is not likely to have a viable topminnow population due to the large mosquitofish population that is likely to have eliminated them. Therefore, any grazing effects outlined here are likely to be largely academic.

The pond at Martin Well is fenced from livestock and fed by an artesian water source. The pond is not connected to any surface drainages and does not collect surface runoff from storm events. Therefore the pond is isolated from any adverse impacts of cattle grazing to the watershed. No direct or indirect impacts from livestock grazing are likely to occur unless cattle gain access to the exclosure accidentally.

Aggregate effects of other federal actions include the maintenance of artesian ponds for sport fishing including Martin Well. Martin Well and Posey Well support mosquitofish and a variety of other nonnative fishes that are likely to have an adverse effect on topminnow and likely already have eliminated the illegally stocked topminnow. Roads that allow public access to topminnow habitat may present an adverse effect depending on the activities that the public engages in at the particular site (e.g. wading, transfer of nonnative fish, bathing, etc.).

(4.) INTERRELATED AND INTERDEPENDENT EFFECTS

In theory, range improvements in the form of stock ponds may affect Gila topminnow through the activity of fishing which is interrelated and interdependent with ponds in the area. Range improvements are likely to pose an adverse effect on the Empire-Cienega. Stock ponds with perennial water do exist on the Empire-cienega allotment which can lead to the establishment and spread of nonnative fishes which can reduce or eliminate the Cienega Creek topminnow population.

Many of the stock tanks are known to dry up annually on the Cienega Creek watershed. Some stock ponds on the Empire-Cienega have the potential to hold exotic fish and bullfrog. Subsequent flooding or fishermen attempting to increase their recreation opportunity on their own could move the exotic fish and bullfrogs into occupied habitat with highly detrimental impacts to topminnow.

(5.) INCIDENTAL TAKE AS APPLICABLE

A small amount of incidental take is possible as livestock walk through or drink from topminnow habitat. The take is likely to occur in the form of harassment, habitat disturbance that may impair cover and food production, and the loss of adult and young fish inhabiting stream margins. Incidental take from implementation of the proposed

grazing management could occur from livestock trampling and watering livestock in topminnow habitat.

c. RATIONALE FOR EFFECTS ANALYSIS

There are six actions analyzed in this BE: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The results of this analysis are presented in tables 10 and 10a for allotments occupied by Gila topminnow.

Permitted use was not found to be likely to adversely affect Gila Topminnow on any of the allotments analyzed. Instead the grazing system and lack of implementation of riparian policy were responsible for any adverse effects to topminnow.

Utilization level may affect watershed cover which can affect topminnow habitat. However, the topminnow sites analyzed were either fed by artesion springs isolated from watershed drainages or had satisfactory watershed condition.

The grazing system allows cattle to use Cold Spring Seep for water and forage on an ephemeral basis. Site visits indicate that the riparian habitat is stable and healthy under the present grazing system and that few trampling impacts to riparian or aquatic habitat are apparent. The area around seep is used ephemerally which subjects topminnow habitat to infrequent trampling and watering of livestock. Cienega Creek is grazed on both the Empire-cienega and Empirita allotments which allows livestock to use topminnow habitat for watering and forage. This is likely to have adverse impacts associated with some topminnow mortality and habitat alteration, especially on the Empirita allotment which does not have a restricted use of topminnow habitat.

Range improvements at Cold Spring Seep may affect watershed function which ultimately affects spring discharge, but this is not likely to have a measurable or significant adverse effect due to the small number of range improvements. Stock ponds; riparian crossing lanes; and watering gaps on Cienega Creek are likely to have an adverse effect on Gila topminnow through the risk of nonnative fish contamination and some incidental topminnow mortality and habitat alteration. Future springbox repair for a livestock water in the area at Big Spring is likely to disturb topminnow habitat.

There are no special management designations on any of the allotments analyzed.

The goals of the riparian policy are being met at topminnow sites on all allotments except the Empirita and Empire-cienega. Restrictions on grazing through implementation of the riparian policy has not occurred yet on the Empirita allotment. This has resulted in warm season grazing that can damage habitat and cause topminnow mortality through trampling or ingestion.

d. EFFECT DETERMINATION (SUMMARY)

The Gila topminnow is known to or may occur at seven locations on the Safford District: Cienega Creek, Nogales Spring, Little Nogales Spring, Martin Well, Watson Wash, Cold Spring Seep, and Big Spring. The Grazing system at Cold Spring Seep, Cienega Creek, Nogales, and Little Nogales springs allows for livestock to access topminnow habitat. This access can lead to a some degree of topminnow mortality and habitat damage. Because the riparian policy and appropriate grazing system has not been implemented on the Empirita allotment, livestock can access Nogales Spring, Little Nogales Spring and a short reach of Cienega Creek during the warm season when the most dramatic habitat damage can occur. Future Springbox repair at Big Spring for livestock watering will likely disturb topminnow habitat.

Through this evaluation it is the Bureau's determination that the proposed grazing management **may affect and is likely to adversely affect** the continued existence of the Gila topminnow in the Safford District based on activities in the Day Mine, Empire-Cienega, and Empirita allotments. Activities on the remainder of BLM allotments in the district pose no real threat to the continued existence of Gila topminnow due to their remoteness from occupied topminnow habitats.

5. PROPOSED MITIGATION

Follow the Biological Opinions written for the stocking of Cold Spring Seep and Big Spring (2-21-89-F-018) and the interim grazing plan on Cienega Creek (2-21-95-F-177). Build future stock ponds such that they are not maintained as perennial in order to discourage the spread of non-native fishes. Survey stock waters for non-native fishes and permanence. Where practicable, work with the USFWS and AGFD to replace non-native fish in ponds with topminnow or other native fishes in perennial stock ponds on Bureau managed lands. Maintain the Martin Well exclosure to minimize accidental cattle entry and replace nonative fish with native fishes. Implement prescribed fire on grassland vegetation types in the Cienega Creek watershed to improve watershed condition.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Stock ponds on private land occur in close proximity to many of these habitats.

In addition to the public and State Trust lands which make up the grazing allotments, several parcels of private land occur within the allotment boundaries. Most of these areas are grazed.

Adjacent to the allotment are also National Forest Lands and extensive private lands, which include the town of Sonoita. Areas around Sonoita have been subdivided and are being developed as "ranchettes". Potential impacts associated with growth in the Sonoita area include changes in the watershed/water balance of the Cienega Creek subbasin, the presence and transport of exotic fish and bullfrogs, and increased recreation in the RCA. Ground water use in the Sonoita area would increase with growth and runoff patterns would also change. Sedimentation associated with land clearing activities and increased runoff may also occur. How much of the area could be developed and at what densities, is not foreseeable. Additional uses that could occur on private lands are livestock grazing and small scale agriculture.

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LOACH MINNOW (*Tiaroga cobitis*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

Listed as Threatened in 1986 with Critical habitat designated in 1994 (USFWS 1984, USFWS 1994). It was petitioned for listing as Endangered in 1994. Up-listing was found to be warranted but precluded by other listing priorities (USFWS 1994). Critical habitat was designated in Aravaipa Creek, Graham and Pinal Co., which included the Bureau's wilderness area plus several miles upstream and downstream. Two segments of the San Francisco river, Greenlee and Catron Cos, were included. The downstream most segment ends at the BLM/FS boundary above the town of Clifton. Other stream and river segments with Critical Habitat include the following: Gila River, Grant and Catron Co.s; Tularosa River, Catron Co.; Blue River, Greenlee Co.; Campbell Blue Creek, Greenlee Co.; and Dry Blue Creek, Catron Co.

b. OCCURRENCE REPORTS

Aravaipa creek through out the wilderness area is well known in the scientific community for it's loach minnow population. Loach minnow has recently been collected in the San Francisco River above Clifton (Dr. P.C. Marsh, Dept. for Env. Studies, ASU, pers. comm.). See Table 11 for allotments where loach minnow occur.

c. SURVEYS

Initial surveys on the San Francisco River above Clifton and below Morenci revealed good habitat conditions but few fish of any species and no loach minnow. However, as mentioned above, it was collected in the Bureau portion of the San Francisco above Clifton. Aravaipa has had annual collections for about 25 years. The loach minnow is present through out the creek. A new population was discovered in Deer Creek (a.k.a. Hell Hole Canyon) a tributary to Aravaipa Creek in 1995. Another small transient population was documented in the lower most segment of Turkey Creek, tributary to Aravaipa in 1991 (BLM files). A preliminary survey on the Gila River in 1991 produced no loach minnow.

d. CONSULTATIONS AND CONFERENCES

Number	Name
2-21-88-F-114	Safford District RMP
2-21-92-F-070	Gila Box RNCA Plan
2-21-87-I-088	Eradication of Exotic Fishes, Aravaipa

2-21-92-I-108	Prescribed Burns, Aravaipa Tablelands
2-21-94-I-543	BLM Acquiring 3 Parcels of Land, Aravaipa

e. REASONS FOR SPECIES DECLINE

This minnow is threatened by habitat destruction due to impoundment, channel downcutting, sedimentation, water diversion, ground water pumping, and the spread of non-native predatory and competitive species (USFWS 1991). Livestock grazing that results in widespread removal of covering grasses and shrubs from the watrshed, or denuding riparian vegetation, may induce dramatic changes in precipitation runoff, suspended sediment, and bedload that increases stream tubidity, clogs interstitial spaces of course substrates , and increase erosion of stream channels and banks (USFWS 1991).

2. RECOVERY PLAN

a. NAME: Loach minnow Recovery Plan.

b. REQUIREMENTS AND RECOMMENDATIONS

c. BUREAU STEPS TO ACCOMPLISH THE REQUIREMENTS

The following actions from the implementation schedule are required by the Bureau to recover the loach minnow:

1) Identify all populations and determine the present level of protection.
2) Enforce laws and regulations pertaining to the ESA and land management,
3) Insure natural flows regimes are maintained,
4) Identify the need for and construct barriers for the conservation of this fish,
5) Acquire available lands and associated water rights,
6) Protect acquired lands from adverse impacts, establish standard monitoring locations and techniques,
7) Determine natural variation in abundance and age class structure,
8) Determine standard methods for quantifying abundance,
9) Conduct bi-annual population estimates,
10) Monitor community composition including range of natural variation, determine the significance of interaction with non-native fishes,

11) Identify areas in need of management and determine necessary habitat improvements,
12) Identify and prepare sites for reintroduction,
13) Reintroduce and into selected stream reaches and monitor,
14) Determine reasons for success or failure of the reintroduction and rectify the problem,
15) Determine quantitative criteria for describing a self-sustaining population,
16) Provide information and education about this species to the public,
17) Ensure that all professional information is made available to other agencies and interested parties.

d. SAFFORD DISTRICT ACCOMPLISHMENTS

Surveys for new populations are being conducted on Bureau lands in the Gila River Drainage. The discovery of a new loach minnow population in Deer Creek and the finding of loach minnow use in Turkey Creek (Aravaipa Tribs) are significant additions to our understanding of the status of the loach minnow. The Bureau has been involved in law enforcement and monitoring activities primarily through the Aravaipa Ranger(s). This provides a presence that deters resource damage and helps law enforcement officers prosecute violators. Water rights have been obtained on Aravaipa Creek and are being pursued in other areas including the Gila River which will protect the San Francisco from overdraft. The Bureau has been instrumental and fully involved in the Aravaipa fish exclusion devise (barrier) since 1989. Plans were drawn up for an upstream barrier on Aravaipa Creek in 1991 using Bureau funds through an Assistance Agreement with TNC. The Aravaipa wilderness was expanded in 1990 and lands along the Aravaipa Creek are being purchased.

Significant studies on Aravaipa Creek and its resources especially fish have been sponsored or conducted by the Bureau. Minckley 1981, Williams 1991, Velasco 1994 and AGFD 1995. All of these studies were directed at understanding the native fish community including loach minnow. The latter two studies specifically looked at the natural variation in abundance and age class. Reintroduction of loach minnow is specifically addressed in the draft Gila Box RNCA Plan and The draft Muleshoe CMA Plan. Information obtained by the Bureau is being disseminated to other agencies and interested publics. In addition the entire Bureau managed portion of the Aravaipa watershed was inventoried for permanent stock ponds and exotic fish. An EA was drafted and signed to allow for renovation of any contaminated ponds.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

This section and the habitat requirements section were derived from information provided in the recovery plan (USFWS 1991a, Minckley (1973) and the T&E species of Arizona, handbook (USFWS 1991b). This species is a bottom dweller that lives less than three years and typically attains a length of three inches. loach minnow spawn in late winter to early spring in Aravaipa Creek. Adhesive eggs are deposited on the underside of rocks located in the same riffles occupied by the resident adults. This fish is an opportunistic, omnivor in diet. Foods utilized by loach minnow include riffle dwelling aquatic insects including ephemeropterans, simmulid and chironomids. Food is gleaned from the substrate rather than captured from the swift, turbulent central portion of the riffle water column.

b. RANGE OF SPECIES

Historically, this species was widely distributed throughout much of the Gila River system. The type specimen was collected from the San Pedro River in 1851. The current range is restricted to the upper Gila River, Aravaipa Creek, Deer Creek (USFWS 1991, BLM files), Eagle Creek (Knowles et al. 1995), Tularosa River, Blue River, Campbell Blue Creek, and Dry Blue Creek, and White River. There remains a strong possibility that some supposedly extirpated populations (Knowles et al. 1995) still exist, as well as, undiscovered populations like the one found in Deer Creek.

c. HABITAT REQUIREMENTS

This unusual minnow is a bottom dweller that utilizes habitat in much the same manner as darters of the genus *Etheostoma*, preferring to utilize shallow, turbulent riffles with cobble substrates. Habitat of this species are characterized as shallow, moderate to swift current velocity, and gravel to cobble substrate. Habitat use varies by age, season, and locality in the upper Gila River. Riffles with cobble substrates are required for spawning. Loach minnow utilize the open cavity on the downstream side of flat rocks to lay their adhesive eggs.

To summarize the loach minnow habitat requirements, this fish needs:
1) unpolluted water with natural variation in temperature, pH and salinity, 2) clear water with a limited sediment load, 3) shallow, turbulent, flowing water over riffle microhabitat 4) riffles with cobble substrate for spawning, 5) habitat areas free of nonnative competitors and predators, and 6) unregulated flooding from storm events to renew habitat features, and sediment that can clog riffle habitat.

d. RATIONALE FOR POTENTIAL HABITAT

No unsurveyed potential habitat is known to occur in the Safford District.

e. HABITAT CONDITION

The habitat in Aravaipa Creek has a high component of riffle (Velasco 1994, AGFD 1995) with substrate adequate for spawning. Riparian condition has not been evaluated for proper functioning condition (BLM 1993), but appears to be in proper functioning condition and at or near its potential based on professional judgement. However, a high sediment load of sand may decrease the quality of loach minnow habitat. The Gila River in Arizona is either highly modified or saturated with non-native predators and competitors. Some aspects of the San Francisco River above Clifton remain in good condition (e.g. base flow, presence riffles with large substrate), but others such as riparian development and bank stability appear to be poor. Deer Creek, a tributary to Aravaipa Creek, is a narrow slot canyon composed largely of riffle habitat with gravel substrate. Base flows are less than 1 cfs in summer. All three areas have and unregulated hydrography.

The San Francisco River had riparian conditions ranging from functional at risk to properly functioning. Most of the riparian areas on the San Francisco rivers are sparse and set far back from the waters edge. Under present conditions they have only a small influence River habitat and character. The aquatic habitat of the San Francisco is contaminated by a wide range of non-native fishes including catfish which are known to forage heavily on native fishes.

f. CURRENT CONDITION OF THE SPECIES AND POPULATIONS

(1.) RANGEWIDE

The species is believed extirpated from Mexico although sufficient inventory information is lacking. In Arizona and New Mexico loach minnow still persists in the White River; North and East Forks of the White River; Aravaipa and Deer creeks; Eagle Creek San Francisco River; Blue River and Blue Campbell Creek; East, Middle and West Forks Of the Gila River; Tularosa River; Whitewater Creek; and Dry Blue Creek (USFWS 1991, BLM 1995, Knowles et al 1995. Due to substantial increase in threats to and new information indicating an increased need to protect the genetic integrity of the loach minnow, the Service has found that reclassification from Threatened to Endangered is warranted (USFWS 1994).

(2.) ACTION AREA

The Aravaipa Creek population remains healthy. It is at risk from non-native fish invading the canyon, especially the red shiner. Aravaipa Creek maintains a self-sustaining population that varies in size from year to year (Velasco 1994). The status of the Deer Creek population, discovered in 1995, is unknown until several years of investigation is conducted; the initial survey suggests that the population is self-sustaining and large. The segment of the San Francisco below the FS/BLM boundary

may support a self-sustaining population but further surveys are required to make a determination. The Gila River in Arizona is not anticipated to harbor loach minnow primarily due to contamination with predacious and competitory non-native fishes including catfish and red shiners.

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

The direct effects of cattle grazing are few to loach minnow. Adult loach minnow reside under rocks in riffle habitat. This can subject them to crushing from livestock crossing these areas which are often preferred by animals and people alike. Eggs and larval fish can be damaged by trampling (Roberts and White 1992). Larval sized fish use shallow water along the margins of aquatic habitat and juvenile fish are weak swimmers at for a time. These small fish are not likely to totally avoid being stepped on or ingested by livestock drinking water.

(2.) INDIRECT EFFECTS

Livestock grazing in the southwestern U.S. has been demonstrated to alter the species composition of communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main direct impacts from cattle are the grazing of plants and trampling of vegetation and soil (Platts 1991, Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands (Fleischner 1994, Platts 1991).

Water quality can be impaired by livestock grazing from nonpoint source pollution and at locations where large numbers of animals congregate. Cattle waste products can deteriorate water quality resulting in alteration of fish communities or fish kills. The impact generally comes from increased levels of ammonia (NH3)and Nitrite (NO2) and decreased levels of dissolved oxygen (O2) (Taylor et al.1989, Cross 1971). The effects of this type of pollution are increased under conditions of limited water supply such as in small ponds and springs. Sedimentation from erosion caused by livestock can impair spawning areas and reduce aquatic productivity which can affect food production (Ward 1992, Meehan 1991).

Riparian areas are important in providing quality habitat for this fish. Increased riparian vegetation has been documented to increase instream cover, increase overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and increase terrestrial invertebrate prey for fish (Platts

1991).

The soils along streams are vulnerable to erosion. Factors thought to be important to the destabilization of streams in the southwest are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Platts 1991, Fleischner 1994). Riparian soil and bank stability should be greater where more intensive management such as riparian fencing and rotational grazing are implemented (Skovlin 1984, Kovalchik and Elmore 1992, Platts 1991). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel destabilization is reduced significantly (Hendrickson and Minckley 1984, Meehan 1991, Kovalchik and Elmore 1992). This is important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream destabilization and concomitant loss of floodplain function (Hastings 1959, Bahre 1991).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney *et al*. 1993). The extent of watershed disfunction which is induced or exacerbated by grazing or is, instead, the product of past management or natural climatic/geologic conditions is uncertain (Masters et al 1991, Bahre 1991, Hastings and Turner 1965). However, it is generally accepted that watershed disturbances from grazing have the potential for negative impacts which can effect fish habitat through excess sedimentation, lowered base flow, altered channel geometry, and erosion from exacerbated flood peaks (Meehan 1991, Debano and Schmidt 1989). Continuous yearlong livestock grazing can affect hydrologic function by reducing protective vegetation and litter and by soil trampling (Fleischner 1994, Platts 1991, Gifford and Hawkins 1976). Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates (Gifford and Hawkins 1976, Blackburn 1984, Orodho *et al*. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). These authors conclude that continuous yearlong grazing may result in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations.

Intensive grazing systems can lessen some of these impacts. The following primary benefits of better grazing systems include, less water erosion and sediment yield, increased water retention, and decreased soil erosion. The anticipated increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991).

Improved range condition due to improvement in plant density and vigor, hence potential production, 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 (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). Implementation of intensive grazing management such as rest rotation, Santa Rita and other systems is likely to improve range condition and watershed function but may not maximize them.

Even with an intensive grazing system, water infiltration rates on the watershed are likely to be impaired. Gifford and Hawkins (1976) found in their review of infiltration studies associated with grazing in the western U.S. that light to moderate grazing caused an average of 25% decline in infiltration on moderately porous soils and 65% decline with heavy grazing. They suggested that recovery of infiltration rates may exceed 10 years after rest from livestock activity (Gifford and Hawkins 1976). Studies by Dadkhah and Gifford (1980) 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. With a reduction in infiltration, it can be anticipated that increased run off volume and decreased recharge to local aquifers will occur (DeBano and Schmidt 1989). However, the work of Rich and Reynolds (1963) in central Arizona indicated that 40 percent (moderate) utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing. The effects of grazing apparently vary by site according to such variables as soil type, non-forage related ground cover, cattle loading (number of livestock and grazing duration), long-term history of cattle use in the area, season of use, and time and space distributions of cattle (Gifford and Hawkins 1976).

The aggregate effects of other activities is likely to be additive to or magnify the effects of grazing to the watershed and the stream channels. These activities include, recreation, road placement and extent, past watershed degradation, loss of beaver activity, mining, pollution from abandoned mines,

Many watershed impacts (including grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by managers. Over 200 hundred years of human activity have resulted in an altered hydrography and generally lowered water tables, disrupting the original flow conditions in many areas (Rabini 1992).

Finally, the loss of native fish may occur from the close proximity of stock waters contaminated with non-native fish and frogs to uncontaminated native fish habitats. Such permanent waters facilitate the easy transport of non-native fish and frogs to these habitats by recreationists attempting to expand fishing opportunities on their own initiative. Flooding can also move non-native fish and frogs from upstream impoundments to downstream habitats occupied by native fishes. This contamination of native fish habitat with non-native fish and frogs often results in the loss of individual native fish or, possibly, entire populations through predation or competition (Minckley and Deacon 1991, Miller 1961, Minckley and Deacon 1968).

Most introductions of non-native fish have been done legally by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson Wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

a. ANALYSIS OF EFFECTS BY PROPOSED ACTION

(1.) DIRECT EFFECTS OF THE PROPOSED ACTION

The riparian area within the Bureau's wilderness boundary has not been grazed since 1973 (Rucks 1981) and the semi-annual trailing of cattle is limited to 15 head of cattle. However, seasonal riparian grazing by two head of cattle is may allow for some injury to loach minnow. Unknown numbers of loach minnow or their eggs may be damaged from winter or spring grazing and resulting trampling similar to that of wading fishermen (Roberts and White 1992). Loach minnow are unusually vulnerable since they prefer shallow water in riffles and hide under substrate that may crush them if it is walked on or driven over by vehicles. Shallow riffles are a choice crossing point for people and cattle alike. Similar impacts are expected to occur to loach minnow in the San Francisco River and Turkey Creek. Deer Creek is isolated from such impacts.

(2.) INDIRECT EFFECTS

Grazing and trailing of livestock in Aravaipa Creek is likely affect stream bank erosion and habitat characteristics to a minor degree.

Seasonal riparian grazing by five head of cattle could cause damage to the riparian area and stream banks along two small (0.1 miles) segments located upstream and downstream of the wilderness. However, this grazing preference has not been in use on the BLM property. The rest of Aravaipa Creek is not grazed and the reach through the wilderness has not been grazed for over 20 years.

(3.) DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS

Bureau activities with aggregate effects in the Aravaipa Creek basin include, grazing on nine allotments, recreation, range improvements, mining, and roads. See Appendix 2 for specific information on allotment analyzed below.

The **South Rim Allotment** which comprises 49 percent of the Aravaipa public

lands or 34,634 acres is not currently being grazed and is likely to be deferred for at least several years. The western half (west of Virgus Canyon) of this allotment has been in non-use for about 20 years. For the last 10 years this allotment has been at half of its permitted use level. This is appears to have resulted in good watershed condition and data indicates that range condition is good to excellent in 75 percenr of the allotment. This likely benefits hydrologic and soil protection relationships that will improve loach minnow habitat. This improved condition should slightly decrease the runoff potential of the range (DeBano and Schmidt 1989, Orodho *et al*. 1990, Chaney *et al*. 1993) within the area. As plant density increases, more of the available moisture infiltrates into the soils or runs off more slowly into first order ephemeral stream channels and is either moved as groundwater through the watershed, or is utilized by plants on site and less runs off. This allotment is within several ACEC's that are designated to benefit desert grassland ecology. The south Rim also has the Turkey Creek ACEC which has had cattle grazing excluded.

Watershed conditions on the **Painted Cave Allotment** has a substantial component that has been judged to be in unsatisfactory condition based on range condition and professional judgement. This allotment has no riparian grazing.

Watershed conditions on the **Dry Camp Allotment** have been judged to be in satisfactory condition based on range condition and professional judgement. This allotment has no riparian grazing.

Watershed conditions on the **Hell Hole Allotment** has a substantial component that has been judged to be in unsatisfactory condition based on range condition and professional judgement. This allotment has no riparian grazing but does have livestock trailing in Aravaipa Creek. Less than 10 head are trailed in Aravaipa Creek three times a year. This can result in some habitat degradation and injury to loach minnow.

Watershed conditions on the **Brandenberg Mountain Allotment** have been judged to be in satisfactory condition based on range condition and professional judgement. This allotment has not had riparian grazing although a small piece of the allotment touches Aravaipa Creek.

The **Quintana Allotment** is very small (40 acres)**.** The Permittee runs his cattle on irrigated pasture and prefers not to run cattle in the Creek.

The **Aravaipa, South Aravaipa and Laurel Canyon Allotments** are also located on the Aravaipa watershed.

The **San Francisco and Red Hickey Hills Allotments** have only a small portion of the allotment touching the San Francisco River. The permittees do not graze the riparian area in order to prevent losing livestock downstream which have to be gathered

later. Grazing occurs out of the river bottom. No formal restriction on livestock grazing is presently attached to their AMP's.

The aggregate effects of Bureau activities in the Aravaipa area include, the combined effects of the nine grazing allotments, recreation, mining, and roads.

The BLM allotments on the Aravaipa watershed have mixture of watershed conditions, both satisfactory and unsatisfactory, as rated based on range condition and professional judgement. Upland range condition for the allotments with deferred grazing is anticipated to result in an increase in the density and vigor of perennial grass plants from former utilization levels which have undergone several reductions in the past. Where yearlong grazing occurs, permitted use has been reduced substantially to lessen the adverse effects to range and watershed condition. The 40 percent average utilization level is anticipated to reduce watershed cover, yet leave enough cover to protect watershed function. The drought policy is likely to reduce watershed damage from grazing during periods of low precipitation. Some watershed impairment is likely from the loss of vegetative cover and decreased soil infiltration rates. This is likely to in crease surface runoff and decrease replenishment of local aquifers.

Loss of vegetative cover and decreased soil infiltration rates can have an adverse effect on critical habitat through decreased water discharge into Aravaipa Creek tributary aquifers and through increased flood peaks which may alter riparian habitat development from reaching an optimum state.

These watershed effects on BLM managed lands can alter loach minnow habitat and need to be put into the context of the total watershed in order to determine the magnitude of such effects. On the South Rim Allotment about 17,000 acres has not been grazed for 20 years. Another 17,000 acres is likely to be deferred a long period (five years or more) as requested by the permittee. Less than 109 of the 527 sq. miles (20 percent) of the Aravaipa watershed (Aravaipa stream gaging station, USGS 1993) is managed by BLM. Of this 20 percent, less than one percent occurs at elevations above 7000 feet where 90 percent of the precipitation that feeds Aravaipa Creek and its tributaries occurs. Therefore, it is reasonable to say that with the reduced numbers of livestock (about 8 head/sq. mile), 40 percent average utilization (which is even less on steep slopes), and the small contribution of precipitation at the elevations on BLM lands; that the impact is likely to be small to base flow in Aravaipa Creek.

Soil disturbance would increase in several ways as a result of the past and maintenance of developed range improvements in the Aravaipa watershed. Most of the range improvements have been completed. Initial minor disturbance caused by vehicle movement to and from the range improvement sites could occur. The actual construction of earthen reservoirs, and water pipeline would create a temporary disturbance through soil movement and compaction. 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 (months) or long periods (years). The disturbance of these sites would increase the opportunity for erosion and sediment transport. This impact would affect up to two acres per existing and proposed water development. The five proposed or any existing stock tanks should not effect surface water drainage to a great degree as they are few and relatively small. Stock ponds on side drainage used to water cattle will result in little impact to the surface flow and the dam would act as a sediment trap mitigating upstream erosion. Approximately two acres would be disturbed for every mile of water pipeline constructed. Any new construction of the stock tanks would disturb about five acres of surface soils. The disturbance associated with the pipelines has been temporary, and has naturally revegetated. About half the disturbance associated with the stock tanks would be permanent due to water storage, soil compaction, and trampling of vegetation by livestock (Andrew 1988). This impact to the Aravaipa watershed would be largely continuous and hard to evaluate. Few new range improvements are anticipated in the Aravaipa basin.

Adverse impact to riparian areas, and consequently to Critical Habitat, in Aravaipa Creek and its tributaries may occur from increased flood peaks. Large storms can produce large quantities of rain at all elevations. If reduced soil infiltration and reduced vegetative cover affect the runoff response of the watershed, then larger flood peaks can be anticipated. If the magnitude and frequency of the floods is increased, then riparian development and stream channel features are likely to be altered and destabilized beyond levels that would occur with no grazing. Again, areas with no grazing coupled with the low densities of cattle and utilization level of 40 percent on areas that are grazed are may reduce watershed impacts to a negligible level.

The difficulty in making determination of watershed effect is compounded by the lack of specific local studies, variability in soil types, and alterations in vegetation community composition from grazing. This last factor may be important, as the second most abundant vegetation type in the district is semi desert grassland which is prevalent on allotments in this watershed. Shrubs may increase at the loss of grass cover in semi desert grassland. As a result, allotments with semi desert grassland, range condition (and likely hydrologic function) may not improve without fire disturbance (McClaran 1995). All of this makes the evaluation of watershed effect problematic, but it appears that the proposed grazing management is likely to have a small impact on watershed function.

Vehicle travel and road maintenance that results from the high profile Aravaipa Wilderness can affect fishery resources. Fish can be injured or displaced and eggs from spawning areas crushed by vehicle activity. In addition, the productivity of shallow riffle (which supply food for fish) crossing areas can be impaired.

Recreation activity along Aravaipa Creek, such as wading, swimming and walking up and down the creek can injure fish if contact is made or displace fish sensitive to frequent disturbance. These activities have an adverse impact of unknown extent. Aravaipa receives an estimated 4,000 visitors annually.

Mining activities can lead to excessive sedimentation, water pollution, and large scale watershed degradation that affect the quality of aquatic habitats for fish and other organisms (Nelson et al. 1991, Minckley 1981).

Riparian and upland roads in Aravaipa and the San Francisco River have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Aravaipa and Turkey Creeks will be exposed to a high risk of erosion from flooding due to the narrow box canyon nature of the drainages.

The riparian road in Turkey Creek have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Turkey Creek could be exposed to a high risk of erosion from flooding due to the narrow box canyon nature of the drainage. However, the general lack of road maintenance in Turkey Creek and presence of a healthy riparian area indicate that the road is not inducing any noticeable impact to Turkey Creek. Many of the upland roads are on steep terrain an subject to some degree of erosion.

The proposed grazing management coupled with these other activities may limit aquatic habitat from reaching its full potential for the loach minnow and its designated Critical Habitat. However, the adverse effects are likely to be small.

(4.) INTERRELATED AND INTERDEPENDENT: Loach minnow and other native fish populations have been negatively impacted by exotic and non-native fish species (Minckley and Deacon 1991, Velasco 1994, Miller 1961, Minckley 1968).

Most introductions of non-native fish have been legally done by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson Wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for

mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

Ninety-eight stock tanks were identified on Bureau managed lands by Bagley (1987). Of these 62 had indication of long-term persistence only two had fish. A third pond on private land was renovated with a piscicide. Stock tanks with perennial water storage tend to serve two purposes. The primary purpose is to meet the needs for stock watering. Their secondary purpose, whether intended or not, may become for stocking with fish for recreational sport fishing. The allotments with stock tanks containing perennial water include Aravaipa (45220), Painted cave (45180), Dry Camp (45200), and South Rim (45290).

Many of the stock tanks are known to dry up annually on the Aravaipa and San Francisco watersheds. Those located on Bureau lands that don't dry are often very remote, decreasing the risk of illegal fish stocking. The risk posed by the use of existing waters and the development of new waters to the fish community of Aravaipa Creek is small, but real, as evidenced by the spread of green sunfish in side canyons such as Virgus and Horse Camp. The potential for exotic fish and bullfrogs to be put into the more permanent ponds exists. Subsequent flooding or fishermen attempting to increase their recreation opportunity on their own could move the exotic fish and bullfrogs into occupied or Critical Habitat with highly detrimental impacts to loach minnow.

The proposed and existing stock ponds should not effect surface water drainage to a great degree as they are relatively small. Stock ponds on side drainages used to water cattle will result in little impact to the surface flow and the dam would act as a sediment trap mitigating erosion. The small groundwater use to fill upland stock waters should not create measurable effects in the flows of Aravaipa Creek or Bonita Creek.

No stock ponds with perennial water are located on the allotment adjacent to the San Francisco River.

(5.) INCIDENTAL TAKE AS APPLICABLE

From the above analysis it is apparent that a small amount of incidental take is possible from the direct impacts of cattle trampling fish and indirectly from habitat modification from watershed degradation coupled with other aggregate and cumulative effects.

d. RATIONALE FOR EFFECTS ANALYSIS

There are six actions analyzed in this BE: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special

management areas. The results of this analysis are presented in Tables 13 and 13a for allotments occupied by loach minnow.

Permitted use was not found to be likely to adversely affect loach minnow on any of the allotments analyzed. Instead the grazing system that allows riparian trailing is responsible for any adverse effects to this fish.

Utilization level may affect watershed cover which can affect loach minnow habitat. However, it was determined that the aggregate affects of grazing 9 allotments plus other activities that disturb the watershed culminate in a small adverse impact to loach minnow habitat.

The grazing system allows cattle to trail Aravaipa Creek is responsible for any adverse effects to this fish. Trailing cattle through Aravaipa creek can result in some habitat degradation and injury to loach minnow.

Maintenance and past construction of range improvements may affect watershed function to a small degree. This small impairment of watershed function has an aggregate effect when coupled with other watershed disturbances, especially the grazing of 9 allotments in the Aravaipa watershed. Stock ponds may have an adverse effect on loach minnow through the risk of nonnative fish contamination.

The management of ACEC's and Wilderness has resulted in tempering livestock grazing to the point where minimal adverse impacts are likely to effect loach minnow.

The goals of the riparian policy are being achieved on BLM lands in Aravaipa Creek and have been for some time (Rucks 1984). This has likely had significant benefits to fish habitat.

e. EFFECT DETERMINATION

The loach minnow is known to occur in Aravaipa Creek and The San Francisco River within the Safford District. The grazing system on the Hell Hole Allotment uses Aravaipa Creek for moving livestock. This access can lead to some unknown degree of loach minnow mortality and habitat damage. Four allotments (Painted Cave, Dry Camp, South Rim, Aravaipa) have stock ponds which could pose a threat of contamination of Aravaipa Creek with sport fish.

Through this evaluation it is the Bureau's determination that the proposed grazing management **may affect and is likely to adversely affect** the continued existence of the loach minnow in the Safford District based on activities and range improvements in the Hell Hole, Aravaipa, Dry Camp and Panted Cave Allotments. It is also the Bureau's finding that the proposed grazing management **may adversely modify Critical**

Habitat, but that any modification is not irreversible. Activities on the remainder of BLM allotments in the district pose no real threat to the continued existence of due to their remoteness from occupied habitats.

5. PROPOSED MITIGATION MEASURES

Monitor watershed condition in conjunction with range studies.

Officially defer riparian grazing on the Quintana, Brandenburg Mountain, Red Hickey Hills and San Francisco Allotments.

Introduce native fishes into permanent stock ponds and periodically monitor these populations for non-native fishes.

Sterilize ponds with perennial water that are not suitable for introduction of native species.

Provide permanent water for livestock and wildlife using troughs instead of ponds.

Licensed livestock use will be in balance with the grazing carrying capacity and important components of watershed function.

Defer or manage livestock grazing as prescribed in the RMP to assure watershed conditions are maintain and/or improved, especially on excellerated eroding areas.

Ungrazed areas in the Aravaipa watershed should be set aside for comparison with grazed areas (as suggested by Bock and Bock 1993).

Develop and implement prescribed fire plan to enhance watershed function in semi desert grassland areas.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Bottomlands in Aravaipa Creek have undergone change from road building, channel modification, tree and wood cutting, livestock grazing, and field and homestead clearing. Fish have been impacted by this plus unscreened diversions that strand fish on fields, unscreened returns that spill exotic fish from private ponds into the creek, and private ponds with exotic fish that can release fish to the creek during floods. About 600 acres of bottom has been cleared for farming (Hadley et al. 1991, Minckley 1981).

The riparian road in along Aravaipa Creek (east and West ends) have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Aravaipa Creek will be exposed to a high risk of erosion from flooding due to the position of the road on the floodplain.

The impacts of past mining are present today. Past mining activity has resulted in heavy metal pollution, including mercury, to Aravaipa Creek and Hell Hole Canyon (Deer Creek) (Minckley 1981).

Tailings at Klondyke were recently cut into at Aravaipa Creek meandered (AZ Dept. of Env. Quality Letter of January 10 1993). The residue of past mining can cause a series of problems. Tailing piles can mass wastes, hill slopes can be destablized, increased sediment load from erosion of tailings, and increased leaching of heavy metals into flood waters. Increase sediment loads can cause changes in channel depth, width and meander pattern (Hadley et al. 1991).

Cattle Ranching between 1895 and 1905 was prevalent in the Aravaipa Watershed. The area was heavily overstocked which caused severe plant denudation of the landscape. The problem became acute to the watershed when a subsequent cycle of drought and flood occurred. During the 1930s and 40s about 20,000 angora goats and 2,500 feral horses and burros roamed Aravaipa. All of this was certain to have a profound and long term effect on riparian areas and watershed health (Hadley et al. 1991). This may explain the loss of marshlands near Klondike and the incision of Aravaipa creak below its historic floodplain (Minckley 1981).

Wildfires that once were important to maintaining grassland health have been suppressed. This may affect character of semi desert grasslands and watershed cover.

The high sediment load that moves through Aravaipa Creek may indicate poor watershed function in the upper portion of the watershed upstream of BLM managed lands. Water diversions along Aravaipa Creek can take between 50 and 80 percent of the surface flow (Minckley 1981). Some of these surface diversions have recently been retired to increase instream flows.

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RAZORBACK SUCKER (*Xyrauchen texanus*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

This species was first proposed for listing as an **Endangered species** in 1978. Listing was not completed until 1991 (USFWS 1991). Critical habitat was designated in 15 reaches of the Colorado River including the reach in eastern Arizona on the Gila River from the New Mexico border to the Coolidge dam (USFWS 1994).

b. T&E OCCURRENCE

Bonita Creek, San Francisco River and Gila River are likely to be occupied (Table 12). In 1981, the State of Arizona and the Service entered into a Memorandum of Understanding (MOU) in an attempt to recover the species to a level that would prevent the need for listing. As a result of this MOU, attempts were made to establish new wild populations of razorback suckers throughout Arizona. The Gila River and its tributaries Bonita Creek and Eagle Creek received hundreds of thousands of small suckers from 1981-1987 (Minckley et al. 1991; AGFD, Non-game fish data base, 1992; BLM files).

There are 288 grazing allotments on Safford District. Razorback suckers may occur but are considered to occur within 12 of these allotments. See (Table 12).

c. T&E SURVEYS

The Gila River, was inventoried in a preliminary manner in 1991. Bonita Creek has been sampled 3 times with one individual razorback sucker positively identified from photos. Lower Bonita Creek was surveyed extensively twice (1991 and 1992). The upper Creek was surveyed for *Gila intermedia* and razorback sucker in 1993.

Many casual observations of fish have been made during other activities in Bonita Creek. On one occasion in March of 1991 a large sucker was observed and photographed. The photos were shown to Dr. Minckley, Dr. Marsh and Dr. Douglas who are all experts at identifying native Arizona Fishes (ASU faculty). They concluded, with little hesitation, that the fish was a razorback sucker. No other such encounters have occurred with this species in Bonita Creek since that time.

d. CONSULTATIONS AND CONFERENCES

The list below contains all consultations with the Service concerning razorback sucker in the Safford District.

Number	Name
2-21-91-I-095	Bonita Creek Allotment Management Plan
2-21-92-F-070	Draft Gila Box RNCA Plan
2-21-92-F-450	Dorothy "B" Mine
2-21-92-I-070	Sanchez Copper Project EIS
2-21-92-I-584	Phelps Dodge Mining Plan?
2-21-93-F-406	Bonita Creek Road Construction
2-21-93-I-396	Log Removal in Gila River
2-21-95-I-081	Morenci Land Exchange EIS?
2-21-95-I-211	Restoration of the Old Safford Bridge EA

e. REASONS FOR SPECIES DECLINE

This species is threatened by habitat alteration, upstream impoundments, water withdrawals, and competition with and predation by non-native fishes (USFWS 1991). Adverse impacts to habitat along the Gila River portion of razorback sucker critical habitat include overuse of rangelands (USFWS 1993)

2. RECOVERY PLAN

No recovery plan has been written for this species.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

The biology of his species is has been studied extensively and is thoroughly reviewed by Bestgen (1990), the Service (1993) and Minckley et al.(1991). This fish lives more than 30 years (Minckley 1983) and may reach 3 feet in length and weights of 13 pounds (Minckley 1973).

b. RANGE OF SPECIES

This fish is endemic to the Colorado River basin, occurring, historically, in all major river and stream tributaries. It still occurs in lakes Mohave, Mead and Havasu and the upper Colorado River. It has been transplanted to the Hassayampa River Preserve (TNC) and Buenos Aires NWR and has been placed in the Verde and Salt Rivers on an "experimental nonessential" basis (ESA Sec. 10(j)). Large numbers of young suckers were released into the Gila River, Bonita Creek, and Eagle Creek in the 1980's.

c. HABITAT REQUIREMENTS

This species occurs in streams to large rivers with slow backwater areas where it feeds on benthic organisms, detritus, and plankton. Adults occupy a variety of habitats including eddies, back waters, flooded gravel pits, flooded bottoms, flooded mouths of tributaries, slow runs, and sandy riffles (Minckley et al. 1991, Bestgen 1990). It is found in Colorado River reservoirs where adult populations persist until they die of old age. Survival of young in reservoirs is not sufficient to sustain the population (Minckley et al. 1991).

Spawning habitat in reservoirs consists of wave swept shores with substrates that range from silt to cobble; areas dominated by gravel are often used for spawning (Bestgen 1990, Minckley et al. 1991). In riverine environments fish spawn with rising water levels and temperature in response to spring flooding. This sucker migrates 10's of miles to specific locations to spawn over rocky runs and gravel bars (Tyus and Karp 1989) or remains in the same area (Minckley et al 1991, Bestgen 1990). In riverine environments of the upper Colorado River, this fish spawns any time from April to June with a total duration of spawning adults lasting for a 5 week period (Bestgen 1990). Spawning would likely occur earlier on the Gila River in the Safford District. Spawning occurs at 9-20 oC (Bestgen 1990).

Because few young razorback suckers are produced in the wild, little is known about the habitat requirements of immature razorback suckers. However, it is known that flooding of bottom-land areas that persist long enough to serve as nursery areas for razorback suckers are important to young razorbacks in riverine environments (Modde et al. 1996).

An important bioplogical component of the habitat requirements of the sucker is nursery areas relatively free of predatory non-native fish. Young suckers are known to be preyed upon by catfish and other non-native species.

Critical habitat for the razorback sucker includes the following primary constituent elements required for their conservation: water, physical habitat, and biological environment. In addition, life history requirements for this fish include inundation of backwater and flood plain (100 year floodplain) areas which provide feeding and nursery habitat.

To summarize the razorback sucker habitat requirements, this fish needs 1) unpolluted water with natural variation in temperature, pH and salinity, 2) big river habitats including eddies, slow run, riffles, and other habitats with slow current velocities, 3) habitat areas free of nonnative competitors and predators, and 4) unregulated spring flooding, 5) areas with rocky or gravelly bottoms for spawning, 6) flooded bottomlands that can be used for nursery areas.

d. RATIONALE FOR POTENTIAL HABITAT

No potential habitat has been identified. All areas stocked with razorback suckers are considered occupied. The San Francisco River was never planted with razorback suckers in the 1980's but is likely to be occupied by individuals that accessed the Gila River (AGFD, Non-game Fish Data Base 1992; Dr. W.L. Minckley Dept. Zoology, ASU; Dr. P.C. Marsh, Dept. Env. Stud., ASU pers. comm.). Therefore this area is considered occupied rather than potential habitat.

e. HABITAT CONDITION

Physical habitat condition on Bureau lands is largely undetermined. However, Minckley and Sommerfeld (1979) stated that the Gila River through the Gila Box RNCA "...is one of the last, low-desert unmodified streams in the American Southwest". They also concluded that the Gila River had the potential to support fishes such as the woundfin minnow, Colorado squawfish, bonytail chub, flannelmouth sucker and razorback sucker.

Flooded bottomland is not a common habitat feature along the BLM portions of the Gila River, San Francisco River or Bonita Creek. However, the other habitat elements described above do occur on the Gila and San Francisco rivers. A rare riverine situation exists in the Safford segment of the Gila and San Francisco Rivers; the natural hydrograph remains unimpaired by large dams (USFWS 1993). Flows can be very low in the late spring and summer leaving large pools connected by a small ribbon of flow. Bonita Creek is a medium size stream averaging about 10 CFS. It is not likely to support a viable razorback sucker population but may provide habitat for spawning and grow out of young sucker which can then migrate downstream to the Gila River.

The condition of riparian habitat bordering the Gila River was inventoried for proper functioning condition (BLM 1993). The riparian condition ranged from not functional (BLM 1993)(Harper and Sheldon allotments) to functional at risk or fully functional (Morenci, smugglers Peak, Gila, Twin C and county line allotments)(appendix 4). The San Francisco River had riparian conditions ranging from functional at risk to properly functioning. Most of the riparian areas on the Gila and San Francisco rivers are sparse and set far back from the waters edge. Under present conditions they have only a small influence on River habitat and character. Bonita Creek was found to have reaches determined to be functional at risk and properly functioning. Riparian development does influence fish habitat to a large degree on Bonita Creek.

The biological component of the habitat has been altered by the loss of co-occurring native fishes, and the addition of predatory and competitive non-native fishes (Minckley et al. 1991, Marsh and Brooks 1990). With the exception of upper Bonita

Creek, the aquatic habitat is contaminated by healthy populations of a wide range of non-native fishes, including catfish, which are known to forage heavily on small razorback suckers.

f. CURRENT CONDITION OF SPECIES AND POPULATIONS

(1.) RANGEWIDE

Only a few isolated populations of razorback sucker and scattered individuals exist today. Little recruitment of young fish into the adult population has been documented. Existing populations are diminishing and considered below the survival level, moving in the direction of extinction (USFWS 1993, Minckley et al. 1991).

(2.) ACTION AREA

In Bonita Creek the fish is likely extirpated as no razorback suckers have been found in surveys since 1991. No surveys have been completed on the Gila River. Although hundreds of thousands of small razorback suckers were released into the Gila River and its tributaries in the 1980's, it is likely that the large catfish biomass in the Gila River precludes self-sustaining populations from developing at the present time (Minckley et al 1991, Marsh and Brooks 1990). However, it is likely that some individuals did grow-out to a large, predator safe, size in tributary streams before moving to the Gila River with it's large predatory catfish population. In this case an unknown number of adult razorback suckers may remain in the San Francisco River and Gila River above San Carlos Reservoir.

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

The effects of dewatering, damming and introduction of non-native predators have had profound direct and indirect effects on this species. These elements have received the bulk of attention (USFWS 1990, USFWS 1991, USFWS 1993, Minckley et al. 1991). The subtle and long term effects of grazing on riparian and watershed function have not been a focus for this species.

(1.) DIRECT EFFECTS

The direct effects of cattle grazing are few to razorback sucker. Eggs and larval fish can be damaged by trampling (Roberts and White 1992). Larval and fingerling sized fish use shallow water along the margins of aquatic habitat and are weak swimmers at for a time. These small fish are not likely to totally avoid being stepped on or ingested by livestock drinking water. Due to the fact that reproduction

is likely to be very limited in the waters of the district and catfish are likely to consume any young that are produced, this potential impact is likely to be negligible.

(2.) INDIRECT EFFECTS

Livestock grazing in the southwestern U.S. has been demonstrated to alter the species composition of communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main impacts from cattle are the grazing of plants and trampling of vegetation and soil (Platts 1991, Marlow and Pogacnik 1985). These impacts can affect the composition and density of plant communities as well as the hydrologic functions of both riparian zones and upland watersheds (Fleischner 1994, Platts 1991).

Water quality can be impaired by livestock grazing from nonpoint source pollution and at locations where large numbers of animals congregate. Cattle waste products can deteriorate water quality resulting in alteration of fish communities or fish kills. The impact generally comes from increased levels of ammonia (NH3)and Nitrite (NO2) and decreased levels of dissolved oxygen (O2) (Taylor et al.1989, Cross 1971). The effects of this type of pollution are increased under conditions of limited water supply such as in small ponds and springs. Sedimentation from erosion caused by livestock can impair spawning areas and reduce aquatic productivity which can affect food production (Ward 1992, Meehan 1991).

Riparian areas are important in providing quality habitat for this fish. Increased riparian vegetation has been documented to increase instream cover, increase overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and increase terrestrial invertebrate prey for fish (Platts 1991).

The soils along streams are vulnerable to erosion. Factors thought to be important to the destabilization of streams in the southwest are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Platts 1991, Fleischner 1994). Riparian soil and bank stability should be greater where more intensive management such as riparian fencing and rotational grazing are implemented (Skovlin 1984, Kovalchik and Elmore 1992, Platts 1991). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel destabilization is reduced significantly (Hendrickson and Minckley 1984, Meehan 1991, Kovalchik and Elmore 1992). This is important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream destabilization and concomitant loss of floodplain function (Hastings 1959, Bahre 1991).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney *et al*. 1993). The extent of watershed disfunction which is induced or exacerbated by grazing or is, instead, the product of past management or natural climatic/geologic conditions is uncertain (Masters et al 1991, Bahre 1991, Hastings and Turner 1965). However, it is generally accepted that watershed disturbances from grazing have the potential for negative impacts which can effect fish habitat through excess sedimentation, lowered base flow, altered channel geometry, and erosion from exacerbated flood peaks (Meehan 1991, Debano and Schmidt 1989). Continuous yearlong livestock grazing can affect hydrologic function by reducing protective vegetation and litter and by soil trampling (Fleischner 1994, Platts 1991, Gifford and Hawkins 1976). Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates (Gifford and Hawkins 1976, Blackburn 1984, Orodho *et al*. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). These authors conclude that continuous yearlong grazing may result in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations.

Intensive grazing systems can lessen some of these impacts. The following primary benefits of better grazing systems include, less water erosion and sediment yield, increased water retention, and decreased soil erosion. The anticipated increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991).

Improved range condition due to improvement in plant density and vigor, hence potential production, 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 (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). Implementation of intensive grazing management such as rest rotation, Santa Rita and other systems is likely to improve range condition and watershed function but may not maximize them.

Even with an intensive grazing system, water infiltration rates on the watershed are likely to be impaired. Gifford and Hawkins (1976) found in their review of infiltration studies associated with grazing in the western U.S. that light to moderate grazing caused an average 25% decline in infiltration rates on moderately porous soils while heavy grazing caused a 65% decline. They suggested that the time required for infiltration rates to fully recover from the effects of grazing may exceed 10 years from the time livestock ceases. (Gifford and Hawkins 1976). Studies by Dadkhah and Gifford (1980) 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. With a reduction in infiltration, it can be anticipated that increased run off volume and decreased recharge to local aquifers will occur (DeBano and Schmidt 1989). However, the work of Rich and Reynolds (1963) in central Arizona indicated that 40 percenrt (moderate) utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing. The effects of grazing apparently vary by site according to such variables as soil type, non-forage related ground cover, cattle loading (number of livestock and grazing duration), long-term history of cattle use in the area, season of use, and time and space distributions of cattle (Gifford and Hawkins 1976).

The aggregate effects of other activities is likely to be additive to or magnify the effects of grazing to the watershed and the stream channels. These activities and include, recreation, road placement and extent, past watershed degradation, loss of beaver activity, mining, pollution from abandoned mines, water diversions, past and present introductions of non-native fishes, off-road vehicle travel, riparian roads, ground water pumping, surface water diversion, and construction of diversion structures that act as barriers to fish migration.

Many watershed impacts (including grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by land management agencies. Over 200 hundred years of human activity have resulted in an altered hydrograph and generally lowered water tables, disrupting the original flow conditions in many areas (Rabini 1992).

Finally, the loss of native fish may occur from the close proximity of stock waters contaminated with non-native fish and frogs to uncontaminated native fish habitats. Such permanent waters facilitate the easy transport of non-native fish and frogs to these habitats by recreationists attempting to expand fishing opportunities on their own initiative. Flooding can also move non-native fish and frogs from upstream impoundments to downstream habitats occupied by native fishes. This contamination of native fish habitat with non-native fish and frogs often results in the loss of individual native fish or, possibly, entire populations through predation or competition (Minckley and Deacon 1991, Miller 1961, Minckley and Deacon 1968).

Most introductions of non-native fish have been done legally by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in watson wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

There are six aspects of the proposed grazing management analyzed with relation to effects on razorback sucker and their habitat: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The Results of this analysis are presented in tables 12 and 12a for allotments occupied by razorback suckers.

(1.) DIRECT EFFECTS

Because the riparian policy and the Congressional mandates for the Gila Box RNCA have not been fully implemented, current grazing activities could result in some limited direct effects to the razorback sucker. The use of grazing systems that allow livestock access to 3 miles of Bonita Creek and 8 miles of the Gila River as well as livestock trespass in deferred areas of the Gila Box RNCA could result in the loss of young suckers from trampling. This could occur over large areas of the stream. Ingestion through consumption of water is unlikely do to the large habitat area and low numbers of larval razorback suckers likely to be produced in the area. Adult suckers are more likely to avoid direct injury from livestock than eggs or larval fish.

These direct effects are most likely to occur on the San Francisco, Morenci Red Hickey Hills, Smuggler Peak, and Harper allotments. The other 5 activities are not likely to have a direct adverse effect on razorback sucker. This loss of young suckers is likely to be insignificant when compared with the number of young fish that likely to be devoured by predacious catfish (Marsh and Brooks 1990) or stranded on fields via unscreened agricultural diversions (USFWS 1993, Minckley et al. 1991).

(2.) INDIRECT EFFECTS

Riparian development has been suppressed along the Gila River and San Francisco River as a result of past grazing practices. In areas where grazing activities that have not been adjusted to implement the BLM riparian policy livestock use continues to adversely impact riparian development.

Livestock grazing prior to 1981, in the Gila Box, impaired riparian function through reduction in plant cover and alteration of plant species composition in the Safford District (Rucks 1981). In 1996, 4 miles of the Gila River is Grazed yearlong, 17 miles have been deferred, and 4 miles has winter/spring grazing. Some of the area that has been deferred is grazed by trespass cattle that come down Eagle Creek. Trespass cattle presents a livestock control problem since eagle creek is privately owned. The lower reach of the San Franciso River is grazed by cattle that come off the uplands (primarily from the west, Morenci allotment). The upper reach is not grazed on regular basis by livestock due to the difficulty the ranchers on the Red Hickey Hills and San

Francisco allotment have with losing cattle down the riverbed. Bonita Creek has only 3 miles of grazed riparian habitat (seasonal winter use). Eight mile of Bonita Creek are deferred from grazing and are largely free of grazing impacts.

Grazed stream segments are at risk of adverse impacts due to destabilization of stream banks through trampling and localized heavy forage utilization. Loss of vegetative cover and destabilization of banks magnifies impacts of natural flood events to fish habitat. The potential results of livestock grazing on stream habitat include channel widening, altered meander pattern, sedimentation of pools and riffles, loss of overhanging vegetation and undercut bank, elevated summer water temperatures, wide daily water temperature fluctuations, and reduction in submerged woody cover (Meehan 1991). Some of these impacts are occurring, but are being reduced as the riparian policy and Congressional mandates for the Gila Box RNCA are being implemented.

Only a small number of range improvements are needed to provide control of cattle in the Gila River. About 4 miles of fence and several pumps and pipe to supply water from the River to the Uplands is needed. This is likely to produce minimal impacts to the Critical Habitat or watershed. Riparian fencing on the Gila River has begun and will be completed in less than 3 years. The potential benefits to fishery resources from improved riparian development along the Gila River include improvement of channel stability and of habitat diversity including formation off-channel pools and backwaters.

Once the proposed grazing management and riparian policy is fully implemented on the Gila River, the proposed management (Draft Gila Box RNCA Plan) would exclude livestock from all but 1 mile of winter/spring grazing along the eastern end of the Gila Box RNCA, 3 miles of winter/spring grazingupstream of the Gila Box RNCA, and a winter grazing riparian pasture on 3 miles of upper Bonita Creek. Riparian area condition has been improving over the years in Bureau managed riparian areas in the Gila River and Bonita Creek. Vegetation and streambanks would continue to be affected where winter grazing on the Gila River and Bonita Creek; however, the riparian condition is monitored and impacts appear to impair riparian function minimally. The lower half of Bonita Creek is in Proper Functioning Condition while the upper half is functioning at risk. the Gila River riparian areas are, with the exception of 2.7 miles, functioning at risk. Riparian improvement has been so dramatic that management of Bonita Creek area received national recognition by the American Fisheries Society.

Overall, the proposed grazing management in riparian areas should be beneficial to the razorback sucker, and it's Critical Habitat in comparison to previous grazing management. The construction of riparian pastures would result in improved livestock control in riparian and aquatic habitats. The quality of those riparian and aquatic areas rested from livestock grazing are anticipated to improve. Minckley and Sommerfeld (1979) supported the Upper Gila-San Simon Grazing EIS, especially with regard to

riparian management. This should benefit qualities of Critical Habitat on the Gila And Bonita Creek.

However, there are some short term indirect impacts from riparian grazing that adversely affect razorback sucker and adversely modify Critical Habitat. Some of these effects may remain, primarily from the drift of cattle down Eagle Creek and the San Francisco River into the Gila River, but also from winter grazing on Bonita Creek and the Gila River.

The 120 BLM grazing allotments on the Gila Watershed have a mixture of watershed conditions, both satisfactory and unsatisfactory, based on range condition surveys and professional judgement (See table 12).

Upland range conditions in the allotments with implemented intensive grazing systems (i.e. livestock rotation systems) and reduced forage allocations is anticipated to result in an increase in the density and vigor of perennial grass plants. Where yearlong grazing occurs, permitted use has been reduced substantially to lessen the adverse effects to range and watershed condition.

The 20-60 percent utilization level will result in a reduction in potential vegetative cover but is anticipated to leave enough cover to protect watershed function.

The drought policy is likely to reduce watershed damage from grazing during periods of low precipitation.

Some watershed impairment is likely to continue due to grazing induced reductions in potential vegetative cover and depressed soil infiltration rates. This is likely to cause a continued but small elevation in surface runoff volumes and depressed replenishment of local aquifers.

These impacts on the upland watersheds can have an adverse effect on critical habitat through decreased water discharge in to the Gila River from tributary aquifers and through increased flood peaks which may alter riparian habitat already weakened by roads or grazing. Ultimately, this could translates to the modification of Critical Habitat on the Gila River and its tributaries.

Soil disturbance is elevated in several ways as a result of the past and proposed development of the range improvements in the Gila River watershed. Initial minor disturbance caused by vehicle movement to and from the range improvement sites combined with thee actual construction of earthen reservoirs, and water pipelines would create a temporary disturbance through soil movement and compaction. 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 (months) or long periods (years).

The disturbance of these sites would increase the opportunity for erosion and sediment transport. This impact would affect up to 2 acres per existing and proposed water development. The 5 proposed or any existing stock tanks should not effect surface water drainage to a great degree as they are few and relatively small. Stock ponds on side drainage used to water cattle will result in little impact to the surface flow and the dam would act as a sediment trap mitigating upstream erosion. Approximately two acres would be disturbed for every mile of water pipeline constructed. Construction of the stock tanks would disturb about five acres of surface soils. The disturbance associated with the pipelines has been temporary, and has naturally revegetated. About half the disturbance associated with the stock tanks would be permanent due to water storage, soil compaction, and trampling of vegetation by livestock (Andrew 1988). T his impact to the Gila River watershed would be small in area but continuous and hard to evaluate. Small amounts of water would be pumped from the river which may have a small effect on surface flows in razorback sucker habitat.

Some adverse watershed impacts have been mitigated by the installation of 17 large and minor sediment detention dams on the San Simon watershed. Over 20,000 acre feet of sediment have been trapped. Sediment transport on the San Simon River appears to be decreasing. (BLM data 1996) Sediment production in the Gila River is generally lower than other rivers in the region (Dr. R.H. Hawkins, watershed hydrologist, Univ. of AZ. personal Comm.).

Although these watershed effects on BLM managed lands can alter razorback sucker habitat, they need to be put into the context of the total watershed in order to determine the magnitude of such effects. Approximately, 1,777 sq. miles (15%) of the Gila River watershed (to the Calva Gaging Station, USGS 1993) is managed by BLM. Of this 15%, less than one percent occurs at elevations above 7000 feet where 90% of the precipitation that feeds the Gila River and its tributaries occurs. Therefore, it is reasonable to say that the impact of the Safford District grazing program on both base flows and flood flows in the Gila River is likely to be very small. This is in part due to the reduced numbers of livestock (about 4 head/sq. mile), 40% average utilization (even less on steep slopes), that are expected to result in acceptable watershed conditions as well as the small percentage of the total watershed precipitation that falls on BLM lands.

However, adverse impact to the developing riparian areas, and consequently to Critical Habitat, in the Gila River and its tributaries may occur from increased flood peaks. Large storms can produce large quantities of rain at all elevations. If reduced soil infiltration and reduced vegetative cover affect the runoff response of the watershed, then larger flood peaks can be anticipated. If the magnitude and frequency of the floods is increased, then riparian development and stream channel features are likely to be altered and destabilized beyond levels that would occur with no grazing.

Again, the low densities of cattle and 40% utilization levels may reduce BLM grazing allotment contributions to watershed impacts to a negligible level.

The difficulty in making determination of watershed effect is compounded by the lack of specific local studies, variability in soil types, and alterations in vegetation community composition from grazing. This last factor may be important, as the second most abundant vegetation type in the district is semi desert grassland. Shrubs may increase at the loss of grass cover in semi desert grassland. As a result, allotments with semi desert grassland, range condition (and likely hydrologic function) may not improve without fire disturbance (McClaran 1995). All of this makes the evaluation of watershed effect problematic, but it appears that the proposed grazing management is likely to have a small impact on watershed function.

(3.) DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS

Bonita Creek allotment

Livestock drives are conducted annually down the riparian corridor from near the reservation boundary to Lee Trail, a distance of nearly 8 miles. The movement of a large number of animals (ca. 300 head) through this riparian area represents a concentrated impact over a short time span and limited area, making it potentially destructive to sensitive fish habitat features through bank erosion during flood events. This is compounded by the close timing of the drive with late winter rains and flooding in February and March. Soil moisture of banks is likely to be elevated at this time of year increasing their susceptibility to damage from trampling. Although grazing may be light during the drive, substantial bank damage may occur. The trailing of cattle up Bonita Creek is anticipated to have short term effects include excess turbidity and trampling of a small number of fish. In the unlikely event that razorback suckers still exist in Bonita Creek and do spawn, some loss of eggs and young fish may occur. If any adult individuals still remain, they are likely to reside in or retreat to deep water out of harms way during the drive.

A segment (three miles) in upper Bonita Creek is grazed annually by about 30 head of cattle during the winter (deferred rotational system, November-February). The winter riparian pasture is monitored and cattle moved before the onset of spring growth, thus, eliminating much of the potential impact of livestock grazing on the sucker or its' habitat.

The **San Francisco and Red Hickey Hills Allotments** have only a small portion of the allotment touching the San Francisco River. The permitees do not graze the riparian area in order to prevent losing livestock downstream which have to be gathered later. Grazing occurs out of the river bottom. No formal restriction on livestock grazing is presently attached to their AMP's.

Riparian grazing will be deferred on the **Morenci Allotment** within three years**.** Currently the riparian area is grazed yearround (75 head of cattle). However, livestock can still enter the Gila River from this allotment via private land on Eagle Creek. Preventing this is problematic due to the mixture of land ownership and topography.

The **Smugglers Peak Allotment** contains one mile of The Gila River near the eastern border of the Gila Box RNCA as well as three miles additional miles of the river upstream of the RNCA. This river reach is grazed in the winter and spring by > 30 head of livestock. this reach has been determined to be is in proper functioning condition (BLM 1993).

The **Harper Allotment** has riparian grazing along less than 1 mile of the Gila River. Sixty-four head of cattle have access to the riparian portion of the allotment on the Gila River. The riparian area on this reach of the Gila River has been rated as nonfunctional. Control of livestock is problematic on this allotment, the majority of the river in this reach is private or state land. The BLM is a very minor player in this portion of the river.

The **Zorilla, Gila, Twin C, Sheldon, Johnny Creek, and Bull Gap allotments** have had livestock excluded from the Gila River and Bonita Creek.

(**4.)** INTERRELATED AND INTERDEPENDENT EFFECTS

Razorback suckers and other native fish populations have been negatively impacted by exotic and non-native fish species (Minckley and Deacon 1991, Marsh and Brooks 1989).

Most introductions of non-native fish have been legally done by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in watson wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

Only four stock tanks and nine other ponds that persist longer than one year were identified on Safford District lands in the Gila River watershed. These stock tank serve two purposes. The primary purpose is to meet the needs for stock watering and wildlife. The secondary purpose, whether intended or not, may become for stocking with fish for recreational sport fishing. Some of the ponds on allotments are intended for the conservation of endangered species. Porter Wash ponds and Tom Nephew Pond

were created for stocking with native fishes but remain empty until an agreement with the Service and AGFD can be reached. Howard Well holds pupfish in a pond in close proximity to twp recreational ponds that harbor non-native fishes.

Known perennial stock ponds and ponds created for wildlife in the Gila River watershed portion of the Safford District. are as follows

Allotment No.	**Allotment Name**	**No. of Perrenial Ponds**	**No. of Ponds with Fish**
4602	Tom Springs	3	None
4604	Day Mine	3	1 Non-native
5108	Tanque	2	2 Non-native
5114	Fan	3	2 Non-native 1 Pupfish
5143	Silverstrike	1	1 Non-native

The only Stock pond that poses a risk of transporting nonnative fish is Mucho Tank on the Day Mine Allotment. It is a large perennial pond over one acre in size. This pond could overflow reaching Markham Creek which leads to the Gila River. The ponds on the Silverstrike Allotment are on drainage that braid out into flats and does not reach the Gila River. The ponds on the Tanque Allotment are fed by an artisan source and do not drain into a wash or other drainage that leads to the Gila River. The other ponds listed are for recreation and are not used to water livestock.

Most stock tanks are known to dry up annually in the Safford District. The risk posed by the use of these ephemeral waters and the development of new waters to the fish community of the Gila River is small. However, the potential for exotic fish and bullfrogs to be put into the more permanent ponds exists. Fishermen attempting to increase their recreation opportunity on their own could move exotic fish and bullfrogs into the more permanent ponds and subsequent flooding could move these fish down stream to occupied or Critical Habitat with detrimental impacts to the razorback sucker. However, it should be remembered that the Gila River already contains healthy, self sustaining populations of predatory non-native fish species.

Bureau activities with aggregate effects in the Gila River basin include, grazing on 120 allotments, sandrail use of the Gila Box RNCA, recreation, mineral leasing, and roads.

On and off highway vehicle travel can affect fishery resources. The Gila is generally traversed by light-weight "sand rails" which tend to remain above the waterline, except to cross the river, and within the geologically renewed disturbance zone demarcated by annual high water. This activity is highest during dry years and may be curtailed by high water during wet years. There is some possibility that fish including young suckers can be injured or displaced and eggs from spawning areas crushed by this activity. In addition, the productivity of shallow riffle (which supply food for fish) crossing areas can be impaired. However, the adverse impact to the fishery is probably limited during most years. The adverse effects of this activity could become more significant during drought years should water quantity become very low and quality reach subcritical levels for fish survival (Minckley and Sommerfeld 1979). If and when livestock are fenced out of the riparian areas of the Gila Box RNCA, the impacts of sand rails on riparian development are likely to become more pronounced.

Recreation activity, in the most popular recreation areas along Bonita Creek, such as wading, swimming and walking up and down the creek probably displace fishes (e.g. Gila chub and, perhaps, razorback sucker) sensitive to frequent disturbance. These activities have an adverse impact of unknown extent. Gold planning at present levels is likely to have light localized impacts to the fish community. However, during droughts when environmental conditions are subcritical to fish, the impact of disturbance associated with recreation activity could be significant.

Sand and gravel activities can lead to excessive sedimentation, water pollution, and watershed degradation that affect the quality of aquatic habitats for fish and other organisms (Nelson et al. 1991). In Contrast, abandoned gravel pits along rivers can also become habitat for razorback suckers once they become inundated with water.

Riparian Roads in Bonita Creek and the San Francisco River have an inherent risk of altering stream hydrograph, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Bonita Creek will be exposed to a high risk of erosion from flooding due to the narrow box canyon nature of the drainage. Some segments may be so badly channelized now that further erosion appears inevitable in any case.

The Brown canal diversion which is maintained on Public lands is unscreened and likely to transport fish to fields where they will perish.

The proposed grazing management coupled with these other activities may limit aquatic habitat in the Safford district from reaching its full potential for the razorback sucker and its designated Critical Habitat.

(5.) INCIDENTAL TAKE AS APPLICABLE

From the above analysis it is apparent that a small amount of incidental take is possible from the direct impacts of cattle trampling fish and indirectly from habitat modification from watershed and riparian degradation coupled with other aggregate and cumulative effects.

d. RATIONALE FOR EFFECTS ANALYSIS

The analysis of the effects of the proposed action should be considered in an historical context to some degree. Historically, livestock grazing on Safford District occurred at levels and intensities far in excess of anything seen today. Prior to the Taylor Grazing Act in 1934 overstocking and overgrazing was a general rule rather than the exception. Prior to 1934 it was not uncommon for large numbers of livestock to die from starvation or lack of water during times of drought. The impacts of these grazing practices on riparian areas, watersheds, and soil erosion are believed to be extremely destructive. For instance in the 1930's the San Simon Watershed was recognized as one of the most disturbed watersheds in the nation. Between 1934 and the present livestock numbers have been reduced and livestock management practices have improved. At the present time most areas in southern Arizona are stocked at levels that are somewhere between 10 percent and 25 percent of historic levels. As a result of reduced stocking levels and better livestock management range conditions have improved. The analysis of the proposed action should be cognizant of this history and view existing impacts in the light of past impacts coupled with the slow recovery trend and the possibility that ecological potentials may not be the same as the once were.

There are six actions analyzed in this BE: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The results of this analysis are presented in tables 12 and 12a for the 12 allotments occupied by razorback Sucker.

Permitted use was not found to, be likely to, adversely affect razorback sucker on any of the allotments analyzed. Instead the grazing system and lack of implementation of riparian policy were responsible for any adverse effects to this fish.

Utilization level may affect watershed cover which can affect razorback habitat. However, it was determined that the aggregate affects of grazing 121 allotment on 15 percent of the Gila River watershed plus other activities that disturb the watershed culminate in an adverse impact to razorback sucker habitat.

The grazing system allows cattle to trail and graze part of Bonita Creek and graze the Gila River. Bonita Creek where there is winter grazing has been rated as functional at risk (Bonita Creek allotment). The grazed area on the Gila River was rated to be in proper functioning condition (Smugglers Peak allotment). These areas allow livestock to use razorback sucker habitat for watering and forage. This is likely to have adverse impacts associated with some possible razorback sucker mortality and habitat alteration.

Maintenance and construction of range improvements may affect watershed function to a small degree. This small impairment of watershed function has an aggregate effect when coupled with other watershed disturbances, especially the grazing of 121 allotments in the Gila River Watershed.

One stock pond is likely to have an adverse effect on razorback sucker through the risk of additional nonnative fish contamination. However, it should be remembered that the Gila River and San Carlos Reservoir already have healthy self sustaining populations of predatory non-native fish.

The implementation of the Congressional mandates and activity level planning has not been completed for the Gila Box RNCA. Restricted levels of grazing continues in substantial portions of the Gila River. Fencing and alterations in grazing systems are being implemented and are anticipated to result in substantial benefits to riparian development and razorback sucker habitat on the Gila River.

The goals of the riparian policy are being achieved in some areas and need to be implemented in other areas. Portions of the Gila River and most of Bonita Creek have had the riparian policy implemented. The Harper and Morenci allotments do not yet conform to the riparian policy. This has resulted in warm season grazing that can damage habitat and cause razorback sucker mortality through grazing of riparian foliage and trampling.

e. EFFECT DETERMINATION (SUMMARY)

Through this evaluation it is the Bureau's determination that the proposed grazing management **may affect and is likely to adversely affect** the continued existence of the razorback sucker in the Safford District based on activities in the Day Mine, Smuggler Peak, Bonita Creek, and Harper allotments. It is also the Bureau's finding that the proposed grazing management **may adversely modify Critical Habitat**, but that this modification is not irreversible. Activities on the remainder of BLM allotments in the district pose no real threat to the continued existence of razorback sucker due to their remoteness from occupied habitats.

5. PROPOSED MITIGATION MEASURES

Conduct snorkel surveys to detect the presence and distribution of razorback suckers in the Gila and San Francisco Rivers and Bonita Creek.

Monitor watershed condition.

Continue to monitor range condition, but begin collection of watershed cover data as well to help determine watershed condition.

Licensed livestock use will be in balance with the grazing carrying capacity and important components of watershed function.

Defer or manage livestock grazing as prescribed in the RMP to assure watershed conditions are maintain and/or improved, especially on excellerated eroding areas.

Develope and implement prescribed fire plan to enhance watershed function in semi desert grassland areas.

Unleased tracts and representative areas where these tracts do not exist should be set aside for comparison with grazed areas as suggested by Bock and Bock (1993).

Continue to implement the riparian policy on allotments with riparian habitat.

Implement the Gila Box RNCA plan.

Work with private land owners to prevent unauthorized use by livestock in the Gila River from Eagle Creek and the San Francisco River.

Provide permanent water for livestock and wildlife using troughs instead of ponds., where feasible.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Past and present practices including farming, unscreened water diversions that strand fish on fields, water development, introduction of non-native fishes, pollution, watershed degradation, road building and maintenance, wood cutting, mining, and livestock grazing have left the aquatic habitat for fish in a degraded state.

Past and present removal of water by the City of Safford constitutes one of the largest adverse impact to fish habitat on Bonita Creek. Water withdraw by the City of Safford is substantial and may become critical to fish during years of low precipitation.

Agricultural operators divert water along the Gila River which reduces discharge during periods of normal low flow and results in higher concentrations of dissolved solids (Minckley et al 1979).

Much of the watershed in Arizona and New Mexico is in poor condition. The result appears to be larger floods and lower base flows in the Gila River and its tributaries (Dr. R.H. Hawkins, watershed hydrologist, Univ. of AZ. personal comm., Peter Stewart, Hydrologist, Gila Nat'l Forest, personal comm.). In addition, increased ground water pumping and channel incision may lead to dewatering as has occurred on other systems such as the Santa Cruz, Bill Williams, and San Pedro Rivers. Settlement and grazing over the last 150 years has resulted in the poor watershed conditions; years of overgrazing may have resulted in the loss of topsoil through erosion leaving behind the gravelly, armored soil surface we see today . Flow conditions have changed over time with greater peaks during storms and longer periods of low or no flow during drought (Minckley and Sommerfeld 1979, Dr. R.H. Hawkins, watershed hydrologist, Univ. of AZ. personal Comm.). Land use and watershed modification in watersheds have likely resulted in a loss in channel complexity and "dynamic equilibrium" so that a more simplified and unstable habitat is common (Minckley and Sommerfeld 1979, Davis 1982). These changes occur slowly but continuously and the problem is recognized only when good historical data are available (Rabini 1992). An additional impact may have come from the elimination of beaver from much of the watershed (Davis 1982).

The watershed has been damaged by roads and scattered active and abandoned mines. Thousands of acres have been disturbed by the Morenci Mine and its spoils. Reports of mine spills and effluent seeps that enter stream courses or percolate into the ground are not uncommon (Minckley and Sommerfeld 1979) and have occurred to a great extent in the past (Chamberlain 1904). In many places throughout the area riparian roadways on private and state lands damage stream banks. Many of the stream bottoms are run by sand rails and motorcycles. Mesquite bosques along the Gila River have been damaged clearing for camps, vehicle traffic, and wood cutting (Minckley and Sommerfeld 1979).

Functioning riparian areas have been reduced to a small fraction of there original distribution over the last century (Ohmart and Anderson 1986). Livestock grazing and its affects are pervasive throughout the watershed.

The historic practice of stocking non-native fishes represents another negative impact to the native fish community (USFWS 1993, Minckley et al 1991, Minckley et al 1979). Non-native fishes in the designated Critical Habitat include Largemouth bass, smallmouth bass, various sunfish, carp, channel catfish, red shiner, yellow bullhead, mosquitofish, fathead minnow, and flathead catfish (Minckley et al 1979, BLM files). San Carlos reservoir is likely the source of many of these fishes and contributes to the problem as a source for continual upstream contamination. Unscreened canals can

draw in fish only to leave them stranded to die on agricultural fields. Diversions can also impede fish migration.

These impacts have culminated in the local extirpation of several native big river species such as razorback sucker, bonytail chub and Colorado squawfish by the turn of the this century. Some of these impacts are still impacting the native fish community: unscreened diversions draw in fish, water development, pollution, watershed degradation, road building and maintenance, mining, and livestock grazing. The influx of non-native fishes represents another adverse impact to the native fish community that has the potential to increase over time if left unchecked (Courteney and Moyle 1992). These past impacts have left a legacy of changes that encumbers the potential for improved management to restore the integrity of the ecosystems in the Gila River basin (Minckley and Deacon 1991).

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SONORA CHUB (*Gila ditaenia*)

1. T&E STATUS/CRITICAL HABITAT

Threatened with Critical habitat (USFWS 1992).

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Coronado National Forest.

3. HABITAT REQUIREMENTS

This chub inhabits perennial and interrupted creeks and streams. It prefers pools with in-stream or overhanging cover.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

The watershed above Sycamore creek has been degraded by, grazing, mining, recreation, and exotic taxa. Improper grazing may perpetuate this disturbed state or exacerbate it. "The importance of a stable, undisturbed watershed for maintaining the environment needed for survival and reproduction of Sonora chub in the United States cannot be overstated" (USFWS 1992, p.15).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Not located on Bureau managed lands nor within watersheds affected by Safford District grazing allotments.

6. EFFECT DETERMINATION

No effect.

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SPIKEDACE (*Meda fulgida*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

Listed as a **Threatened** species in 1986 with Critical habitat designated in 1994 (USFWS 1986, USFWS 1994). It was petitioned for listing as Endangered in 1994. Up-listing was found to be warranted but precluded by other listing priorities (USFWS 1994). Critical habitat was designated in Aravaipa Creek, Graham and Pinal Co.'s, which included the Bureau's wilderness area plus several miles upstream and downstream. The Verde River, Yavapai Co. and the Gila River, Grant and Catron Counties were the only other areas designated.

b. T&E OCCURRENCE

Aravaipa Creek through out the wilderness area is well known for it's spikedace population (Table 13). No other occurrences are known for BLM managed lands in the Safford District.

c. T&E SURVEYS

Aravaipa has had annual collections for about 25 years. The Spikedace is present through out the creek but is not known to occur in any of its tributaries. A preliminary survey on the Gila River in 1991 did not find any spikedace.

d. CONSULTATIONS AND CONFERENCES

Number	Name
2-21-88-F-114	Safford District RMP
2-21-92-F-070	Gila Box RNCA Plan
2-21-87-I-088	Eradication of Exotic Fishes, Aravaipa
2-21-92-I-108	Prescribed Burns, Aravaipa Tablelands
2-21-94-I-543	BLM Acquiring 3 Parcels of Land, Aravaipa

e. REASONS FOR SPECIES DECLINE

This minnow is threatened by habitat destruction due to impoundment, riparian alteration, channel downcutting, water diversion, ground water pumping, and the spread of non-native predatory and competitive species (USFWS 1991). The landscape surrounding spikedace habitat has been impacted by domestic livestock grazing, mining, agriculture, timber harvest, and other development. These activities contribute

to habitat degradation by altering flow regimes, increased watershed and channel erosion and thus sedimentation, and adding contaminants such as toxic materials, or nutrient-enriching fertilizers to streams and rivers (USFWS 1991).

2. RECOVERY PLAN

a. NAME

Spikedace recovery plan.

b. REQUIREMENTS AND RECOMMENDATIONS

c. BUREAU STEPS TO ACCOMPLISH THE REQUIREMENTS

The following actions from the implementation schedule are required by the Bureau to recover the Spikedace:

1) Identify all populations and determine the present level of protection.
2) Enforce laws and regulations pertaining to the ESA and land management,
3) Insure natural flows regimes are maintained,
4) Identify the need for and construct of barriers for the conservation of this fish,
5) Acquire available lands and associated water rights,
6) Protect acquired lands from adverse impacts,
7) Establish standard monitoring locations and techniques,
8) Determine natural variation in abundance and age class structure,
9) Determine standard methods for quantifying abundance,
10) Conduct bi-annual population estimates,
11) Monitor community composition including range of natural variation, determine the significance of interaction with non-native fishes,
12) Identify areas in need of management and determine necessary habitat improvements,
13) Identify and prepare sites for reintroduction,
14) Reintroduce Spikedace into selected stream reaches and monitor,
15) Determine reasons for success or failure of the reintroduction and rectify the problem,
16) Determine quantitative criteria for describing a self-sustaining population,
17) Provide information and education about this species to the public,
18) Ensure that all professional information is made available to other agencies and interested parties.

d.SAFFORD DISTRICT ACCOMPLISHMENTS TOWARD RECOVERY PLAN

Surveys for new populations are being conducted on Bureau lands in the Gila River Drainage. The Bureau has been involved in law enforcement and monitoring activities primarily through the Aravaipa Ranger(s). This provides a presence that deters resource damage and helps law enforcement officers prosecute violators. Water rights have been obtained on Aravaipa Creek. The Bureau has been instrumental and fully involved in the Aravaipa fish exclusion devise (FED) since 1989. Plans were drawn up for an upstream FED on Aravaipa Creek in 1991 using Bureau funds through an Assistance Agreement with The Nature Conservancy (TNC). The Aravaipa wilderness was expanded in 1990 and lands along the Aravaipa Creek are being purchased.

Significant studies on Aravaipa Creek and its resources, especially fish have been sponsored or conducted by the Bureau. Minckley 1981, Williams 1991, Velasco 1994 and AGFD 1995. All of these studies were directed at understanding the native fish community including Spikedace. The latter two studies specifically looked at the natural variation in abundance and age class. Reintroduction of spikedace is specifically addressed in the draft Gila Box RNCA Plan and The draft Muleshoe CMA Plan. Information obtained by the Bureau is being disseminated to other agencies and interested publics. In addition the entire Bureau managed portion of the Aravaipa watershed was inventoried for permanent stock ponds and exotic fish. An EA was drafted and signed to allow for renovation of any contaminated ponds.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

This fish lives two to three years and attains a typical size of less than three inches. Spikedace breed in the spring (April-June) in response to water discharge and increasing temperature. Eggs are adhesive and demersal which means that they are deposited in the water column or on substrate. Hatching time for most other native cyprinids is about one week. No specific hatching times have been observed. This fish is largely carnivorous. Important food types include ephemeropterans, hydropsychid trichopterans, and chironomids.

b. RANGE OF SPECIES

Historically, this species was widely distributed throughout much of the Gila River system. The type specimen was collected from the San Pedro River in 1851. The current range is restricted to the upper Gila River in New Mexico, Aravaipa Creek, Eagle Creek, and upper Verde River. There remains a strong possibility that

some supposedly extirpated populations (Knowles et al. 1995) still exit, well as, undiscovered populations.

c. HABITAT REQUIREMENTS

Spikedace occupy flowing water, usually less than a meter deep, over sand and gravel substrate. Microhabitat features often include shear zones along sand-gravel bars or broad shallow areas over gravel-sand bars or quiet eddies on the downstream edge of riffles. As with most native fishes young are often found along stream margins over soft fine grained bottoms. In larger rivers, spikedace are often found in the vicinity of tributary mouths. The fish use shallower, strongly flowing areas in springtime, often over sand/gravel substrate. Specific habitat associations vary seasonally, geographically, and by life stage. Spawning occurs over sandy gravelly riffles (USFWS 1991).

To summarize the spikedace habitat requirements, this fish needs: 1) unpolluted water with natural variation in temperature, pH and salinity, 2) flowing water less than three feet deep, 3) shear zones created by gravel bars and quiet eddies below riffles, 5) riffles with gravel substrate for spawning, 6) habitat areas free of nonnative competitors and predators, and 7) unregulated flooding from storm events to renew habitat features.

d. RATIONALE FOR POTENTIAL HABITAT

None identified.

e. HABITAT CONDITION

The habitat in Aravaipa Creek has a high component of riffle and run, but lacks substantial pool development. There is a high sediment load of sand and periodic heavy metal pollution (Minckley 1981). Despite these problems, conditions at Aravaipa Creek afford adequate habitat for this species (Velasco 1994, Bettaso et al. 1995) with substrate adequate for spawning. Riparian condition has not been evaluated for proper functioning condition (BLM 1993), but appears to be in proper functioning condition and at or near its potential based on professional judgement.

f. CURRENT CONDITION OF SPECIES AND POPULATIONS

(1.) RANGEWIDE

Both the distribution and abundance of spikedace have become dramatically reduced in the past century, with major changes occurring in recent decades. Major rivers and streams such as the lower reaches of the mainstream Gila, Salt and Verde

rivers that once supported substantial populations have been recently depleted (USFWS 1991).

(2.) ACTION AREA

The Aravaipa Creek population remains healthy. However, it is at risk from non-native fish invading the canyon, especially the red shiner (Velasco 1994, Bettaso et al. 1995).

4. DETERMINATION OF EFFECT

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

The direct effects of cattle grazing are few to spikedace. Eggs and larval fish can be damaged by trampling (Roberts and White 1992). Larval and fingerling sized fish use shallow water along the margins of aquatic habitat and are weak swimmers at for a time. These small fish are not likely to totally avoid being stepped on or ingested by livestock drinking water.

(2.) INDIRECT EFFECTS

Livestock grazing in the southwestern U.S. has been demonstrated to alter the species composition of vegetation communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main impacts from cattle are the grazing of plants and trampling of vegetation and soil (Platts 1991, Marlow and Pogacnik 1985). These impacts can affect the composition and density of plant communities as well as the hydrologic function of both riparian zones and uplands watersheds. (Fleischner 1994, Platts 1991).

Water quality can be impaired by livestock grazing from nonpoint source pollution and at locations where large numbers of animals congregate. Cattle waste products can deteriorate water quality resulting in alteration of fish communities or fish kills. The impact generally comes from increased levels of ammonia (NH_3)and Nitrite (NO_2) and decreased levels of dissolved oxygen (O_2) (Taylor et al.1989, Cross 1971). The effects of this type of pollution are increased under conditions of limited water supply such as in small ponds and springs. Sedimentation from erosion caused by livestock can impair spawning areas and reduce aquatic productivity which can affect food production (Ward 1992, Meehan 1991).

Riparian areas are important in providing quality habitat for this fish. Increased riparian vegetation has been documented to increase instream cover, increase

overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and increase terrestrial invertebrate prey for fish (Platts 1991).

The soils along streams are vulnerable to erosion. Factors thought to be important to the destabilization of streams in the southwest are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Platts 1991, Fleischner 1994). Riparian soil and bank stability should be greater where more intensive management such as riparian fencing and rotational grazing are implemented (Skovlin 1984, Kovalchik and Elmore 1992, Platts 1991). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel destabilization is reduced significantly (Hendrickson and Minckley 1984, Meehan 1991, Kovalchik and Elmore 1992). This is important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream destabilization and concomitant loss of floodplain function (Hastings 1959, Bahre 1991).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney *et al*. 1993). The extent of watershed disfunction which is induced or exacerbated by grazing or is, instead, the product of past management or natural climatic/geologic conditions is uncertain (Masters et al 1991, Bahre 1991, Hastings and Turner 1965). However, it is generally accepted that watershed disturbances from grazing have the potential for negative impacts which can effect fish habitat through excess sedimentation, lowered base flow, altered channel geometry, and erosion from exacerbated flood peaks (Meehan 1991, Debano and Schmidt 1989). Continuous yearlong livestock grazing can affect hydrologic function by reducing protective vegetation and litter and by soil trampling (Fleischner 1994, Platts 1991, Gifford and Hawkins 1976). Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates (Gifford and Hawkins 1976, Blackburn 1984, Orodho *et al*. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). These authors conclude that continuous yearlong grazing may result in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations.

Intensive grazing systems can lessen some of these impacts. The following primary benefits of better grazing systems include, less water erosion and sediment yield, increased water retention, and decreased soil erosion. The anticipated increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991).

Improved range condition due to improvement in plant density and vigor, hence potential production, 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 (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). Implementation of intensive grazing management such as rest rotation, Santa Rita and other systems is likely to improve range condition and watershed function but may not maximize them.

Even with an intensive grazing system, water infiltration rates on the watershed are likely to be impaired. Gifford and Hawkins (1976) found in their review of infiltration studies associated with grazing in the western U.S. that light to moderate grazing caused an average 25 percent decline in infiltration on moderately porous soils while heavy grazing caused a 65 percent decline. They suggested that time required for infiltration rates to fully recovery from the effects of grazing may exceed 10 years after livestock grazing has ceased (Gifford and Hawkins 1976). Studies by Dadkhah and Gifford (1980) 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. With a reduction in infiltration, it can be anticipated that increased run off volume and decreased recharge to local aquifers will occur (DeBano and Schmidt 1989). However, the work of Rich and Reynolds (1963) in central Arizona indicated that 40 percent (moderate) utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing. The effects of grazing apparently vary by site according to such variables as soil type, non-forage related ground cover, cattle loading (number of livestock and grazing duration), long-term history of cattle use in the area, season of use, and time and space distributions of cattle (Gifford and Hawkins 1976).

The aggregate effects of other activities is likely to be additive to or magnify the effects of grazing to the watershed and the stream channels. These activities include, recreation, road placement and extent, past watershed degradation, loss of beaver activity, mining, pollution from abandoned mines,

Many watershed impacts (including grazing) are cumulative, slow acting, and show effects on a time scale not usually considered by land management agencies. Over 200 hundred years of human activity have resulted in an altered hydrography and generally lowered water tables, disrupting the original flow conditions in many areas (Rabini 1992).

Finally, the loss of native fish may occur from the close proximity of stock waters contaminated with non-native fish and frogs to uncontaminated native fish habitats. Such permanent waters facilitate the easy transport of non-native fish and frogs to these habitats by recreationists attempting to expand fishing opportunities on their own

initiative. Flooding can also move non-native fish and frogs from upstream impoundments to downstream habitats occupied by native fishes. This contamination of native fish habitat with non-native fish and frogs often results in the loss of individual native fish or, possibly, entire populations through predation or competition (Minckley and Deacon 1991, Miller 1961, Minckley and Deacon 1968).

Most introductions of non-native fish have been done legally by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson Wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

a. ANALYSIS OF EFFECTS BY PROPOSED ACTION

(1.) DIRECT EFFECTS

The riparian area within the Bureau's wilderness boundary has not been grazed since 1973 (Rucks 1981) and the semi-annual trailing of cattle is limited to 15 head of cattle. However, seasonal riparian grazing by two head of cattle is may allow for some injury to spikedace. Small numbers of larval spikedace or their eggs may be damaged from winter or spring grazing and resulting trampling similar to that of wading fishermen (Roberts and White 1992). Adult fish are less likely to be harmed directly since they occupy the middle portion of the water column and will likely flee from oncoming danger.

(2.) INDIRECT EFFECTS

Grazing and trailing of livestock in Aravaipa Creek is likely to have small effects on stream bank erosion and habitat characteristics.

Seasonal riparian grazing by five head of cattle could cause damage to the riparian area and stream banks along two small (0.1 miles) segments located upstream and downstream of the wilderness. However, this grazing preference has not been in use on the BLM property. The rest of Aravaipa Creek is not grazed and the reach through the wilderness (12 miles) has not been grazed for over 20 years.

The nine BLM allotments on the Aravaipa watershed have mixture of watershed conditions, both satisfactory and unsatisfactory, based on range condition and professional judgement.

Upland range condition in the allotments with deferred grazing is anticipated to

improve. This is expected to result in an increase in the density and vigor of perennial grass plants present. Where yearlong grazing occurs, permitted use has been reduced substantially to lessen the adverse effects to range and watershed condition.

The 40 percent average utilization level reduce potential watershed cover, but is anticipated to leave enough cover to protect watershed function.

The drought policy is likely to reduce watershed damage from grazing during periods of low precipitation.

Some watershed impairment is likely to continue due to grazing induced reductions in potential vegetative cover and depressed soil infiltration rates. This is likely to cause a continued but small elevation in surface runoff volumes and depressed replenishment of local aquifers.

Loss of vegetative cover and decreased soil infiltration rates can have an adverse effect on critical habitat through decreased water discharge into Aravaipa Creek tributary aquifers and through increased flood peaks which may alter riparian habitat development from reaching an optimum state.

Soil disturbance would increase in several ways as a result of the past and maintenance of developed range improvements in the Aravaipa watershed. Most of the range improvements have been completed. Initial minor disturbance caused by vehicle movement to and from the range improvement sites could occur. The actual construction of earthen reservoirs, and water pipeline would create a temporary disturbance through soil movement and compaction. 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 (months) or long periods (years).

The disturbance of these sites would increase the opportunity for erosion and sediment transport. This impact would affect up to two acres per existing and proposed water development. The five proposed or any existing stock tanks should not effect surface water drainage to a great degree as they are few and relatively small. Stock ponds on side drainage used to water cattle will result in little impact to the surface flow and the dam would act as a sediment trap mitigating upstream erosion. Approximately two acres would be disturbed for every mile of water pipeline constructed. Any new construction of the stock tanks would disturb about five acres of surface soils. The disturbance associated with the pipelines has been temporary, and has naturally revegetated. About half the disturbance associated with the stock tanks would be permanent due to water storage, soil compaction, and trampling of vegetation by livestock (Andrew 1988). This impact to the Aravaipa watershed would be largely continuous and hard to evaluate. Few new range improvements are anticipated in the

Aravaipa basin.

These watershed effects on BLM managed lands can alter spikedace habitat and need to be put into the context of the total watershed in order to determine the magnitude of such effects. On the South rim allotment about 17,000 acres has not been grazed for 20 years. Another 17,000 acres is likely to be deferred a long period (five years or more) as requested by the permittee. Less than 109 of the 527 sq. miles (20 percent) of the Aravaipa watershed (Aravaipa stream gaging station, USGS 1993) is managed by BLM. Of this 20 percent, less than one percent occurs at elevations above 7000 feet where 90 percent of the precipitation that feeds Aravaipa Creek and its tributaries occurs. Therefore, it is reasonable to say that with the reduced numbers of livestock (about eight head/sq. mile), 40 percent average utilization (even less on steep slopes), and the small contribution of precipitation at the elevations on BLM lands; that the impact is likely to be small on flood flows and base flow in Aravaipa Creek.

Adverse impact to riparian areas, and consequently to Critical Habitat, in Aravaipa Creek and its tributaries may occur from increased flood peaks. Large storms can produce large quantities of rain at all elevations. If reduced soil infiltration and reduced vegetative cover affect the runoff response of the watershed, then larger flood peaks can be anticipated. If the magnitude and frequency of the floods is increased, then riparian development and stream channel features are likely to be altered and destabilized beyond levels that would occur with no grazing. Again, areas with no grazing coupled with the low densities of cattle and utilization level of 40 percent on areas that are grazed are may reduce watershed impacts to a negligible level.

The difficulty in making determination of watershed effect is compounded by the lack of specific local studies, variability in soil types, and alterations in vegetation community composition from grazing. This last factor may be important, as the second most abundant vegetation type in the district is semi desert grassland which is prevalent on allotments in this watershed. Shrubs may increase at the loss of grass cover in semi desert grassland. As a result, allotments with semi desert grassland, range condition (and likely hydrologic function) may not improve without fire disturbance (McClaran 1995). All of this makes the evaluation of watershed effect problematic, but it appears that the proposed grazing management is likely to have a small impact on watershed function.

(3.) DIRECT AND INDIRECT EFFECT BY ALLOTMENTS

Bureau activities with aggregate effects in the Aravaipa Creek basin include, grazing on nine allotments, recreation, range improvements, mining, and roads. See Appendix 2 for specific information on allotment analyzed below.

The **South Rim Allotment** which comprises 49 percent of the Aravaipa public

lands or 34,634 acres is not currently being grazed and is likely to be deferred for at least several years. The western half (west of Virgus Canyon) of this allotment has been in non-use for about 20 years. For the last 10 years the eastern portion of this allotment has been at half of its permitted use level. This is appears to have resulted in good watershed condition and data indicates that range condition is good to excellent in 75 percent of the allotment. This likely benefits hydrologic and soil protection relationships that will improve spikedace habitat. This improved condition should slightly decrease the runoff potential of the range (DeBano and Schmidt 1989, Orodho *et al*. 1990, Chaney *et al*. 1993) within the district. As plant density increases, more of the available moisture infiltrates into the soils or runs off more slowly into first order ephemeral stream channels and is either moved as groundwater through the watershed, or is utilized by plants on site and less runs off. This allotment is within several ACEC's that are designated to benefit desert grassland ecology. The South Rim also has the Turkey Creek ACEC which has had cattle grazing excluded.

Watershed conditions on the **Painted Cave Allotment** has a substantial component that has been judged to be in unsatisfactory condition based on range condition surveys and professional judgement. This allotment has no riparian grazing.

Watershed conditions on the **Dry Camp Allotment** have been judged to be in satisfactory condition based on range condition surveys and professional judgement. This allotment has no riparian grazing.

Watershed conditions on the **Hell Hole Allotment** has a substantial component that has been judged to be in unsatisfactory condition based on range condition surveys and professional judgement. This allotment has no riparian grazing but does have livestock trailing in Aravaipa Creek. Less than 10 head are trailed in Aravaipa Creek three times a year. This can result in some habitat degradation and injury to spikedace.

Watershed conditions on the **Brandenberg Mountain Aallotment** have been judged to be in satisfactory condition based on range condition surveys and professional judgement. This allotment has not had riparian grazing although a small piece of the allotment touches Aravaipa Creek.

The **Quintana Allotment** is very small (40 acres**).** The Permittee runs his cattle on irrigated pasture and prefers not to run cattle in the Creek.

The **Aravaipa, South Aravaipa and Laurel Canyon Allotments** are also located on the Aravaipa watershed.

(4.) INTERRELATED AND INTERDEPENDENT EFFECTS

Spikedace and other native fish populations have been negatively impacted by exotic and non-native fish species (Minckley and Deacon 1991, Velasco 1994, Miller 1961, Minckley 1968).

Most introductions of non-native fish have been legally done by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public (e.g. topminnow, red shiners, and guppies in Watson wash, sunfish in Martin Well). The release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964).

Ninety-eight stock tanks were identified on Bureau-managed lands by Bagley (1987). Of these 62 had indication of long-term persistence, yet only two had fish. A third pond on private land was renovated with a piscicide. Stock tanks with perennial water storage tend to serve two purposes. The primary purpose is to meet the needs for stock and wildlife watering. Their secondary purpose, whether intended or not, may become for stocking with fish for recreational sport fishing. The allotments with stock tanks containing perennial water include Aravaipa, Painted cave, Dry Camp, and South Rim.

Many of the stock tanks are known to dry up annually on the Aravaipa watershed. Those located on Bureau lands that don't dry are often very remote, decreasing the risk of illegal fish stocking. The risk posed by the use of existing waters to the fish community of Aravaipa Creek is small, but real, as evidenced by the spread of green sunfish in side canyons such as Virgus and Horse Camp. The potential for exotic fish and bullfrogs to be put into the more permanent ponds exists. Subsequent flooding or fishermen attempting to increase their recreation opportunity on their own could move the exotic fish and bullfrogs into occupied or Critical Habitat with highly detrimental impacts to spikedace. The present policy is to build stock tanks that also provide permanent water for wildlife. This policy can lead to the spread of nonnative fishes through illegal sportfish transfers.

The aggregate effects of Bureau activities in the Aravaipa area include, the combined effects of the 9 grazing allotments, recreation, mining, and roads.

Vehicle travel and road maintenance that results from the high profile Aravaipa Wilderness can affect fishery resources. Fish can be injured or displaced and eggs from spawning areas crushed by vehicle activity. In addition, the productivity of shallow riffle (which supply food for fish) crossing areas can be impaired.

Recreation activity along Aravaipa Creek, such as wading, swimming and walking up and down the creek can injure fish if contact is made or displace fish sensitive to frequent disturbance. These activities have an adverse impact of unknown extent. Aravaipa receives an estimated 4,000 visitors annually.

Mining activities can lead to excessive sedimentation, water pollution, and large scale watershed degradation that affect the quality of aquatic habitats for fish and other organisms (Nelson et al. 1991, Minckley 1981).

Riparian and upland roads in Aravaipa have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Aravaipa and Turkey Creeks will be exposed to a high risk of erosion from flooding due to the narrow box canyon nature of the drainages.

The riparian road in Turkey Creek have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Turkey Creek could be exposed to a high risk of erosion from flooding due to the narrow box canyon nature of the drainage. However, the general lack of road maintenance in Turkey Creek and presence of a healthy riparian area indicate that the road is not inducing any noticeable impact to Turkey Creek. Many of the upland roads are on steep terrain an subject to some degree of erosion.

The proposed grazing management coupled with these other activities may limit aquatic habitat from reaching its full potential for the spikedace and its designated Critical Habitat. However, the adverse effects are likely to be small.

(5.) INCIDENTAL TAKE AS APPLICABLE

From the above analysis it is apparent that a small amount of incidental take is possible from the direct impacts of cattle trampling fish and indirectly from habitat modification from watershed degradation coupled with other aggregate and cumulative effects.

d. RATIONALE FOR EFFECTS ANALYSIS

There are six actions analyzed in this BE: permitted use; grazing systems; utilization level; range improvements; riparian area management; and special management areas. The results of this analysis are presented in Tables 13 and 13a for allotments occupied by spikedace.

Permitted use was not found to be likely to adversely affect spikedace on any of the allotments analyzed. Instead the grazing system that allows riparian trailing is responsible for any adverse effects to this fish.

Utilization level may affect watershed cover which can affect spikedace habitat. However, it was determined that the aggregate affects of grazing 9 allotments plus other activities that disturb the watershed culminate in a small adverse impact to spikedace habitat.

The grazing system allows cattle to trail Aravaipa Creek is responsible for any adverse effects to this fish. Trailing cattle through Aravaipa creek can result in some habitat degradation and injury to spikedace.

Maintenance and past construction of range improvements may affect watershed function to a small degree. This small impairment of watershed function has an aggregate effect when coupled with other watershed disturbances, especially the grazing of nine allotments in the Aravaipa watershed. Stock ponds may have an adverse effect on Spikedace through the risk of nonnative fish contamination.

The management of ACEC's and Wilderness has resulted in tempering livestock grazing to the point where minimal adverse impacts are likely to effect spikedace.

The goals of the riparian policy are being achieved on BLM lands in Aravaipa Creek and have been for some time (Rucks 1984). This has likely had significant benefits to fish habitat.

e. EFFECT DETERMINATION (SUMMARY)

The spikedace is known to occur in Aravaipa Creek within the Safford District. The grazing system on the Hell Hole allotment uses Aravaipa Creek for moving livestock. This access can lead to some small degree of spikedace mortality and habitat damage. Four allotments (Painted Cave, Dry Camp, South Rim, Aravaipa) have stock ponds which could pose a threat of contamination of Aravaipa Creek with sport fish.

Through this evaluation it is the Bureau's determination that the proposed grazing management **may affect and is likely to adversely affect** the continued existence of

the spikedace in the Safford District based on activities and range improvements in the Hell Hole, Aravaipa, Dry Camp and Panted Cave Allotments. It is also the Bureau's finding that the proposed grazing management **may adversely modify Critical Habitat**, but that any modification is not irreversible. Activities on the remainder of BLM allotments in the district pose no real threat to the continued existence of spikedace due to their remoteness from occupied habitats.

5. PROPOSED MITIGATION MEASURES

Monitor watershed condition in conjunction with range studies.

Officially defer riparian grazing on the Quintana and Brandenburg Mountain allotments.

Introduce native fishes into permanent stock ponds and periodically monitor these populations for non-native fishes.

Sterilize ponds with perennial water that are not suitable for introduction of native species.

Provide permanent water for wildlife and livestock using troughs instead of ponds, where feasible.

Licensed livestock use will be in balance with the grazing carrying capacity and important components of watershed function.

Defer or manage livestock grazing as prescribed in the RMP to assure watershed conditions are maintain and/or improved, especially on excellerated eroding areas.

Ungrazed areas should be set aside for comparison with grazed areas(as suggested by Bock and Bock 1993).

Develope and implement prescribed fire plan to enhance watershed function in semi desert grassland areas.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

Bottomlands in Aravaipa Creek have undergone change from road building, channel modification, tree and wood cutting, livestock grazing, and field and homestead clearing. Fish have been impacted by this plus unscreened diversions that strand fish on fields, unscreened returns that spill exotic fish from private ponds into the creek, and

private ponds with exotic fish that can release fish to the creek during floods. About 600 acres of bottom has been cleared for farming (Hadley et al. 1991, Minckley 1981).

The riparian road in along Aravaipa Creek (east and West ends) have an inherent risk of altering stream hydrography, stream base-level and sediment erosion/deposition patterns which can result in subsequent stream destabilization. Such stream adjustments can set fish habitat development back (Furniss et al. 1991). Channel stabilization can reduce impacts of otherwise unstable road segments. Some of the road segments in Aravaipa Creek will be exposed to a high risk of erosion from flooding due to the position of the road on the floodplain.

The impacts of past mining are present today. Past mining activity has resulted in heavy metal pollution, including mercury, to Aravaipa Creek and Hell Hole Canyon (deer creek) (Minckley 1981).

Tailings at Klondike were recently cut into at Aravaipa Creek meandered (AZ Dept. of Env. Quality Letter of January 10 1993). The residue of past mining can cause a series of problems. Tailing piles can mass wastes, hill slopes can be destablized, increased sediment load from erosion of tailings, and increased leaching of heavy metals into flood waters. Increase sediment loads can cause changes in channel depth, width and meander pattern (Hadley et al. 1991).

Cattle Ranching between 1895 and 1905 was prevalent in the Aravaipa Watershed. The area was heavily overstocked which caused sever pant denudation of the landscape. The problem became acute to the watershed when a subsequent cycle of drought and flood occurred. During the 1930s and 40s about 20,000 angora goats and 2,500 feral horses and burros roamed Aravaipa. All of this was certain to have a profound and long term effect on riparian areas and watershed health (Hadley et al. 1991). This may explain the loss of marshlands near Klondike and the incision of Aravaipa creak below its historic floodplain (Minckley 1981).

Wildfires that once were important to maintaining grassland health have been suppressed. This may affect character of semi desert grasslands and watershed cover.

The high sediment load that moves through Aravaipa Creek may indicate poor watershed function in the upper portion of the watershed upstream of BLM managed lands. Water diversions along Aravaipa Creek can take between 50 and 80% of the surface flow (Minckley 1981). Some of these surface diversions have recently been retired to increase instream flows.

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YAQUI CATFISH (*Ictalurus pricei*)

1. T&E STATUS/CRITICAL HABITAT

This fish was listed as endangered in 1984 with critical habitat (49 FR 34490). Critical habitat is within the boundaries of the San Bernardino NWR.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Not yet re-established in the United States. hatchery population being held at Dexter National Fish hatchery (USFWS 1995).

3. HABITAT REQUIREMENTS

This catfish inhabits moderately to large streams in areas with medium to slow current velocities. Almost no information exists on this subject.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of critical habitat leaving it less suitable or unsuitable for Yaqui catfish (Platts 1991, Taylor et al. 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to both the Yaqui catfish and the critical habitat it occupies (Courteney and Moyle 1992,Miller 1961, Velasco 1994). In the case of the Yaqui Catfish, hybridization with the closely related channel catfish (Ictalurus punctatus) would have the most serious consequences.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Only a small fraction (<10%) of the watershed is land managed by the Bureau. In addition, no watershed degradation issue exists for Bureau lands that belong to the watershed that feeds Leslie Creek or Black Water Draw (Kevin Cobble, Pers. Comm. USFWS Refuge Manager). **No perennial stock tanks that could harbor non-native fishes occur on Bureau managed lands.**

6. EFFECT DETERMINATION:

The proposed grazing management **may affect but is not likely to adversely affect** the Yaqui catfish nor adversely modify or destroy critical habitat.

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YAQUI CHUB (*Gila purpurea*)

1. T&E STATUS/CRITICAL HABITAT

This fish was listed as endangered in 1984 with critical habitat (49 FR 34490). Critical habitat is within the boundaries of the San Bernardino NWR.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

It is found in Leslie Creek, Swisshelm Mountains, West Turkey Creek, Chiricahua Mountains, and Black Draw, San Bernardino NWR.This fish can also be found in ponds on the San Bernardino NWR (USFWS 1995, San Bernardino NWR files).

3. HABITAT REQUIREMENTS

Specific information on the habitat requirements of this fish is very limited. Yaqui chub live in deep pools in creeks, scoured areas of cienegas and other stream associated with quiet waters.They seek cover in daylight, especially undercut banks and in areas of accumulated debris. In artificial ponds adults similarity tend to occupy the lower part of the water column and seek shade. Young occupy near shore zones, often near the lower ends of riffles (USFWS 1995).

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of critical habitat leaving it less suitable or unsuitable for Yaqui chub (Platts 1991, Tayloret al. 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to native fishes(Courteney and Moyle 1992, Velasco 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Only a small fraction (<10%) of the watershed is land managed by the Bureau. In addition, no watershed degradation issue exists for Bureau lands that belong to the watershed that feeds Leslie Creek or Black Water Draw (Kevin Cobble, Pers. Comm. USFWS Refuge Manager). **No perennial stock tanks that could harbor non-native fishes occur on Bureau managed lands.**

6. EFFECT DETERMINATION

The proposed grazing management **may affect but is not likely to adversely** affect the chub nor adversely modify or destroy critical habitat.

7. LITERATURE CITATIONS

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YAQUI TOPMINNOW (*Poeciliopsis occidentalis sonoriensis*)

1. T&E STATUS/CRITICAL HABITAT

The Gila topminnow (Poeciliopsis occidentalis) was listed as endangered in 1967 without critical habitat (USFWS 1982, 1995). No critical habitat has been listed for this fish.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Populations occur in Leslie Creek and Black Draw, San Bernardino NWR. These populations are downstream of some BLM allotments.

3. HABITAT REQUIREMENTS

Life history traits and habitat requirements for the Yaqui topminnow are largely unstudied. However it is thought that this subspecies has very similar traits to the Gila topminnow. The Gila topminnow and many other poeciliids can tolerate a wide variety of physical-chemical conditions. They are good colonizers in part because of this tolerance and in part because a single gravid female can start a population (Meffe and Snelson 1989). Minckley (1969, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists. Simms and Simms (1992) found the densities of Gila topminnows in Cienega Creek, Pima Co., Arizona, to be greater in pool, glide and backwater habitats and less dense in marsh, riffle, chute, cascade and fall habitats. They occurred more frequently over sand substrates than over other categories of substrates.

Gila topminnows are known to occur in streams fluctuating from 6 to 37oC, pH from 6.6 to 8.9, dissolved oxygen levels of 2.2 to 11 mg/l, and can tolerate salinities approaching those of sea-water (Meffe et al. 1983). Topminnows can burrow under mud or aquatic vegetation when water levels decline (Minckley and Deacon 1974, Meffe et al. 1983). Sonoran topminnows regularly inhabit spring heads with high loads of dissolved carbonates and low pH (Minckley et al. 1977, Meffe 1983, Meffe and Snelson 1989). This factor has helped protect small populations of topminnows as predacious mosquitofish are usually rare or absent under these conditions.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Watershed degradation can affect sedimentation, stream channel dynamics, and hydrologic processes. Overgrazing can lead to damage of habitat leaving it less suitable or unsuitable for Yaqui topminnow (Platts 1991, Taylor et al 1991). Perennial stock ponds can and often do harbor game and other non-native fishes detrimental to native fishes. (Courteney and Moyle 1992, Miller 1961, Velasco 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Only a small fraction (<10%) of the watershed is land managed by the Bureau. In addition, no watershed degradation issue exists for Bureau lands that belong to the watershed that feeds Leslie Creek or Black Water Draw (Kevin Cobble, Pers. Comm. USFWS Refuge Manager). **No perennial stock tanks that could harbor non-native fishes occur on Bureau managed lands.**

6. EFFECT DETERMINATION

The proposed grazing management **may affect but is not likely to adversely** affect the Yaqui topminnow.

7. LITERATURE CITATIONS

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Mammals

JAGUAR (*Felis onca*)

A large, tawny colored cat with uniform black rosettes, with a small black spot in the center. The head and body length ranges from 44 to 58 inches while the tail length varies from 21 to 26 inches. Body weight varies from 150 to 225 pounds (Burt and Grossenheider 1964).

1. T&E STATUS/CRITICAL HABITAT

Proposed Endangered.

The jaguar is extirpated from the United States (Harwell and Siminski 1990).

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

The AGFD Heritage Data Base does not record any recent (last 50 years?) reports of the jaguar in southeastern Arizona (Anonymous 1995). Personnel on the Safford District have information of a reported jaguar (1986) in the Dos Cabezas Mountains. In addition, a very reliable jaguar sighting was reported (spring of 1995), from southeastern Cochise County (Coronado National Forest).

3. HABITAT REQUIREMENTS

Found in the low mountains, chaparral and open forests (probably oak-woodlands). Most jaguar reports in Arizona are in the Madrean Evergreen Woodland, shrub-invaded semi-desert grasslands, and river bottoms (Harwell and Kaminski 1990).

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

The decline of the jaguar in Arizona is believed to be the result of predator control activities associated with livestock grazing.

Livestock management as far as forage utilization etc., does not seem to effect the jaguar. The jaguar's preying on domestic livestock is where the conflict occurs. The livestock owner's response to this predation, is the key to whether the jaguar is adversely or not adversely effected.

Range improvement projects like prescribed fire may impact potential jaguar and their prey species habitat.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The recovery plan indicates the jaguar may be considered extirpated from Arizona with occasional reports of jaguars crossing the border from Mexico.

Jaguars are very rare and the possibility of jaguars residing on public lands on the Safford District, BLM, are slight. Due to the probability the jaguar is not in the Action Area, and a likely no effect determination will be made, it is unnecessary to consider the jaguar in detail.

6. EFFECT DETERMINATION

As mentioned above, the response to predation will determine whether or not the jaguar is not adversely or is adversely effected, as defined by the Endangered Species Act (ESA).

As a species proposed for listing under the ESA, Federal agencies cannot undertake any actions that would preclude the listing of that species. Livestock grazing will not effect the suitability of the habitat for the jaguar. Livestock grazing will not significantly effect the habitat of the jaguar's prey base because the jaguar is opportunistic and preys on many different species in many different habitats.

Should efforts proceed to relocate jaguars into historical habitat, livestock management in these areas will comply with the approved Safford District Animal Damage Control (ADC) Plan (Anonymous 1994). The ADC Plan identifies Special Management Areas and Predator Control Areas and describes the management of each. (Jaguar reports are also shown on the maps.) The location of these most recent reports are within the Special Management Areas so identified. (One report is from Forest Service lands near Sonoita, AZ.) These Special Management Areas only allow ADC activities in an emergency situation and must receive prior approval from the BLM (on public lands). At this time, through the Environmental Assessment process, stipulations will be placed on the ADC activities so the Bureau does not allow adverse effects (jeopardy) to the jaguar or its habitat.

A very recent report however, contradicts information gleaned from the literature. Jaguars are even now a part of the fauna of the Action Area (based on the jaguar report on the Douglas Ranger District, Coronado National Forest).

Therefore, potential indirect effects to jaguar or its habitat from livestock management (Range Improvements-prescribed fire and Animal Damage Control programs) will have a **May Effect** determination.

Following the procedures shown in the Safford District Animal Damage Control Plan will provide protection to the jaguar and will ensure non-lethal means are utilized to remove problem animals.

Prescribed burn plans will consider the needs of the jaguar in areas of jaguar reports and will not change the habitat making it unsuitable for the reintroduction of jaguars into the Action Area.

These stipulations in the ADC plan along with NEPA documentation and implementation of Section 7 requirements of the Endangered Species Act will protect the jaguar and its habitat resulting in a **May Effect Not Likely to Adversely Affect** the jaguar and its habitat.

7. LITERATURE CITATIONS

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Burt, William H., and R.P. Grossenheider. 1964. A Field Guide to the Mammals. Houghton Mifflin Company. Boston, MA. 284 pp.

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JAGUARUNDI (*Felis yagouaroundi tolteca*)

The jaguarundi is long and slender, slightly larger than a house cat (may be up to twice as large as a typical house cat), and its pelage ranges from gray to reddish-brown in color. Body size ranges from 22 to 30 inches; tail 13 to 24 inches; weight 15 to 18 pounds. Field recognition would be a long-bodied, short-legged, uniformly colored, very large house cat, with a tail nearly as long as the rest of the body.

1. T&E STATUS/CRITICAL HABITAT

Endangered

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Extremely rare in the United States. Most reports are from Texas. One unverified report from Guadalupe Canyon area in the extreme southeastern corner of Arizona.

3. HABITAT REQUIREMENTS

Prefers dense bushy areas and thorn thickets similar to the ocelot.
Mostly nocturnal but will hunt during daylight hours. Prey are mostly small birds and mammals.

The Recovery Plan only recommends hunter/trapper surveys to determine abundance and distribution of these cats. No specific direction was given regarding management of the species or its habitat.

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

Livestock grazing (Permitted Use, Grazing Systems, Utilization levels, Riparian area management and Special Management Areas) will not impact the habitat of the jaguarundi.

Grazing may reduce ground cover (vegetation) and make the prey for jaguarundi's easier to catch. Over the long term, this type of grazing may reduce prey species populations which could in turn effect the jaguarundi.

Animal control efforts to control predators other than jaguarundi's may result in incidental take of the jaguarundi.

Range improvements like prescribed burns could impact jaguarundi and their prey species habitat.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Harwell and Siminski (1990), state the jaguarundi is extremely rare in the United States. Burt and Grossenheider (1964) and Harwell and Siminski (1990) consider the jaguarundi unlikely to occupy habitats in Arizona.

In order for the jaguarundi to be affected by livestock management, the species must be found in the Action Area. It is extremely unlikely the jaguarundi will be found in the Action Area so a no effect determination is likely. In view of this, a detailed analysis is inappropriate.

6. EFFECT DETERMINATION

It is unlikely jaguarundi would prey on livestock due to their small size. Therefore, no ADC activities would be targeted for the jaguarundi.

The jaguarundi is very unlikely to be found in Arizona. As such, livestock grazing should have **No Effect** on the jaguarundi or its habitat.

7. LITERATURE CITATIONS

Burt, William H. and R. p. Grossenheider. 1964. A field Guide to the Mammals. Houghton and Millfin Company. Boston. pp 284.

Harwell, Gary and P. Siminski. Listed Cats of Texas and Arizona (With Emphasis on The Ocelot). US Fish and Wildlife Service. Albuquerque, NM. pp 131.

LESSER LONG-NOSED BAT (*Leptonycteris curasoae yerbabuena*e)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS / CRITICAL HABITAT

Endangered. Critical habitat: None designated (Federal Register 53 [190] 1988).

b. T&E OCCURRENCE

For an extensive list of locality records see Cockrum and Petryszyn (1991).

c. T&E SURVEYS

A roost survey (funded by Heritage Grant Program) of mine shafts and tunnels was performed last summer in the vicinity of Tucson. Final report should be due shortly. Cockrum and Petryszyn (1991) provide considerable information regarding locations of major roosts.

d. CONSULTATIONS/CONFERENCES

The following Section 7 consultations which may involve the lesser long-nosed bat have been conducted by the Safford District:

NUMBER	NAME
2-21-88-F-114	Safford District RMP
2-21-88-I-109	Safford District Land Exchange
2-21-89-I-007	Renovation of Fairbanks Mercantile
2-21-89-I-121	Peregrine Falcon Surveys
2-21-89-F-018	Big and Cold Springs Pupfish Stocking
2-21-90-F-196	Cienega Creek Diversion
2-21-90-I-150	Cienega Creek Pasture Fencing
2-21-91-F-160	Cienega Creek
2-21-91-I-095	Bonita Creek Allotment Management
2-21-91-I-170	Cienega Creek Earth Day Project
2-21-91-I-270	Peloncillo Habitat Management Plan
2-21-92-F-070	Gila Box NCA
2-21-92-F-450	Dorothy "B" Mine 2700 Acres Copper
2-21-92-I-071	Gila Resource Area, Sanchez Copper Mine
2-21-92-I-108	Prescribed Burns, Aravaipa Creek Tablelands
2-21-92-I-219	Braidfoot Allotment Cattle Grazing
2-21-92-I-584	Phelps Dodge Mining

2-21-92-I-733	Howard Well Water Supply
2-21-93-F-406	Road Construction Bonita Creek
2-21-93-I-430	Cienega Creek Headcut Repair & Fencing
2-21-94-I-053	EA Animal Damage Control Plan
2-21-94-I-213	Muleshoe Cooperative Management Plan
2-21-94-I-543	BLM Acquiring 3 Parcels of Land
2-21-95-F-177	Cienega Creek Interim Grazing Plan
2-21-95-I-049	Draft Dos Cabezas Mountains Wilderness
2-21-95-I-081	Morenci & Safford Land Exchange
2-21-95-I-209	Big Spring Supplemental Stocking
2-21-95-I-211	Restoration of Old Gila River Bridge
2-21-95-I-304	Stream Gauge Installation Cienega Creek
2-21-95-I-313	Flood Repairs to Road in Turkey Creek
2-21-95-F-081	Morenci Land Exchange With Phelps Dodge

e. REASON FOR SPECIES DECLINE

1.Lesser long-nosed bat are declining, in part, due to human disturbance of roost sites both in the US and Mexico (USFWS 1988). The species is sometimes killed at roost sites for fun or, in a case of mistaken identity, to control "vampire" bats (USFWS 1988).

2.Another reason for the decline is thought to be a reduction in the bats' food supply, the nectar and pollen from columnar cactus and paniculate agaves (USFWS 1988). Harvest of wild agave in Mexico for the production of liquor is thought to be excessive in the bat's wintering area.

2. RECOVERY PLANS

a. NAME

Draft lesser long-nosed recovery plan (Fleming 1993).

b. REQUIREMENTS / RECOMMENDATIONS

1. Protect roost sites of lesser long-nosed bats.
2. Protect food resources of the species.

c. BUREAU STEPS TO ACCOMPLISH

No specific steps. Protection of food resources would appear to be the BLM's

logical role.

d. SAFFORD ACCOMPLISHMENTS TOWARD RECOVERY PLAN

None.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

The lesser long-nosed bat is migratory, residing in southern Mexico during the winter. In spring the bats begin their northward migration to southern Arizona and southwestern New Mexico. Female arrive first at lower elevations and establish maternity roosts. This movement coincides with the reproductive cycle of the large cactus of the Genus Cereus (Cockrum 1989). Maternity roosts persist until after the young are capable of flight, around mid-to late July (Cockrum, 1989). Females move to higher elevations feeding on the nectar and pollen of blooming agaves.

Males arrive later than females but the details of their movements are not well known. In southern Arizona, males roost in small numbers and generally at elevations above 5500 feet.

In July through September, a diverse series of roosts are occupied from high to low elevations on a transient basis. By late September Leptonycteris vacate Arizona and move into Mexico. They spend the winter months south of Sonora, Mexico.

The lesser long-nosed bat utilizes caves, mines, and abandoned tunnels as day roosts. At night it feeds on the pollen and nectar of columnar cacti and paniculate agaves (century plants) (U.S. Fish & Wildlife Service 1988). It is also known to consume insects and cactus fruit (Cockrum 1989).

The lesser long-nosed bat is considered an important pollinator of saguaro, organ pipe and agave. Studies from the Rincon Mountains suggest that the viability of agave seed was reduced by declines in bat populations (USFWS 1988, Cockrum 1989).

b. RANGE OF SPECIES

Cochise, Pima, Santa Cruz, Graham, Pinal, Maricopa Counties in Arizona. Extreme southwestern New Mexico. Absent from the Chihuahuan desert. Big Bend, Texas. South into Mexico and El Salvador (BLM 1996).

c. HABITAT REQUIREMENTS

In Arizona, preferred habitat consists of Sonoran Desert containing saguaro, organ pipe, and/or agave (Hoffmeister 1986). Higher elevation grasslands, deserts, and woodland containing paniculate agaves are also utilized (Hoffmeister 1986). Chihuahuan desert is generally avoided since it lacks preferred forage species.

Long-nosed bats require roost sites: mines, caves, tunnels, etc. for day roosting, rearing of young, resting after night feedings, resting during late summer movements, etc. Roost sites should be free of human disturbance (USFWS 1988).

d. RATIONALE FOR POTENTIAL HABITAT

The following criterion are suggested for identifying potential habitat:

The habitat should contain stands of paniculate agave or columnar cactus.

The habitat should contain suitable day roosts; i.e. mine shafts or natural caves with low levels of human disturbance.

The roosts and forage stands should be in reasonable proximity to one another (ten to twenty miles).

e. HABITAT CONDITION

Observation indicate that habitat conditions may be declining. Many roosts are subject to repeated human entry. Data on condition of forage base is lacking at this time. The density of saguaro cactus in and around Tucson and other metropolitan areas may be declining due to urban expansion (personal observation).

f. CURRENT CONDITION OF SPECIES (POPULATION STATUS)

(1.) RANGEWIDE

Many roost sites in US and Mexico now contain few or no individuals (USFWS 1988). Species is considered on the decline. USFWS survey of all known sites of occurrence found only one colony of 500 individuals. A major maternity colony (Colossal Cave), consisting of 20,000 (USFWS 1988) to 5,000 (Cockrum and Petryszyn 1991) individuals, has vanished, probably due to human harassment. Most colonies reported consist of 50 individuals or less. One unconfirmed report of 2000 to 3000 individuals was reported in the Santa Rita/ Patagonia Mountain area in 1987 (USFWS 1988). Two small populations are thought to occur in Cochise County, AZ, the largest of the two about 300 individuals (USFWS 1988).

An alternative view expressed by Cockrum and Petryszyn (1991) is that the lesser longed-nosed bat is as abundant as ever. Petryszyn (1991?) asserts no decline in population has occurred with the exception of the eviction of the colony at Colossal cave.

(2.) ACTION AREA

Same as rangewide.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT

None. There is little potential for disturbance of roost sites by livestock.

(2.) INDIRECT

Livestock grazing could, potentially, have a number of effects on the forage base of lesser long-nosed bats, primarily Agave palmeri, Agave parryi, and saguaro Carnegia gigantea. Organ pipe cactus, another food source, does not occur within the boundaries of the Safford District.

In extreme cases, overstocking of livestock can lead to depletion of agave. Livestock have been observed foraging on the developing flower stalks of agave (Forest Service 1996). This causes the individual plant to respond by basal sprouting a new rosette (Dan Robinette, pers. comm.). Severe, prolonged overstocking could overcome this response reducing flower production of agave in the long term.

At lower elevations, livestock may inhibit survival of saguaros by trampling seedlings under nurse plants (palo verde, ironwood, etc.); by grazing nurse plants and removing protective cover, or by grazing the seedlings themselves (Abouhaldar 1992). This may affect the lesser long-nosed bat indirectly by decreasing its available forage supply.

This effect is most likely to occur in relatively flat terrain (Abouhaldar 1992). Steep rocky terrain inhibits cattle utilization and shelters seedlings from trampling (Abouhaldar 1992).

Less obvious is the impact of livestock on frequency and intensity of wildfire, which affects saguaro and agave, the bat's forage base. In the Sonoran desert, livestock

transport seeds and promote the spread of annual grasses, particularly red brome Bromus rubens, a European invader (Gould 1973). Red brome is highly tolerant of fire. During wet winters it spouts abundantly providing green forage for a short period. Once it dries it increases the potential for wildfire to the detriment of saguaro and other succulents.

At higher elevations, livestock grazing if severe enough may reduce ground cover in and around dense stands of agave thereby reducing the potential for fire. Agave are somewhat adapted to wildfire and will often recover, losing only the outermost leaves to scorching heat. Agave also seem to prefer rockier soil types where fuel loads are lower. The degree of additional fire resistance conferred by grazing may not be significant.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

(1.) DIRECT EFFECTS

The Safford district range management program does not appear to have any direct effect on lesser long-nosed bat. Indirect effects on the food supply of lesser long-nosed bat are discussed below.

(2.) INDIRECT EFFECTS

(a.) Permitted use

No long term monitoring data is available at this time to determine whether livestock use depresses saguaro survival on public lands in Safford district. In theory, adjusting livestock numbers based on upland carrying capacity should reduce the negative effect of livestock on saguaro seedlings. Saguaro stands on steep rugged terrain are probably largely unaffected by livestock.

Adjusting permitted use to allotment carrying capacity should reduce cattle foraging on agave stalks to an insignificant level.

It is not known what affect the adjustment of permitted has on the spread of red brome in the Sonoran desert. It is likely that adjusting permitted use would lessen the opportunity for invading species to become established.

With permitted use adjusted to carrying capacity the frequency of fire fuel loads in grassland sites will not be significantly altered. Hence, livestock grazing (adjusted to carrying capacity) will not influence the effects of wildfire on stands of agave.

(b.) Grazing Systems

Year-long grazing may be detrimental to seedling saguaro survival and result in reduced stands in the long term. The effect will be most noticeable during the warmer months when livestock crowd beneath nurse trees for shade and to forage on leaves and seed pods of leguminous trees.

Livestock may forage on fleshy agave stalks when they first emerge in April and May under yearlong grazing. This may have an effect on agave densities depending on local situation.

Seasonal grazing, if limited to winter months, will reduce the effect of livestock on saguaro seedlings. As temperatures warm livestock will congregate under trees and may trample seedlings.

Seasonal grazing probably has little effect on agave particularly if livestock are removed before May when stalks emerge.

Ephemeral grazing may effect saguaro seedlings if cattle are licensed on the allotment in the warm season. If removed before temperatures warm up, then cattle will not congregate under trees, and damage to saguaro seedlings will be reduced.

Seasonal grazing probably has little effect on agave, particularly if livestock are removed before flower stalks emerge.

Grazing systems of various types, rest-rotation, deferred rotation, Santa Rita, may have an effect depending on the local situation. If an entire herd is rotated into a pasture in April or May when fleshy stalks of agave are most palatable then a significant reduction in flowering stalks may occur. If herd enters the pasture in June when stalks are flowering, and hence less palatable then the effect will be minimal.

The effects of various grazing systems on saguaro seedlings is little studied. Most low elevation grazing consists of seasonal or ephemeral grazing by steers, perhaps with a small base herd grazing year-long. Few low elevation allotments have elaborate grazing systems. An entire herd rotating into a single pasture from another portion of the allotment, especially during the warm months, could result in significant trampling of seedlings on foothills and bajadas. Saguaro stands could be reduced in the long-term.

It is not known what effects grazing systems have on red brome infestation.

(c.) Utilization Standard for uplands

Limiting utilization in upland can result in lower rates of seedling trampling in the

case of saguaros and lower rates of agave stalk foraging. The actual effect depends on a number of factors such terrain, placement of water developments, etc.

It is not known how utilization rates influence red brome invasion. Red brome may be less likely to invade where utilization is held to 40%.

(d.) Range improvements

Livestock tend to congregate in and around reservoirs and wells for water especially during the warmer months. This could result in fewer saguaro seedlings surviving in the vicinity of water development in Sonoran desert habitats. Agave densities could be reduced in the vicinity of water developments in grassland habitats.

The increased numbers of livestock results in a reduction of plant cover and can increase opportunities for establishment of invading plant species. Range developments could, depending on stocking rates and soil conditions, foster the spread of red brome to the detriment of saguaros.

(e.) Riparian Policy

The forage species of the lesser long-nosed bat are non-riparian in character. Hence the riparian policy will have no indirect effect on lesser long-nosed bat.

(f.) Special management areas

Most special management is directed toward improvement of riparian areas. Forage species of the lesser long nosed bat do not appear to be affect to any significant degree by management applied to special areas in the Safford District. Saguaro is limited to steep south facing slopes and will probably not be affect by the suspension of grazing on Muleshoe allotment. Agave are present in small numbers on rocky soils and will probably not be affected by the special management of the Muleshoe allotment.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

Approximately 114 allotments have been identified as having potential lesser long-nosed bat foraging habitat (either stands of saguaro or agave). None are known to contain roosts. No direct impacts are known to occur as a result of grazing.

None of these allotments, in the opinion of the range specialists most familiar with the allotments, are experiencing reductions in saguaros and/or agave due to grazing pressure or spreading of red brome due to livestock. Reduction of saguaros or agave could be occurring around livestock water developments and corrals however this is considered to be a highly localized effect (perhaps one or two acres per development)

and therefore, discountable relative to the total acreage of the allotments involved. The determination for these allotments (109 in all) is may affect but not likely to adversely affect for permitted use, grazing systems, range improvements, and utilization; no effect for riparian policy and special management areas.

Four allotments, Guadalupe W. AZ, Muleshoe, Hotwell, and Lacy have no grazing hence no effect for any of the six categories.

Simmons allotment has no grazing permitted, therefore, no effect for permitted use. Since cattle are currently grazing on the allotment, it was determined that the grazing system (or, more properly, lack of one), utilization (which due to compliance problems could exceed 40%), and range improvements may be affecting lesser long-nosed bat but are not likely to adversely affect the species. As with the other allotments, riparian policy and special management areas have no effect.

(4.) INTERRELATED / INTERDEPENDENT

Range improvements, resulting from the range program, can impact the potential habitat for this species, though not adversely.

(5.) INCIDENTAL TAKE

None

c. RATIONALE FOR EFFECTS

The rational for determination of effect was based on the best information available in the literature regarding lesser long-nosed bat and its preferred forage species, coupled with available knowledge of conditions on a given allotment.

If an allotment has potential lesser long-nosed bat foraging habitat and,

1) is not, in the opinion of the range specialist most familiar with the allotment, experiencing significant declines in saguaro and/or agave density (those reductions limited to an acre or two in the vicinity of livestock corral(s) or water development(s)), and,

2) is not, in the opinion of the range specialist, experiencing a spread of red brome,

Then the determination for the given allotment is may affect, not likely to adversely, to affect lesser long-nosed bat for permitted use, grazing system, utilization, or range improvements.

If an allotment is not being grazed and there are no plans to graze in the foreseeable future then the determination is no effect since there are no cattle present to affect the forage species of the lesser long-nosed bat.

The Simmons allotment is a special case since it has no permitted use but livestock use is on-going due to compliance difficulties. Using the rationale for the other four allotments in non-use, the determination for permitted use is no effect. However since cattle are present the determination for grazing system, range improvements, and utilization is may affect, not likely to adversely affect using the rationale for allotments where livestock grazing is occurring as permitted.

The determination of no effect for riparian policy hinges on the rational that lesser long-nosed bat is not dependent on riparian areas in any way.

Special management areas are considered to have an effect if the habitat needs of lesser long-nosed bat are part of the special management of the area. Since no special management areas in the Safford district have provisions for lesser long-nosed bat habitat protection the determination is no effect for all allotments.

d. EFFECT DETERMINATION

The determination is **no effect** for four allotments: Muleshoe, Hotwell, Lacy, and Guadalupe W. Az., all of which are not being grazed presently.

The determination for the remaining one hundred-ten allotments is **may affect, not likely to adversely affect** for permitted use (except for Simmons allotment as noted above), grazing system, range improvements, and utilization; no effect for riparian policy and special management areas.

The overall effect of the grazing program in the Safford District for the lessor long-nose bat is **may affect, but is not likely to adversely affect** its continued existence.

5. PROPOSED MITIGATION MEASURES.

Due to the determinations of may affect, not likely to adversely affect, for 110 allotments and no effect for four allotments; no mitigation is proposed.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA.

Considerable disturbance of Sonoran desert habitat has occurred on private land (personal observation). This is especially noticeable around the Tucson metropolitan

area. Saguaro cactus and other species are being removed and habitat is being fragmented to make room for housing developments, shopping malls, and other uses. Its is not known how this activity affects the lesser long-nosed bat. It is conceivable that major foraging areas are being lost and that this, combined with other impacts, may be causing a long term decline in the species.

7. LITERATURE CITATIONS

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U.S. Fish and Wildlife Service. USDI. 1988. Endangered and threatened wildlife and plants; determination of endangered status for two long-nosed bats. 50 CFR 17. Federal Register. Vol. 53 No.190. pages 38456-38460.

MEXICAN GRAY Wolf (*Canis lupus baileyi*)

This species is a large dog-like carnivore weighing between 60-90 pounds. It has a distinct white line around the mouth.

1. T&E STATUS/CRITICAL HABITAT

The Mexican gray wolf was listed as **endangered** on June 4, 1973, with no critical habitat. It has been extirpated from its historic range in the southwestern United States. Fish and Wildlife Service is nearing completion on an environmental impact statement for the re-introduction of this species into either of two areas, the White Sands Missile Range in southern New Mexico or the Blue Primitive Area within New Mexico and Arizona.

2 LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Currently, the Mexican gray wolf is not found on any of the land managed by the Safford District.

3. HABITAT REQUIREMENTS

This species was found in Madrean evergreen forests and woodlands, including pine, oak woodlands, pinyon-juniper forests, riparian areas, and grasslands. There is potential habitat for this species within the Safford District, but none is occupied.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Wolves were exterminated because of conflicts with livestock and game species. Since they have been extirpated, there are no effects from the livestock grazing program.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

This species is not being fully analyzed because it is no longer found in the action area.

6. EFFECT DETERMINATION

The grazing program within the Safford District would have a '**no effect**' on the Mexican gray wolf and a **"may affect, but not likely to adversely affect**" on the potential, but not occupied habitat for this species.

7. LITERATURE CITATION

U.S. Fish and Wildlife Service. 1982. Mexican Wolf Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 103 pp.

MT. GRAHAM RED SQUIRREL (*Tamiasciurus hudsonicus grahamensis*)

1. T&E STATUS/CRITICAL HABITAT

Endangered. Critical habitat established February 5, 1990 (mature forests over 10,000 feet in elevation in the Pinaleno Mountains, Graham County, Arizona) (Anonymous 1996).

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

Only found in the Graham Mountains on USFS lands. Not found on Public lands administered by the Bureau.

3. HABITAT REQUIREMENTS

Requires old-growth spruce-fir or Mixed Conifer forests found in Pinaleno Mountains usually above 8,000 feet in elevation. Needs a mature forest with enough cone bearing trees to sustain the squirrel through the winter (Anonymous 1996).

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

Livestock grazing poses no direct or indirect effect to the squirrel. Livestock management, if it involves prescribed fire, may impact squirrel habitat.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

Not found on lands administered by the Bureau.

6. EFFECT DETERMINATION

The squirrel is not found on Bureau (Public) lands. Therefore, **No Effect** is determined because the species is not found in the area of analysis.

7. LITERATURE CITATIONS

Anonymous. 1996. Draft Biological Assessment. Coronado National Forest Land and Resource Management Plan. March 1996. USDA Forest Service Southwestern Region. Albuquerque, NM

OCELOT (*Felis pardalis sonoriensis*)

1. T&E STATUS/CRITICAL HABITAT

Endangered

Historically the ocelot was found from central Mexico north through Texas (*F. p. nelsoni*), and northwest to central Arizona *(F. p. sonoriens*is). (The ocelot was noticeably absent in New Mexico.) In Arizona, the range is a narrow strip coming in at the southeast corner of the state, then northwest to Camp Verde (Hall 1981).

Historical records of the ocelot in Arizona consists of a single report. This skull was taken from an archeological midden near Reddington.

Mearns reported a "skin" of an ocelot taken at Ft. (Camp) Verde in 1887. Another ocelot report came from Camp Verde in 1931-32. In 1963 an ocelot sighting was reported from the San Simon River north of San Simon, AZ. In 1964 an ocelot was killed in the Huachuca Mountains west of the San Pedro River.

Since 1980, four ocelots may have been trapped in Arizona. Two from the San Pedro valley, one from the Holbrook-Concho area and one from Sasabe, AZ.

Northern Sonora continues to have ocelot reports but have not been substantiated .

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

In Arizona, the range is a narrow strip coming in at the southeast corner of the state, then northwest to Camp Verde.

Historical records of the ocelot in Arizona consists of a single report. This skull was taken from an archeological midden near Reddington.

Land status of these reports are unknown.

3. HABITAT REQUIREMENTS

The ocelot Recovery Plan (Harwell and Siminski 1990) lists five major plant communities preferred by the ocelot.

- humid tropical forests
- humid subtropical forests
- coastal mangroves

- swampy savannas
- semi-arid thornscrub

Two of these five plant communities may occur in southeast Arizona-swampy savanna and semi-arid thornscrub. (These plant communities were not described in the Recovery Plan and are mentioned here as possible plant communities in Arizona). Swampy savannas may closely resemble the cienega habitat while semi-arid thornscrub may resemble oak-woodlands and/or Chihuahuan Desert plant communities.

Cienega habitat occurs along the San Pedro River (St. David cienega) and Empire Creek (Empire Cienega).

The Huachuca, Mule, Winchester, Galiuro, Pinaleno, and Chiricahua Mountains may provide habitat preferred by ocelots.

Ocelots prefer areas of dense vegetation including brush and trees.

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

Prey species of the ocelot vary but are usually associated with forested areas or thornscrub. Some of the species listed by the Recovery Plan are: fulvous harvest mouse, cotton rats, raccoon, javelina, skunks, doves and quail (Harwell and Siminski 1990).

Removal of grasses, forbs and shrubs from livestock grazing may effect prey populations of the ocelot. This would be an indirect effect to the ocelot.

Predator control activities associated with livestock management may impact ocelots even though the target species may be coyotes etc.

Range improvements such as prescribed burns may impact prey and ocelot habitat.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The ocelot has been extirpated from Arizona so the chances of the ocelot being affected by livestock management is very low. The likelihood of making a no effect determination is very high so it would seem unnecessary to consider the ocelot in detail.

6. EFFECT DETERMINATION

Only one specimen has been verified in Arizona. This specimen came from an archeological midden near Reddington on the lower San Pedro River, on unknown land ownership. The Recovery Plan lists six possible sightings in Arizona from 1963 to 1990. One of these reports (1963) was just north of San Simon, AZ, presumably on BLM lands (Harwell and Siminski 1990).

The chances of finding an ocelot on the Safford District, BLM, remains slight. Should one be found, livestock grazing activities should not impact the ocelot because the ocelot prefer dense underbrush or dense stands of trees. These areas are usually avoided by domestic livestock.

Adherence to the 40 percent average utilization on key forage species in key areas should provide adequate habitat for prey species to carry out their normal life functions such as survival and reproduction. The 40 percent utilization level will leave residual ground cover (forage) and ensure health of the forage plants.

District inventories/surveys over the last several years have not recorded any ocelot reports.

The last report of an ocelot in Arizona was in 1964. It is highly unlikely the ocelot resides here. If the species is not present in the area and possible effects can be mitigated, then a **No Effect** determination is appropriate.

7. LITERATURE CITATIONS

Harwell, Gary and D.P. Siminski. 1990. LISTED CATS OF TEXAS AND ARIZONA RECOVERY PLAN. USFSWS, Albuquerque, NM. 102 pp.

Hall, E.R. 1981. THE MAMMALS OF NORTH AMERICA. John Wiley and sons. New York. 2 Vol. 1,181 pp.

Mollusk

SAN XAVIER TALUSSNAIL (*Sonorella eremita*)

1. STATUS: PROPOSED ENDANGERED

Occurs on one hill in Mineral Hill area, Pima County (USFWS 1994). Critical Habitat: None proposed.

2. LAND STATUS

Located on one hillside on private land (Hoffman 1990).

3. HABITAT

Limestone hills, with deep, north-facing, tallus slopes and little or no soil development (Hoffman 1990). Highly restricted distribution.

4. EFFECTS OF GRAZING

Probably no effect. Footing and lack of vegetation probably make habitat undesirable for livestock. Species appears most affected by road building associated with communication facilities (USFWS 1994). Mining activity also has the potential to destroy or severely alter the habitat conditions (USFWS 1994).

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The species is located on private land and is not affected by livestock grazing because the ruggedness of its preferred habitat.

6. DETERMINATION OF EFFECT

The existing grazing management on public lands within the Safford District has **no effect** on the San Xavier tallussnail.

7. LITERATURE CITATIONS

Hoffman, J.E. 1990. Status survey of seven land snails in the Mineral Hills and the Pinaleno Mountains, Arizona. Prepared for the U.S. Fish and Wildlife Service, Phoenix, AZ. Contract No. 20181-88-00973. 11+ p.

U.S. Fish and Wildlife Service. USDI. 1994. Endangered and threatened wildlife and plants; proposed rule to list the San Xavier Talussnail as endangered. 50 CFR 17

Federal Register. Vol.59 No. 56. pages 13691-13694.

Plants

ACUNA VALLEY PINEAPPLE CACTUS (*Echinomastus erectocentrus var. acunesis)*

1. T&E STATUS/CRITICAL HABITAT

This species was determined to be a Category 1 species, in 1993.

2. LAND STATUS (WHERE SPECIES OCCUR IN THE ACTION AREA)

This cactus has been found on U.S. National Park Service land, at Organ Pipe Cactus National Monument, and on private land. Occurrence reports of this cactus are primarily from around the towns of Florence and Ajo, Arizona. The range is from western Pima to Maricopa and Pinal Counties.

3. HABITAT REQUIREMENTS

Habitat for this species appears to be on well drained knolls and gravel ridges from 1300 to 2000 feet in elevation. The species occurs in the Palo Verde-Saguaro Association of the Sonoran Desertscrub.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

While cattle do not graze this cactus, they may have a direct effect by inadvertently knocking them over as they trail over the range. Because these cacti are small and may be hidden in the taller grass plants, cattle might not see them well enough to avoid them. Under light to moderate stocking rates, this should not occur very often. Cattle will generally have trails that they follow and will avoid stepping on these plants.

Indirect effects of the proposed action could be caused by changes in range condition on the allotments where this species does occur.

Improper livestock grazing management would result in less perennial grass cover, more bare ground, and possibly increased runoff and soil erosion.

Range improvement practices designed to reduce brush invasion (prescribed fire, imprinting, rootplowing, etc.) could have adverse impacts upon this cactus species, and surface disturbing actions (water developments, fencing, road developments, etc.) associated with the livestock operations will require an environmental assessment and botanical evaluation to prevent any adverse impacts to the Pima Pineapple cactus. Considering the low elevation and precipitation zone of the potential habitats for this

species it is unlikely that any vegetation manipulation projects would be proposed.

On those allotments where there is a significant amount of BLM administered lands, or where BLM has decided to enter into coordinated management plans with the Arizona State Land Department and the Natural Resources Conservation Service.

Grazing systems and monitoring will be developed to reduce impacts and evaluate the effects on any known populations.

The primary adverse effect to this species is loss of habitat due to urban expansion, off road vehicle use, road construction, farming, and mining. Illegal collection of this species may also have an adverse effect.

The use of land for livestock grazing would tend to preserve the habitat for this cactus. Livestock operations require large areas of open space. There is very little protection for preserving state and private lands from possible sale and development. In those areas identified by BLM for retention of the public lands and acquisition of the state and private lands, the long term outlook for protection of existing habitat is higher.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED:

This cactus has only been located on the extreme southern edge of the Tucson Resource Area where the lands administered by BLM are widely scattered. It has not been located on BLM lands.

6. EFFECT DETERMINATION

Since this species has not been located on BLM lands **no effects** from the Safford District grazing program are anticipated.

7. LITERATURE CITATIONS

Arizona Game and Fish Department, 1994. Heritage Data Management System. Rare Plants of the Bureau of Land Management's Safford District and Vicinity - Elements Occurrence Notebook. Phoenix, Arizona.

Rutman, S., 1992. Handbook of Arizona's Endangered, Threatened, and Candidate Plants. U.S. Fish and Wildlife Service. Phoenix, Arizona p.30.

U.S. Bureau of Land Management. 1988. Phoenix Resource Management Plan and Final Environmental Impact Statement. Phoenix, Arizona.

ARIZONA CLIFFROSE (*Purshia subintegra*)

This species is an evergreen shrub of the rose family which has a potential to reach 6 feet tall or more. The bark is pale gray and shreddy. The young twigs are usually covered with dense, soft white hairs, and are glandless. The leaves are usually simple, but can have 1-5 lobes, with edges smooth and entire and revolute. The flowers 5 white or yellow petals <0.5 inches long.

1. T&E STATUS/CRITICAL HABITAT

The Arizona cliffrose was listed as **endangered** on May 29, 1984, with no critical habitat.

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

The listed range for this species is Graham, Yavapai, Maricopa, and Mohave counties. This species occurs near the Safford District on the San Carlos Indian Reservation.

3. HABITAT REQUIREMENTS

The habitat for this species consist of white soils of tertiary limestone lakebed deposits (Retriever soil series). This type of habitat is not found in lands administered by the Safford District.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Because of the lack of this habitat in the Safford District to support this species, the livestock grazing program would have no effect on it.

5. REASONS WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The Safford District does not have any areas with the habitat requirements of this species. None are expected to be found and grazing will not impact this species.

6. EFFECT DETERMINATION

Grazing will have a '**no effect**' on the continuing existence of this species.

7. LITERATURE CITATIONS

U.S. Fish and Wildlife Service. 1994. Arizona Cliffrose (*Purshia subintegra*) Recovery Plan. USDI Fish and Wildlife Service, Arizona Ecological Services State Office,

Phoenix, Arizona. 90 pp. + appendix.

ARIZONA HEDGEHOG CACTUS (*Echinocereus triglochidiatus arizonicus*)

1. SPECIES BACKGROUND INFORMATION

This species is a succulent perennial plant with dark green cylindroid stems, 2.5-16 inches long and 3-4 inches in diameter. Each stem has + or - 10 tuberculate ribs, with strong ribbing. The stems occur singly but most often as clusters of only a few stems. Central spines are 1-3, gray or pinkish with the longest deflexed. There are 5-11 radial spines, shorter then the central ones and often slightly curved. The bright red flowers are produced on the sides of the stems.

a. T&E STATUS/CRITICAL HABITAT

The Arizona hedgehog cactus was listed as **ENDANGERED** on November 26, 1979, with no critical habitat (Federal Register 44[208] 1979).

b. T&E OCCURRENCE REPORTS

This group of cacti has been the source of much taxonomic controversy (Ferguson 1989). Work is currently being done to clarify its taxonomy. Until this is completed, the populations found in this district and the surrounding areas will be treated as the listed species.

This species was originally reported in a small locality between Superior and Globe (Benson. 1969) near Highway 60. Another population was later found about 16 miles south of the type locality (Bingham, 1979), but was not considered distinctive enough for positive identification. Cedar Creek Associates (unpublished data) recently reported the discovery of numerous plants considered to be *E. t. arizonicus* in the general area of the type locality around the proposed Carlota Copper Project area west of Globe, on Apache Peak northeast of Globe, on El Capitan in the Mescal Mountains, and in Six-Shooter Canyon in the Pinal Mountains. Species resembling the Arizona hedgehog cactus have been found in the Apache National Forest north of Morenci around Pinal Peak and Enebro Mountain. This species was reported in Bonita and Markham Creeks and the Gila and San Francisco Rivers, and in Guthrie Peak in the Black Hills by BLM personnel. Allotments with occupied habitat of this species are: Metcalf, Morenci, Smuggler Peak, Twin C, Guthrie Peak, Day Mine, Johnny Creek, and Bonita Creek. Another 78 allotments have potential habitat. Refer Table 15a for a list of these allotments.

c. T&E SURVEYS

SWCA, Inc. conducted spot surveys in 35 areas between the type locality and the New Mexico Border, during the period between November 29 and December 2, 1994, and in December 13 and 15, 1994. Plants resembling the Arizona hedgehog cactus were found in 9 of these 35 areas. Surveys were conducted on Public Land and on U.S. Forest Service land north of Morenci on April 11-13 and May 18, 1995. A total of 303 and 286 plants resembling *E. t. arizonicus* were found in these areas, respectively (SWCA, Inc. 1995).

d. CONSULTATIONS/CONFERENCES

The following Section 7 consultations which may involve the Arizona hedgehog cactus have been conducted by the Safford District:

NUMBER	NAME
2-21-84-I-022	Safford District Land Sale
2-21-87-I-065	Safford District Land Exchange
2-21-87-I-066	San Pedro River BLM Lands
2-21-87-I-088	Eradication of Exotic Fish
2-21-88-F-114	Safford District RMP
2-21-88-I-109	Safford District Land Exchange
2-21-89-I-007	Renovation of Fairbanks Mercantile
2-21-89-I-121	Peregrine Falcon Surveys
2-21-89-F-018	Big and Cold Springs Pupfish Stocking
2-21-90-F-196	Cienega Creek Diversion
2-21-90-I-150	Cienega Creek Pasture Fencing
2-21-91-F-160	Cienega Creek
2-21-91-I-095	Bonita Creek Allotment Management
2-21-91-I-170	Cienega Creek Earth Day Project
2-21-91-I-270	Peloncillo Habitat Management Plan
2-21-92-F-070	Gila Box NCA
2-21-92-F-450	Dorothy "B" Mine 2700 Acres Copper
2-21-92-I-071	Gila Resource Area, Sanchez Copper Mine
2-21-92-I-108	Prescribed Burns, Aravaipa Creek Tablelands
2-21-92-I-219	Braidfoot Allotment Cattle Grazing
2-21-92-I-584	Phelps Dodge Mining
2-21-92-I-733	Howard Well Water Supply
2-21-93-F-406	Road Construction Bonita Creek
2-21-93-I-430	Cienega Creek Headcut Repair & Fencing
2-21-94-I-053	EA Animal Damage Control Plan
2-21-94-I-213	Muleshoe Cooperative Management Plan

2-21-94-I-543 BLM Acquiring 3 Parcels of Land
2-21-95-F-177 Cienega Creek Interim Grazing Plan
2-21-95-I-049 Draft Dos Cabezas Mountains Wilderness
2-21-95-I-081 Morenci & Safford Land Exchange
2-21-95-I-209 Big Spring Supplemental Stocking
2-21-95-I-211 Restoration of Old Gila River Bridge
2-21-95-I-304 Stream Gauge Installation Cienega Creek
2-21-95-I-313 Flood Repairs to Road in Turkey Creek
2-21-95-F-081 Morenci Land Exchange With Phelps Dodge

d. REASON FOR SPECIES DECLINE

Factors leading to this species being placed on the endangered species list included the present or threatened destruction, modification or curtailment of its habitat or range; its overutilization for commercial, scientific, or educational purposes; disease or predation (including grazing); and the inadequacy of existing regulatory mechanisms (Federal Register 44. 1979).

2. RECOVERY PLANS

There is no recovery plan for this species.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

These plants begin to flower in late April and are in full flower in mid May. They produce bright red flowers along the side of the stem which remain open for several days. Fruits mature in July and August (Ralston. unpublished). Normal sexual reproduction by seeds is the means of reproduction. Approximately 100 seeds are produced per fruit (Phillips. 1985).

b. RANGE OF SPECIES

The entire range is listed as central Arizona in Pinal and Gila counties in the Pinal, Dripping Springs, Superstition and Mescal Mountains. Similar plants have been found in Greenlee, Cochise and Graham counties.

c. HABITAT REQUIREMENTS

This species is found in open rocky slopes, steep-wall canyons, and in boulder and rocky outcrops at elevations of 3,400-5,500 feet (Ralston. unpublished), and in the understory of shrubs in the ecotone between Madrean Evergreen Woodland and Interior

Chaparral (Rutman. 1992). Recently, however, plants resembling the listed species have been found at elevations below 3200 and above 7000 feet. Aspect does not play a role in lower elevations, but at higher elevations, southern aspect appears to be preferred. It is scattered on open slopes, in narrow cracks between boulders and in the understory of shrubs. It occurs in interior chaparral, Madrean evergreen woodland, and desert grassland. Associated dominant species include juniper (*Juniperus monospermum)*, grama grasses (*Bouteloua sp.)*, shrub live oak (*Quercus turbinella*), wait-a-minute (*Mimosa biuncifera*), whitethorn (*Acacia constricta*), mesquite (*Prosopis juliflora*), agave (*Agave sp.*), bear grass (*Nolina microcarpa*), skunk bush (*Rhus trilobata*), banana yucca (*Yucca baccata*), sotol (*Dasylirion wheeleri*), and snakeweed (*Gutierrezia sarothrae*).

d. RATIONALE FOR POTENTIAL HABITAT

Potential habitat for this species are those areas with open, rocky slopes, steep wall canyons, and boulder and rocky outcrops. If the new populations which have been found are assumed to be the Arizona hedgehog cactus, the elevation range would then be expanded from the original range of 3,500 to 5,500 feet to 3,200 to 7,000 feet.

e. HABITAT CONDITION

Conflict with grazing is limited because the type of habitat where this species occurs is not preferred by livestock. The condition of these areas is generally good, with little or no grazing occurring because of their steepness or roughness, or lack of livestock forage plants. The apparent trend in 94% of the allotments with potential or occupied habitat is static or upward. The 6% of the allotments with a downward trend have 86% of their acreage in good or excellent range condition. The condition in 81% of the total acreage of the allotments is fair to excellent. The condition of the acreage of potential or occupied habitat would be better than the condition for the total allotment acreage because it is on rocky, steep slopes and rock cliff areas where livestock are not normally found. Information on range condition and trend is found on Appendix 3.

f. CURRENT CONDITION OF SPECIES (POPULATION STATUS)

(1.) RANGEWIDE

When originally listed, this species was known from only a few locations in the area near the county line between Gila and Pinal counties. Since then, other populations resembling this endangered species have been found in the area between the site of the original populations and the Arizona-New Mexico border. This would considerably expand their range and improve their population status. Work is underway to clarify the taxonomy of this species and verify whether these new populations are the listed species.

(2.) ACTION AREA

This species has been found in the Safford District in habitats similar to those described in its habitat requirements. If these new populations are to be considered the listed species, then the status of this species in the action area is much more numerous and widespread than it was originally believed to be.

4. DETERMINATION OF EFFECTS

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT

One of the factors listed in the Federal Register notice for listing of this species was disease or predation (including grazing). Grazing can affect this species directly through the actual grazing or trampling of the plant by livestock while they are grazing other more palatable plant species.

(2.) INDIRECT

Livestock grazing can have indirect effects on this species by modifying its habitat. Grazing and trampling of the other plant species in the habitat of the hedgehog cactus can reduce the numbers or density of those species. This would open up the area around the cactus, provide less competition from these surrounding plants, enhancing the survivability and propagation of this endangered species. At the same time, some of these surrounding plant species may be providing protection from predation for the Arizona hedgehog or providing a better microclimate for seedling germination. Grazing would then decrease their protection from predation and degrade the microclimate for seedling germination. Trampling of the soil by livestock can compact it and reduce its water infiltration capacity.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

The habitat requirements for this species places it in areas where livestock access is difficult or limited. Occupied habitat has been found in 8 grazing allotments. Another 78 allotments have potential habitat. The occupied habitat has been in areas that receive little or no grazing. Because of the ruggedness of the areas containing this type of habitat, few livestock of the permitted number in each particular allotment would congregate there, and less of these would potentially come into contact with the actual plant. The permitted use will determine what number of livestock will be permitted to graze in a certain allotment. The fact that livestock are present in these allotments with potential habitat for the Arizona hedgehog cactus will have an effect on this species, but

will not likely adversely affect it. Grazing systems will diminish the effects of grazing for plants in general, including the listed species. Standard utilization levels for the uplands have been set at a level where forage plants will not be adversely affected but can retain their vigor through the years. Range improvements can help in spreading out utilization by livestock to make it more even over a larger area of the allotment. Some improvements, like livestock waters, can also create sacrifice areas of heavy utilization. Fences can help in regulating or controlling livestock use. Riparian policy and management would not affect the hedgehog cactus because it has not been found in this type of habitat. The existence and management of special management areas would affect this species if these areas were on habitat of this listed species and if their management led to decreased levels of grazing or decreased numbers of livestock in these habitats.

(1.) DIRECT EFFECTS

Livestock grazing could result in the actual consumption of the individual plants and/or the trampling of plants by livestock. The extent of these effects are not known. Generally, cacti will not be consumed by livestock unless other more palatable food sources are lacking. However, they can be consumed by accident while grazing other plants intermixed with the cacti. Permitted use determines what numbers of livestock will be in an allotment. If that allotment is occupied by or has potential habitat for this listed species, the presence of livestock in this habitat can potentially have an effect on it. It establishes the possibility of its being trampled. Grazing systems can concentrate livestock numbers in potential or occupied cacti habitat, potentially affecting this species. Utilization levels in the uplands, where habitat for these species is mainly found, can affect this species by increasing the potential of its being consumed by livestock. With proper grazing practices, livestock will not be grazing on these cacti. The probability of trampling will vary with the concentration of these cacti, ruggedness of the terrain where found, the numbers of livestock in the area, and the length of time that they are kept there.

(2.) INDIRECT EFFECTS

Livestock grazing could alter the existing habitat of the Arizona hedgehog cactus by modifying the vegetation around it and affecting the water infiltration ability of the surrounding soil. The extent of this is not known. Immediate indirect effects would the decrease in vegetation cover surrounding the cacti. On the long term, grazing could change the surrounding species composition.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

The grazing elements which can impact the listed species or its habitat are the

permitted use, grazing systems, and upland utilization standards. Permitted use determines the numbers of livestock, and grazing systems and upland utilization standards determine the grazing use of these livestock numbers. Grazing in the allotments with potential or occupied habitat for the cacti believed to be the listed species can impact this species, except for those allotments where grazing is not taking place, Badger Den and Guadalupe W. Allotments. In all the grazed allotments, cattle can potentially consume or trample this species, or to a lesser degree, alter the species composition around the cacti or decrease the water infiltration quality of the soil around it. Because grazing has been adjusted to allow for forage plants regeneration over time, these effects will be minimal, not adverse.

(4.) INTERRELATED/INTERDEPENDENT

Grazing interrelated or interdependent actions would include those range improvement projects which would be needed to support grazing. Most improvements have been completed. Any new ones that may need to be done would be constructed in a manner which would have the least effect, or no effect, on the listed species and would be evaluated separately and individually.

c. RATIONALE FOR EFFECTS

In the grazing program for this district, permitted use, grazing systems, and utilization could all affect the listed species. These would determine the degree of contact that livestock could have with the hedgehog cactus or its habitat. Even though the permitted use or permitted livestock numbers in each allotment have been reduced to conform to the available forage, livestock would continue to use these allotments with occupied or potential habitat. The presence of livestock in Arizona hedgehog cactus habitat would place them in potential contact with this species. Grazing systems determine how livestock will graze, or be managed, within each allotment. Unless the grazing system completely eliminates grazing or livestock presence in the listed species habitat, grazing could still have an effect as a result of the grazing system. A heavier impact would result if livestock are concentrated in a smaller area of an allotment even if for a shorter period of time, increasing the potential for contact with these cacti. The holistic type of grazing will do this more then the other types of grazing systems used in this district. These effects would not be adverse because livestock would not tend to congregate on the rugged and rough habitat for the listed species even under this intense grazing management. Even though the grazing utilization levels in this district have been set to allow for forage plant regeneration, livestock will still have the potential to come in contact with these cacti. Because utilization is averaged out over the allotment, there will be areas where utilization will be more then 40 percent and up to 60 percent, which will increase the possibility of livestock contact with the listed species. Range improvements could also affect this species by keeping livestock in, keeping them away from, or concentrating them in occupied or potential habitat for this species.

Most improvements have been completed and those that will be proposed, will be evaluated separately and individually. Because the habitat for this species is not found in riparian areas, riparian policy and management would have no effect on this species. If special management areas are found within potential or occupied habitat for this listed species, this would have an effect if the extra layer of management would affect the numbers of livestock or the amount of grazing in those areas. Many of the special management areas within the district are within riparian areas. Their management would not affect the listed species. For a list of these grazing elements and their affects on the different allotments, see Table 15.

d. EFFECT DETERMINATION

In this district, 86 grazing allotments were identified with potential and/or occupied habitat for this species. Three of these allotments have no livestock use and will not be affected by grazing. Over 300,000 acres of potential or occupied Arizona hedgehog cactus habitat occurs on allotments that are grazed. The extensive acreage of this habitat in the Safford District suggests that this species may be more common and widespread then previously believed. Also, given the ruggedness of this type of habitat, the likelihood that livestock will come in contact with this species is low. With this much acreage of potential and occupied habitat for this species, the overall effect of grazing is "**may affect, but is not likely to adversely affect**" the continued survival of this species. The determination of grazing effects by individual allotments with potential and/or occupied habitat is listed in Table 15a.

5. PROPOSED MITIGATION MEASURES

None proposed.

6.CUMULATIVE EFFECTS OF STATE OR PRIVATE ACTIONS WITHIN THE AREA

Mining is the activity with the most potential for affecting this species. Mining occurs within the habitat for this species in the Safford District on private, state and public lands. Mining is expected to continue and increase in the future on these lands. All these have the potential to impact this species.

7. LITERATURE CITATIONS

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Rutman, S. 1992. Handbook of Arizona's Endangered, Threatened, and Candidate Plants. Page 14. U.S. Fish and Wildlife Service, Phoenix, Arizona.

SWCA, Inc. 1995. Biological Assessment for the Proposed Morenci Land Exchange. Unpublished report to Bureau of Land Management, Safford District.

U.S. Fish and Wildlife Service. 1979. Determination That *Echinocereus triglochidiatus* var. *arizonicus* is an Endangered Species. Federal Register 44(208):61556-61558. October 25, 1979.

CANELO HILLS LADIES TRESSES (*Spiranthes delitescens*)

1. T&E STATUS/CRITICAL HABITAT

This species was proposed as an Endangered species on 4/3/95 with no critical habitat.

2. LAND STATUS (WHERE SPECIES OCCUR IN THE ACTION AREA)

Populations of this species is known to exist in only four cienegas in southern Arizona at approximately 5,000 feet in elevation. One population is found in Cochise county and three in Santa Cruz county. One population is found at the Arizona Nature Conservancy's Canelo Hills Cienega. Two other populations are found on private land. One in the San Rafael Valley, and one in the Babocamari Cienega. The fourth population is locaed on U.S. Forest Service land in the Canelo Hills.

Since this species does occur in Cienegas at about 5,000 feet, it could possibly occur in the following BLM grazing allotments: Empire Ranch - 6090, Empirita Ranch - 6210, Babocamari - 5208, and Brunchow Hill - 5251.

3. HABITAT REQUIREMENTS

This species occurs in Cienegas intermixed with tall grasses and sedges at about 5,000 feet in elevation. The soils are finely grained, highly organic, and saturated. The associated plant species include: Bidens spp., Carex spp., Juncus spp., Eleocharis spp, typha spp., and equisetum spp.. Flowering occurs in late July to early August, when temperatures range from 60 degrees F at night to 100 degrees F during the day. During that time, precipitation averages 15 to 20 inches.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Little is known about the effects of livestock grazing on this species. An adverse effect on this proposed species would occur if livestock grazing is degrading the watershed to the extent that cienega habitats are being lost or altered. The habitat and plants are susceptible to damage by poor livestock grazing practices. The literature suggests that the spread of exotic plant species such as Johnson grass could become a problem due to competition for light in dense cienega vegetation. The literature also suggests that prescribed fire may be a useful tool in maintaining a suitable cienega habitat for this species.

The riparian areas in the resource area are being managed to improve vegetative conditions and restore or maintain proper functioning condition of the watershed.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

This species is not being fully analyzed at this time because it has not been located on any lands administered by the BLM. Should this species be found, the Bureau will initiate consultation, and take necessary measures to protect it.

6. EFFECT DETERMINATION

The Safford District grazing program should have **no effect** on this species since it has not been found on BLM administered lands within the district.

7. LITERATURE CITATIONS

Arizona Game and Fish Department, 1994. Heritage Data Management System. Rare Plants of the Bureau of Land Management's Safford District and Vicinity - Elements Occurrence Notebook. Phoenix, Arizona.

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U.S. Bureau of Land Management. 1988. Phoenix Resource Management Plan and Final Environmental Impact Statement. Phoenix, Arizona.

COCHISE PINCUSHION CACTUS *Coryphantha robbinsorum*)

1. T&E STATUS/CRITICAL HABITAT

This cactus was listed threatened, January 9, 1986, without critical habitat.

2. LAND STATUS

All known populations in Arizona are on privately owned land or Arizona State Land in the extreme southeastern Cochise county. It also occurs in northern Sonora, Mexico.

3. HABITAT REQUIREMENTS

This species occurs in the transition zone between the Chihuahuan Desert Scrub and Semidesert Grassland. It is found on hills with soils composed of thin, gravelly loam over Permian Limestone at an elevation of 4200-4700 feet. Most individuals of Cochise pincushion cactus appear to occur on bedrock or where bedrock is very close to the surface and in open areas, exposed to full sunlight. In these microsites, very little or no soil is present. Associated species include Muhlenbergia asperifolia, Calliandra eriophvlla, Agave palmeri, Vauquelinia Pauciflora, Echinocereus fendleri var. rectispinus, Dyssodia spp., Coryphantha vivipara, opuntia phaeacantha, Fouquieria splendens.

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Although cattle do not graze this species, they may inadvertently knock them over as they trail over the range. In the recovery plan for Cochise Pincushion Cactus it is reported that livestock destroyed one plant from a monitoring plot, established in 1989 by the FWS, about one-half mile from a water source. The next year cattle started trailing directly through the plot. This plant was not protected by bedrock from cattle hooves and was killed due to trampling, others were damaged. According to the report cattle no longer use the trail. The bedrock or coarse rock substrate seems to protect most plants from damage by trampling. Bedrock also protects the species from damage due to range improvement practices which cause surface disturbance.

5. REASONS WHY THIS SPECIES IS NOT BEING FULLY ANALYZED

This species is not being analyzed more because there are no known plants on Federal land. All known plant locations are in areas where BLM has no management responsibility or authority. The plant is not known to occur within any BLM grazing allotment where BLM authorizes livestock grazing. Cattle do not eat this cactus, so there is no effect at all on this species from cattle grazing. As stated above there are

possible effects from cattle trampling, however, this would be a rare occasion due to the location of the species close to bedrock areas where cattle prefer not to cross.

6. EFFECTS DETERMINATION

It is BLM's determination that the proposed action would have **"No Effect"** on the Cochise Pincushion Cactus.

7. LITERATURE CITATIONS

Miller, D.J. and R.A. Hilsenback. 1993. Cochise pincushion cactus Corypantha robbinsorum recovery plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Rutman, S. 1989. Corypantha robbinsorum (Cochise Pincushion Cactus): Report on 1988 monitoring effort. U.S. Fish and Wildlife Service, Ecological Services, Phoenix, Arizona.

U.S. Department of Interior. Fish and Wildlife Service, 1986. Final rule to determine Corypantha robbinsorum to be a threatened species. Federal Register 51(6):952-956

HUACHUCA WATER UMBEL (*Lilaeopsis schaffneriana ssp. recurva*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

This species was proposed as an Endangered Species on 4/3/95 without critical habitat.

b. T&E OCCURRENCE

Disjunct locations in Southeastern Arizona and adjacent Sonora Mexico. In Arizona, in Santa Cruz and Cochise counties on private, military, Forest Service, BLM, and USF&WS lands.

An existing population of this species was recently reported in Empire Gulch on the Empire-Cienega Ranch that is located in Pima county. This includes: Occupied habitat on the Empire-Cienega Allotment (No. 6090), and potential habitat on the Empirita Allotment (No.6210), Babocamari Allotment (No. 5208), and the Brunchow Hill Allotment (No. 5251). These allotments are currently grazed, and have suitable habitat sites. Refer to Riparian Inventory. See Appendix 4.

The species appears to be naturally recolonizing the San Pedro River at several locations.

c. T&E SURVEYS

None

d. CONSULTATIONS/CONFERENCES

Section 7 Consultation has been completed on the Interim Livestock Grazing Management Plan - Empire Cienega Ranch. 1996.

e. REASON FOR SPECIES DECLINE

The decline or rarity of this species has probably been caused by the general loss and decline of cienega and stream habitats throughout Arizona.

2. RECOVERY PLANS:

No recovery plan has been developed for this species as of this date.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

This species is a herbaceous semi-aquatic perennial with slender erect leaves growing from nodes of creeping shallow rhizomes. Tiny 3 to 10 flowered umbels arise from root nodes. Inflorescence peduncles are always shorter than the leaves. The flowers are 1 to 2 millimeters wide with tiny maroon-tinted petals. Fruits are globose, usually slightly longer than wide. Flowering has been observed from March through October.

The rhizomes branch freely and may form dense mats in the sand or mud, making it impossible to identify individual plants. Flowers may be self-fertile. The plant reproduces vegetatively via rhizomes.

b. RANGE OF SPECIES

This species is found in southeastern Arizona and adjacent Sonora, Mexico in cienegas and associated vegetation within the Sonoran desertscrub, semidesert grasslands, oak woodlands, and conifer forests between 4,000 and 6,500 feet elevation.

c. HABITAT REQUIREMENTS

Lilaeopsis is usually found in water from 2 to 16 inches deep. This plant requires a semi-aquatic habitat with an intermediate level of flooding frequency. A moderate flood frequency and the associated level of disturbance to other plant species is required to maintain the ecological niche for this species. However populations can be destroyed when floods are too frequent or intense. Plants are found in unshaded or shaded sites. This species requires perennial water, gentle stream gradients, small to medium sized drainages, and apparently mild winters. Associated plants include willows, alder, cottonwood, cattails, bulrushes, sedges, rushes, grasses, and watercress.

d. RATIONALE FOR POTENTIAL HABITAT

Potential habitat for this species includes riparian areas in southeastern Arizona between 4,000 and 6,500 feet (particularly in Santa Cruz and Cochise Counties).

e. HABITAT CONDITION

Occupied habitat exists on the Empire-Cienega Allotment (No. 6090). Potential habitat exists on the Empirita Allotment (No.6210), Babocamari Allotment (No. 5208), and the Brunchow Hill Allotment (No. 5251).

The allotments listed above have riparian habitats suitable for the water umbel that are in good condition, and can either be considered properly functioning or functioning at risk. Refer to Range Condition and Trend Table in Appendix 3 and Riparian Inventory Table in Appendix 4.

f. CURRENT CONDITION OF SPECIES

(1.) RANGEWIDE

No information on the condition this species in the Sonora, Mexico portion of its' range is available.

(2.) ACTION AREA

This species has apparently been lost from at least four historic sites in Arizona (Saint David, 2 sites; Tucson; Monkey Springs). The species appears to be naturally recolonizing the San Pedro River at several locations including the Hwy 90 crossing and Boquillas Ranch. This may be a result of improved aquatic habitat stability following improvement in management of the BLM San Pedro Riparian Conservation Area. A new population was recently discovered on the Empire Ranch in Empire Gulch, where improvements in the livestock grazing management are resulting in improvements in watershed conditions.

4. DETERMINATION OF EFFECTS

a. GENERAL EFFECTS OF GRAZING

(1.) DIRECT EFFECTS

The direct effects to this species from livestock grazing would be consumption of this species by cattle, and the trampling of the plants by cattle as they forage and drink in the vicinity of the cienega habitats.

(2.) INDIRECT EFFECTS

The indirect effects from poor livestock management practices would be overall degradation of the watershed that results in a loss of desirable plant cover in the uplands and bottoms. During precipitation events less water would enter the soil through infiltration on site, resulting in more runoff and a quicker release of water from the watershed. This would produce a "flashy" flooding cycle. Flood flows resulting from precipitation events would have higher peak flows, and tend to be more erosive than in those watersheds with better vegetative cover. Larger more erosive flood events coul;d nave negative impacts on populations and the ecological niche of this species.

This situation could also result in higher rates of sedimentation in some areas and more scouring of stream channels in other sites.

Other indirect effects could include surface disturbance resulting from activities associated with livestock grazing. These might include the use of prescribed fire, road construction and maintenance, or construction of new water developments.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

Six elements of the proposed action (permitted use, grazing systems, utilization levels, range improvements, riparian area management, and special management areas) are are analyzed as to their effects on the water umbel and its habitat. The result of this analysis is presented in Effect Analysis Table for each allotment with occupied or potential habitat.

(1.) DIRECT EFFECTS

The allotments with either occupied or potential habitat for this species are currently being managed with the emphasis on improving the riparian areas, while improving or maintaining the adjacent uplands.

The implementation of the Riparian Management Policy and an appropriate grazing system are the primary actions which will reduce the adverse impacts of livestock grazing to the water umbel. In most cases this will require the construction of the range improvements necessary to implement these policies.

(2.) INDIRECT EFFECTS

The adjacent uplands on the above allotments are being managed to provide adequate rest necessary to improve or maintain the existing range conditions. Any range improvements will require an environmental assessment to evaluate the impacts on any of the sensitive resources present.

(3.) DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

Allotments with occupied or potential habitat are all well managed by the livestock operators and most are being managed according to an existing allotment management plan.

An Interim Management Plan is in effect on the Empire-Cienega allotment. The coordinated management plan is completed on the Empirita, however the range

improvements necessary to implement the livestock rotations and deferments have not been constructed. A draft plan is currently being developed for the Babocamari allotment. No interagency plan has been started for the Brunchow Hill allotment, although the operator does have a management strategy of his own. These grazing plans do provide periods of nonuse from livestock grazing for the riparian areas. The primary season of use by livestock is during the winter dormant period on the Empire, Empirita, and Babocamari allotments. The rotation on the Brunchow Hill allotment is not known.

On the Empire, riparian pastures have been developed under Sec 7 consultation to protect the riparian habitats. The riparian pastures and alternative water sources have been developed to reduce the dependence on water and forage from the riparian zones. Those areas where no alternative water source is available, cattle grazing has been deferred during the spring and summer growing seasons.

On the Empirita, less than one mile of riparian habitat along Cienega Creek is in the allotment. The BLM and the grazing lessee are working to provide additional rest for this portion of Cienega Creek. Alternative water and additional fencing will be required. It is currently used in the winter when most plants are dormant and cattle prefer the uplands. We do plan further protection and consultation on the Empirita in the near future. It is being considered in the Land Use Planning for Sonoita Valley currently in progress. Currently this part of the allotment is used during the winter season. Until the necessary range improvements are developed, we may have to change the proposed grazing rotations and deferments, due to lack of water, or inability to control the movements of the cattle. This may result in cattle using the flowing water in Cienega Creek when the effects could be detrimental to the water umbel.

The Babocamari and Brunchow Hill allotments have riparian habitat and allotment management plans are being developed (as per the Safford RMP) which will be consulted upon under Section 7. Both riparian areas are in good condition.

The portion of the Babocamari allotment with riparian habitat along the Babocamari River has been used for the last five years during the winter. The BLM and the grazing lessee are currently developing a grazing management plan to provide for future use of the allotment and the protection of the riparian habitat. Until this plan is completed and implemented, possible adverse impacts could result from use of the riparian areas.

Only a very small portion of the riparian area on the Brunchow Hill allotment is on BLM administered lands. The majority of the lands are privately owned by the lessee. This land is being managed by the lessee and appear to be in good condition.

(4.) INTERRELATED AND INTERDEPENDENT EFFECTS

No interrelated or interdependent effects have been identified.

(5.) INCIDENTAL TAKE AS APPLICABLE

The term "take" does not apply to plant species under the Endangered Species Act.

c. RATIONALE FOR EFFECTS ANALYSIS

On the Empire-Cienega Ranch, **the proposed action may have an effect on this species, but it is not likely to adversely affect it**. The interim grazing management has been implemented, and Section 7 consultation completed.

On the Empirita, the plan has been developed, however the necessary range improvements have not been constructed. **Because the plan has not been implemented, the current livestock grazing may have an adverse effect upon the water umbel**. Cattle grazing may occur in the riparian areas along Cienega Creek either when it is not desirable, or it may continue longer than proposed. This species does tolerate or even require some level of disturbance to help it remain dominant in the plant community. Otherwise it may be replaced with higher seral plants, such as rushes and cattails. Therefor some disturbance by livestock should not be taken as detrimental. Once the plan is fully implemented, these adverse impacts should cease.

On the Babocamari and Brunchow Hill allotments, **the proposed action may have an adverse effect upon the water umbel**, because the livestock grazing is not currently managed under a coordinated plan designed to achieve specific resource objectives.

d. EFFECT DETERMINATION

The Safford District grazing program **may adversely effect** the water umbel.

On the Empire-Cienega Ranch, **the proposed action may have an effect on this species, but it is not likely to adversely affect it**.

On the Empirita, the plan has been developed, however the necessary range improvements have not been constructed. **Because the plan has not been implemented, the current livestock grazing may have an adverse effect upon the water umbel**.

On the Babocamari and Brunchow Hill allotments, **the proposed action may have an adverse effect upon the water umbel**,

5. PROPOSED MITIGATION MEASURES

Proposed mitigation measures include:

Continue implementation of the Riparian Policy and Development of Coordinated Management Plans for those allotments within retention areas. Complete environmental assessments and initiate Section 7 consultation as appropriate. This would include Empirita, Babocamari. and Brunchow Hill allotments.

6. CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE ACTION AREA

The private and state lands in the range of this plant species have little protection from possible development which could result in loss of habitat for this species. The BLM has been active in acquiring wetland habitats in southeastern Arizona to help preserve these rare vegetation communities. The Empire-Cienega and San Pedro Riparian NCA are excellent examples. Most of the riparian lands however, are in private ownership and our only influence is through education of the public of their value.

Most of these wetlands are extremely productive site, and the availability of water and shade have made them very attractive to livestock. The result has been the historic overuse of these sites by cattle. The beauty of these areas has also made the sale of these lands for residential development a booming business.

7. LITERATURE CITATIONS

Arizona Game and Fish Department, 1994. Heritage Data Management System. Rare Plants of the Bureau of Land Management's Safford District and Vicinity - Elements Occurrence Notebook. Phoenix, Arizona.

Rutman, S., 1992. Handbook of Arizona's Endangered, Threatened, and Candidate Plants. U.S. Fish and Wildlife Service. Phoenix, Arizona p.39.

U.S. Bureau of Land Management. 1988. Phoenix Resource Management Plan and Final Environmental Impact Statement. Phoenix, Arizona.

KEARNEY'S BLUE STAR (*Amsonia kearneyana*)

1. T&E STATUS/CRITICAL HABITAT

Kearney's Blue Star was listed as an Endangered species on 1/19/89 without critical habitat. The recovery plan for this species was completed in 1993.

2. LAND STATUS (WHERE SPECIES OCCUR IN ACTION AREA)

The range within Arizona is restricted to west-facing drainages in South and Sycamore canyons in the Baboquivari Mountains, Pima County. This plant has been located on the Tohono O'Odham Indian Reservation.

It was introduced on private land into Brown Canyon on the east side of the Baboquivari Mountains in 1988. Since then the population in Brown Canyon was transplanted to the east side of the mountain. Therefore we do not expect to find this species in the Tucson Resource Area.

In the Tucson Resource Area, potential habitat for this species would be in the Baboquivari Mountains in the transition between the oak woodlands and the semidesert grasslands.

Potential habitat for this species could possibly occur in the following BLM allotments: Anvil Ranch - 6100, Elkhorn Ranch 6175, Thomas Canyon - 6063, and Baboquivari - 6089. However, these BLM lands generally have an east facing aspect, and the species is known to only occur naturally on west facing exposures.

Range conditions in the Anvil, Elkhorn, Baboquivari, and Thomas Canyon allotments are generally good to excellent.

The Baboquivari and Coyote Mountains have been surveyed looking for other populations of this Amsonia. None have been located, and it is not likely to occur on the BLM administered lands which are primarily east facing mountain slopes.

3. HABITAT REQUIREMENTS

The required habitat is west facing aspects in mountain canyons in partial shade under deciduous riparian trees from 3,750 - 4,500 feet. It occurs on west facing slopes in the transition between the Madrean oak woodlands and the semidesert grasslands with the following associated species: Mexican blue oak, velvet mesquite, and Arizona walnut. The known population grows in the stable partially shaded, coarse alluvium along a dry wash. .

4. GENERAL EFFECTS OF LIVESTOCK GRAZING

Like many species in the dogbane family, Kearney's Blue Star has a toxic milky sap. Apparently, cattle do not graze this plant because of the milky toxic sap even during times of drought, when surrounding vegetation has been grazed.(Phillips, April 1981).

Trampling of plants by livestock could affect this species if it is present in areas where heavy livestock grazing is occurring.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

The known natural occurrence of this species is only on west facing slopes of the Baboquivari Mountains. The BLM administered lands listed as potential habitat are generally east facing exposures of these mountains. The BLM administered lands in the Tucson Resource Area do not meet the habitat requirements as outlined in the literature (Handbook of Arizona's Rare Plants, Summer 1992).

6. EFFECT DETERMINATION

Since this plant species is not expected to be present on any of the four BLM grazing allotments listed as potential habitat, there would be **"no effect"** from the direct impacts of livestock grazing.

7. LITERATURE CITATIONS

Arizona Game and Fish Department, 1994. Heritage Data Management System. Rare Plants of the Bureau of Land Management's Safford District and Vicinity - Elements Occurrence Notebook. Phoenix, Arizona.

Rutman, S., 1992. Handbook of Arizona's Endangered, Threatened, and Candidate Plants. U.S. Fish and Wildlife Service. Phoenix, Arizona p.19.

U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Species of Arizona. Phoenix, Arizona p. 14.

NICHOL'S TURK'S HEAD CACTUS (*Echinocactus horizonthalonius var. Nicholii)*

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

The Nichol's Turk's head cactus was listed as an endangered species on October 26, 1979, with no critical habitat.

b. T&E OCCURRENCE

Presently the Nichol's Turk's head cactus is known to occur in two disjunct populations in the U.S. and one population in northern Mexico. The U.S. populations are in the Vekol Mountains in southwestern Pinal County, Arizona, and in the Waterman Mountains on north-central Pima County, Arizona. The Mexican population occurs in the Sierra del Viejo of northwestern Sonora.

Occupied habitat occurs on the Agua Dulce allotment (No. 6125)

Estimated potential habitat in the Waterman Mountains is 5,000 acres and estimated potential in the Vekol Mountains is 5,700 acres.

Small outcrops of similar limestone, where the cactus is not known, occur to the west of the Waterman Mountains.

c. T&E SURVEYS

The BLM administered lands in the vicinity of the known populations have been surveyed.

d. CONSULTATIONS/CONFERENCES

Recovery Plan completed April 14, 1986.
Habitat Management Plan completed May 1, 1986.
EA# AZ-025-86-014
Eastern Arizona Grazing EIS completed Sept. 1986.
Phoenix Rangeland Program Summary - Sept. 1987.
Phoenix Resource Management Plan completed Sept. 29 1989.
Waterman ACEC designated
Minerals estate segregated on Waterman Mountain Site June 1994.
Allotment Management Plan completed February 17, 1989.

e. REASON FOR SPECIES DECLINE

Mining activity is a major threat to this cactus. The Waterman and Vekol mountains contain a high grade lime of commercial value. Quarrying of the limestone and the building of roads and supporting facilities has had impacts in the past. Development of other mineral deposits in the area (copper, silver, gold, cobalt, vanadium, and molybdenum) may also be viewed as a threat. Off-road vehicle use is another disturbance factor. Motorcycles and all-terrain vehicles have destroyed a number of plants. New trails caused by OHV use and the establishment of unauthorized campsites and parking areas have impacted habitat and individual plants. Illegal collection of plants and seeds may also be a factor for the decline of this species.

2. RECOVERY PLANS:

a. NAME

Nichol Turk's Head Recovery Plan - 1986

b. REQUIREMENTS/RECOMMENDATIONS

1) Developing and Implementing a Habitat Management Plan.
2) Alleviate the threats of mining, ORV use, and illegal collecting.
3) Enforce regulations on collecting plants, and mining.
4) Search for new populations.
5) Monitor and study existing populations.

c. BUREAU STEPS TO ACCOMPLISH

1) Recovery Plan completed April 14, 1986.
2) Habitat Management Plan completed May 1, 1986.
EA# AZ-025-86-014
3) Eastern Arizona Grazing EIS completed Sept. 1986.
Phoenix Rangeland Program Summary - Sept. 1987.
4) Phoenix Resource Management Plan completed Sept. 29 1989.
Waterman ACEC designated
5) Minerals estate segregated on Waterman Mountain Site June 1994.
6) The mineral withdrawal has been signed by the Secretary of the Interior and should be effective in June of 1996.
7) Allotment Management Plan completed February 17, 1989.

d. SAFFORD ACCOMPLISHMENTS TOWARD RECOVERY PLAN:

The Tucson Resource Area is currently requesting the Secretary of the Interior to withdrawl the mineral estate from entry under the mining laws.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

These plants produce pink-magenta flowers which bloom from April to mid-May. Fruits are covered with wooly, white hairs. This cactus invariably has a single stem, but often several seedlings grow around its base, giving the appearance of small clumps.

b. RANGE OF SPECIES

Presently the Nichol's Turk's head cactus is known to occur in two disjunct populations in the U.S. and one population in northern Mexico. The U.S. populations are in the Vekol Mountains in southwestern Pinal County, Arizona, and in the Waterman Mountains on north-central Pima County, Arizona. The Mexican population occurs in the Sierra del Viejo of northwestern Sonora.

c. HABITAT REQUIREMENTS

Nichol's Turk's head cactus grows on both alluvial fans and inclined terraces and saddles of the Waterman and Vekol Mountains on limestone derived soils between 3,381 and 3,829 feet. The taxon occurs within the Arizona Upland Division of the Sonoran Desertscrub. Vegetation is open and characterized by sparse trees and scattered shrubs. The dominant associated species are foothill palo verde (Cercidium microphyllum), triangleleaf bursage (Ambrosia deltoidea), white ratany (Krameria grayi), and prickly pear cactus (Opuntia sp.).

On both fans and terraces there is an "open aspect" to the cactus' environment. This suggests that this cactus is a poor competitor with shrubs and trees for space, moisture, light, and nutrients. It is able to persist on limestone outcrops because the colonization rates of shrubs and trees onto such sites are low.

d. RATIONALE FOR POTENTIAL HABITAT

Potential habitat would be other limestone outcrops to the west of the known location in the Waterman Mountains. These sites would be located on the Tohono O'Odham Tribal lands.

e. HABITAT CONDITION

Occupied habitat occurs on the Agua Dulce allotment (No. 6125). The rangeland vegetation conditions in the Agua Dulce allotment where the Waterman population is located is generally in fair to good condition and the trend is upward (refer to Range Condition and Trend Table in Appendix 3). Livestock grazing is managed under an allotment management plan, and watering points have been changed to reduce possible impacts. Monitoring studies have been established by BLM.

f. CURRENT CONDITION OF SPECIES

(1.) RANGEWIDE

The condition of the species in the portion of its' range located in Mexico is unknown.

(2.) ACTION AREA

The number of individuals in all populations is estimated to be near 10,000. The BLM has established monitoring studies on the population under the Habitat Management Plan and in the Allotment Management Plan. BLM is currently in the process of withdrawing the mineral estate from entry under the mining laws. The remaining threat to the population on the BLM lands would be illegal collecting of the cactus.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT

The only possible effect by livestock may be inadvertent trampling of young cact by livestock. The cactus occurs on limestone outcrops where livestock do not congregate. The possibility of trampling exists, but would be slight.

(2.) INDIRECT

No indirect effects of livestock grazing were identified or anticipated.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

Six elements of the proposed action (permitted use, grazing systems, utilization levels, range improvements, riparian area management, and special management

areas) are analyzed as to their effects on the Turk's Head cactus and its habitat. The result of this analysis is presented in Effect Analysis Table for Agua Dulce allotment which is the only allotment with occupied or potential habitat for this species.

All applicable elements of the proposed action have been implemented on the Agua Dulce allotment.

(1.) DIRECT EFFECTS

The direct effects to this species from the proposed action would be possible trampling of young plants by livestock, and possibly changes in range condition resulting from livestock grazing.

(2.) INDIRECT EFFECTS

The indirect effects to this species from the proposed action would be construction of new range improvements and any vegetation manipulation practices (fire, root plowing, land imprinting) which might destroy cacti.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

The BLM has completed a Habitat Management Plan and a Coordinated Management Plan for the management of livestock grazing on the Agua Dulce allotment. These plans addressed reducing the presence of livestock in the occupied habitat, and implementing a livestock grazing strategy that would improve the overall health of the land. Both these actions have been completed, and monitoring studies have been implemented to study the effects on the Nichol Turk's Head Cactus. An existing watering point for livestock was moved to reduce cattle impacts in the occupied habitat. Also, because of below average rainfall in the area, the livestock operator has elected to only run cattle seasonally on this allotment. This change from yearlong use has further reduced the impacts from livestock.

While some range improvements are planned on this allotment to improve livestock management and improve the existing range conditions, none of these are proposed in the occupied habitat. Any proposed improvements would necessitate an environmental assessment and a botanical evaluation of possible effects to this species.

(4.) INTERRELATED/INTERDEPENDENT EFFECTS

As discussed in the section above, the BLM's Habitat and Livestock Management Plans have been implemented, and careful attention is given to completing those actions which would not only reduce impacts to this species, but would also promote the

recovery of it. This includes withdrawal of the habitat from mineral entry, acquisition of state and private lands adjacent to the occupied BLM lands, increased paroling of the area, and monitoring.

(5.) INCIDENTAL TAKE AS APPLICABLE

The term "take" does not apply to plant species under the Endangered Species Act.

c. RATIONALE FOR EFFECT DETERMINATION

The occupied habitat is in a portion of the allotment where grazing use has been deliberately reduced by moving an existing livestock water. It is unlikely that any concentration of livestock which would result in any trampling of this cactus will occur under the proposed or existing management.

d. EFFECT DETERMINATION

The proposed action should have **no effec**t on the Nichol Turk's Head Cactus.

5. PROPOSED MITIGATION MEASURES

The proposed mitigation is to continue to pursue those actions identified in the Recovery Plan, the Habitat Management Plan, the Coordinated Management Plan, and the Phoenix Resource Management Plan.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

This area is within the Silverbell Resource Conservation Area. The BLM has designated this an area for retention of the public lands, and acquisition of state and private lands as the opportunity arises. The area has also been designated an Area of Critical Environmental Concern, and steps are being taken to withdraw the mineral estate from entry under the mining laws. The state and private lands could be developed or mined, which could have adverse impacts on the cactus.

The lands in this area have been grazed by livestock for many years and are currently leased for this purpose. Past livestock management practices resulted in overuse of the vegetation resource and declines in the condition of the rangelands in the Silverbells. Current management practices recognize the need for improved livestock management and conditions are slowing improving.

7. LITERATURE CITATIONS

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U.S. Bureau of Land Management. 1988. Coordinated Resource Management Plan - Cocoraque and Agua Dulce Ranches. Phoenix, Arizona.

U.S. Bureau of Land Management. 1988. Phoenix Resource Management Plan and Final Environmental Impact Statement. Phoenix, Arizona.

PIMA PINEAPPLE CACTUS (*Coryphantha scheeri var. robustispina*)

1. SPECIES BACKGROUND INFORMATION

a. T&E STATUS/CRITICAL HABITAT

This cactus was proposed as an endangered species on April 20, 1992 without critical habitat. It was listed as endangered, Notice of Review, October 25, 1993.

b. T&E OCCURRENCE

This species has had numerous occurrence reports. It occurs in southeastern Arizona in Pima and Santa Cruz counties.

c. T&E SURVEYS

There have been numerous inventories and surveys of this cactus within the area described above.

d. CONSULTATIONS/CONFERENCES

e. REASONS FOR SPECIES DECLINE

Large land areas are needed to maintain viable populations of this species. The spread of urbanization, road construction, illegal collecting, introduction of aggressive exotic plant species, and habitat degradation due to historic and present land uses, have reduced populations and continue to pose threats.

2. RECOVERY PLAN

Currently no recovery plan exists.

3. SPECIES BIOLOGY

a. LIFE HISTORY/CYCLE INFORMATION

This species flowers around mid-July with the onset of the summer monsoons. Plants can be very widely distributed. Densities can be lower than one plant per 4 acres. Seeds are viable. The relative importance of sexual vs. asexual reproduction is unknown. Pollination is by small bees. Fruit set and seed production were high in 1988.

b. RANGE OF SPECIES

Known range is bounded by the Santa Rita Mountains on the east, Baboquivari Mountains on the west, Tucson to the north and the southern limit is reached a few miles south of the U.S./Mexico border.

c. HABITAT REQUIREMENTS

This species is generally found on flat ridges with little slope in the Sonoran desertscrub and the semidesert grasslands at elevations from 2,000 to 5,000 feet. Associated species include: white-thorn acacia (Acacia constricta), velvet mesquite (Prosopis velutina), snakeweed (Gutierrezia microcephala), triangle-leaf bursage (Ambrosia deltoidea), and various other cacti and grasses.

d. RATIONALE FOR POTENTIAL HABITAT

This cactus has a wide range of occurrence in the Tucson Resource Area. Without vegetation surveys of all public lands in the resource area, it is being assumed that the potential habitat are those lands south of Tucson, west from the Whetstone Mountains to the Tohono O'Odham Nation. More inventories will be required to narrow the scope of the potential habitat.

e. HABITAT CONDITION

Due to the relatively wide distribution of this species in the Tucson Resource Area, the condition of the habitat is varied. Conditions range from poor to excellent (refer to the Range Condition and Trend Table in Appendix 3).

f. CURRENT CONDITION OF SPECIES (POPULATION STATUS)

(1.) RANGEWIDE

The condition of this species in the portion of its' range in Mexico is unknown.

(2.) ACTION AREA

Because this cactus occurs in various locations, the threats to its survival are also variable. The U.S. Fish and Wildlife service considers the trend to be downward due to the continued loss and degradation of habitat.

4. DETERMINATION OF EFFECT

a. GENERAL GRAZING EFFECTS TO SPECIES

(1.) DIRECT

Although cattle do not graze this species, they may inadvertently knock them over as they trail over the range. The small size of these cacti and the presence of tall grasses, make them difficult to see. Range improvement practices which cause surface disturbance such as ripping soils, or construction of pipelines and reservoirs, can directly impact the species.

(2.) INDIRECT

The indirect effects of livestock grazing could be overall changes in range conditions. Improper livestock grazing management would result in less perennial grass cover, more bare ground, and possibly increased runoff and soil erosion.

Range improvement practices designed to reduce brush invasion (prescribed fire, imprinting, rootplowing, etc.) could have adverse impacts upon this cactus species.

b. ANALYSIS OF EFFECT BY PROPOSED ACTION

Six elements of the proposed action (permitted use, grazing systems, utilization levels, range improvements, riparian area management, and special management areas) are analyzed for effects are analyzed as to their effects on the Pima pineapple cactus and its habitat. The result of this analysis is presented in Effect Analysis Table for each allotment with occupied or potential habitat.

(1.) DIRECT EFFECTS

While cattle do not graze this cactus, they may have a direct effect upon them by inadvertently knocking them over as they trail over the range. These cacti are small and may be hidden in the taller grass plants, where cattle might not see them well enough to avoid them. Under light to moderate stocking rates, this should not occur very often. Cattle will generally have trails that they follow and will avoid stepping on these plants.

(2.) INDIRECT EFFECTS

The indirect effects of the proposed action could be overall changes in range conditions on the allotments where this species does occur. Improper livestock grazing management would result in less perennial grass cover, more bare ground, and possibly increased runoff and soil erosion. On those allotments where there is a

significant amount of BLM administered lands, or where BLM has decided to enter into coordinated management plans with the Arizona State Land Department and the Natural Resources Conservation Service, grazing systems and monitoring will be developed to reduce impacts and evaluate the effects on any known populations.

Range improvement practices designed to reduce brush invasion (prescribed fire, imprinting, rootplowing, etc.) could have adverse impacts upon this cactus species, and any proposed surface disturbing actions (water developments, fencing, road developments, etc.) associated with the livestock operations will require an environmental assessment and botanical evaluation to prevent any adverse impacts to the Pima Pineapple cactus.

(3.)DIRECT AND INDIRECT EFFECTS ON ALLOTMENTS OR GROUPS OF ALLOTMENTS

The implementation of the grazing management program is in various stages in the Tucson Resource Area. Because of the broad extent of possible occurrence of this cactus, eighteen allotments are identified and analyzed for effects. Information specific to each allotment concerning the acres, stocking rates, type grazing system, and management category can be found in the Allotment Information Table in Appendix 2. The current range condition and trend data is in Appendix 3. The effect analysis and determination is detailed in Tables 18 and 18A which follow at the end of this narrative.

(4.)INTERRELATED/INTERDEPENDENT EFFECTS OF PROPOSED ACTION

Such interrelated activities as construction of new improvements and vegetation manipulations could effect this species if their presence is not known. Environmental Assessments and Botanical evaluations would be completed prior to any project development (as per the range improvement policy) to determine potential impacts.

(5.) INCIDENTAL TAKE AS APPLICABLE

The term "take" does not apply to plant species under the Endangered Species Act.

c. RATIONALE FOR EFFECTS DETERMINATION

While a few individual plants may be kicked over and killed, overall range conditions should continue to improve and become more stable in those areas where BLM, State Land Department, and the Natural Resources Conservation Service are actively involved in improving livestock management. This increased stability should benefit this cactus. The development of cooperative livestock management plans will necessitate vegetation inventories and monitoring, development of grazing systems to provide

necessary rest for forage plants, and planning of range improvements. As the populations of this cactus are discovered, care can be taken to understand its niche in the grassland communities, and steps will be taken to provide for its protection and recovery. On those areas where there is very little federal land, and the proposed management is custodial, populations will be protected once they are identified.

d. EFFECT DETERMINATION

The proposed action **may affect, but is not likely to adversely affect** the Pima pineapple cactus.

5. PROPOSED MITIGATION MEASURES:

a. Development of coordinated management plans for those allotments within retention areas. Complete environmental assessments and initiate Section 7 consultation as appropriate.

b. Continue to complete environmental assessments for new improvements and conduct botanical inventories to determine new population locations.

6.CUMULATIVE EFFECTS OF STATE AND PRIVATE ACTIONS WITHIN THE AREA

The primary adverse effects to this species is loss of habitat due to urban expansion, off road vehicle use, road construction, farming, and mining. The use of land for livestock grazing would tend to preserve the habitat for this cactus. Livestock operations require large areas of open space. There is very little protection for preserving state and private lands from possible sale and development. In those areas identified by BLM for retention of the public lands and acquisition of the state and private lands, the long term outlook for protection of existing habitat is higher.

7. LITERATURE CITATIONS

Arizona Game and Fish Department, 1994. Heritage Data Management System. Rare Plants of the Bureau of Land Management's Safford District and Vicinity - Elements Occurrence Notebook. Phoenix, Arizona.

Rutman, S., 1992. Handbook of Arizona's Endangered, Threatened, and Candidate Plants. U.S. Fish and Wildlife Service. Phoenix, Arizona p.23.

U.S. Fish and Wildlife Service. 1991. Endangered and Threatened Plan and Final Environmental Impact Statement. Phoenix, Arizona.

Reptiles

NEW MEXICO RIDGENOSED RATTLESNAKE (*Crotalus willardi obscurus*)

A small rattlesnake from 15 to 24 inches in length, with a reddish, brown or gray body. A prominent ridge lines the edges of the snout hence the name (Stebbins 1966).

1. T&E STATUS/CRITICAL HABITAT

Threatened

2. LAND STATUS WHERE SPECIES OCCUR IN ACTION AREA

USFS Coronado National Forest, Douglas Ranger District. There are no reports on the Safford District BLM (Anonymous 1995).

3. HABITAT REQUIREMENTS

Prefers higher mountains of southeastern Arizona and Southwestern New Mexico, in the pine-oak and pine-fir habitats. Elevation range varies from 5,600 feet to 9,000 feet.

4. GENERAL EFFECTS OF LIVESTOCK MANAGEMENT

Snake prefers higher mountainous areas of southeast Arizona. Preferred habitat is in creek bottoms or rocky, moist hillsides in the shrub understory.

Livestock grazing will not impact preferred shrub habitat because the forage plants are not preferred by cattle (alder etc.).

Livestock may directly impact the snake by stepping on it. This event should be extremely remote.

Range improvement practices such as prescribed burns may impact rattlesnake habitat.

5. REASON WHY THE SPECIES IS NOT BEING FULLY ANALYZED

One report near Guadalupe Canyon, New Mexico, on a rocky hillside with large boulders. This report location is in the oak-woodland habitat on an open encinal site. Appears to be transitory as found in this off-site location.

No known reports on the Safford District, BLM.

No reports plus no preferred habitat make it unlikely this species will be found on the Safford District, BLM. It is therefore, unnecessary to analyze this species in detail.

6. EFFECT DETERMINATION

The Safford District BLM does not contain any pine-fir or pine-oak habitat. This coupled with the lack of reports in the area along with no reports from field personnel, it is unlikely the ridge-nosed rattlesnake will be found on BLM lands.

Therefore, grazing will have **no effect** on the ridge-nosed rattlesnake.

7. LITERATURE CITATIONS

Anonymous. 1995. Special Status Animals of the San Simon RA and Vicinity. AGFD Heritage Data Management System. 8/31/95 (S.S. Schwartz)

Stebbins, Robert C. 1966. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Company. Boston, MA. 221 PP.