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Environmental Assessment

Seibold / Kunde / Crittenden / Papago Allotment Management Plans

Sierra Vista Ranger District, Coronado National Forest
Santa Cruz County, Arizona

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SUMMARY

The Coronado National Forest proposes to issue grazing permits and develop allotment management plans for the Seibold, Crittenden, Kunde, and Papago allotments on the Sierra Vista Ranger District, Coronado National Forest, Santa Cruz County, Arizona. This action is needed, because permits have expired or are about to expire, Biological Opinions regarding Federally-listed wildlife species must be incorporated in the allotment management plans, construction or reconstruction of range improvements is necessary to improve livestock distribution, and permitted numbers may need to be adjusted on at least one allotment.

The proposed actions are intended to improve rangeland vegetation and riparian area conditions, improve livestock distribution and to maintain or improve habitat for management indicator species. The proposed action includes features designed to mitigate impacts to federally listed species. The proposed action will provide income to allotment permittees, and may require government expenditures on range improvements, but will have little impact on the economy of Santa Cruz County.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

No Action/No Grazing

Use of the grazing allotments by domestic livestock would be discontinued. Removal or maintenance of existing improvements would be authorized by a separate decision.

Current Management

A term grazing permit would be issued for the current classes and numbers of animals, seasons of use, and allowable utilization levels. Existing range improvements would be maintained, but no new improvements would be constructed.

Redrock Pasture Exclosure - Kunde Allotment

This alternative is identical to the proposed action, except that cattle would be excluded from the Redrock Pasture of the Kunde Allotment in order to reduce impacts to the Gila topminnow. Permitted numbers would be reduced to reflect the reduction in acreage capable for grazing.

No Range Improvements - Papago Allotment

This alternative is identical to the proposed action, except that no new range improvements would be constructed on the Papago allotment. Desired rangeland condition would be achieved through reductions in permitted numbers.

Based upon the effects of the alternatives, the Sierra Vista District Ranger will decide whether or not to authorize grazing on the Seibold, Crittenden, Kunde and Papago Allotments. Separate decisions may be made for each allotment. If a decision is made to authorize grazing, the Ranger will also decide which management practices and mitigation measures will be prescribed in each allotment management plan, including permitted class and numbers of animals, season of use, range facilities to be constructed,

allowable utilization levels, the term of the new permit, and monitoring actions to be employed.

INTRODUCTION

Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four parts:

Introduction: The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

Comparison of Alternatives, including the Proposed Action: This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.

Environmental Consequences: This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by environmental component and significant issues. Within each section, the affected environment is described first, followed by the effects of the alternatives

Agencies and Persons Consulted: This section provides a list of preparers and agencies consulted during the development of the environmental assessment.

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Sierra Vista Ranger District Office in Hereford, Arizona or the Forest Supervisor's Office in Tucson.

Background

The Seibold, Crittenden, Kunde and Papago allotments contain lands suitable for domestic livestock grazing. Where consistent with other multiple-use goals and objectives there is Congressional intent to allow grazing on suitable lands (Multiple-Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resource Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976). It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (Forest Service Manual 2203.1).

Use of forage for livestock is normally regulated by an Allotment Management Plan

(AMP). Since the existing management plans were prepared, there have been changes in resource condition, permit administration, and regulatory background. These include implementation of the Redrock Action Plan to improve Gila topminnow habitat (Doc. 3), combined management of the Seibold and Crittenden allotments, combined management of the Papago and Z Triangle allotments and Biological Opinions with terms and conditions for several threatened or endangered species. The cumulative effects of these management actions have resulted in improvements in both riparian and upland conditions throughout the Redrock Canyon watershed. The improvement has been particularly dramatic in many of the riparian areas. There has been significant development of deciduous riparian vegetation, stabilization of banks and deepening of water channels. There is a need to reflect these changes in current, integrated management plans for each allotment. There is also a need to bring the allotments into compliance with the provisions of the Rescission Act (PL 104-19, Section 504) by analyzing the environmental effects of permit issuance.

Purpose and Need for Action

The purpose of this proposal is to achieve desired rangeland and riparian conditions on the Seibold, Crittenden, Kunde and Papago allotments through the revision of Allotment Management Plans, while making forage available to qualified livestock operators and improving the habitat for threatened, endangered and other species.

This action is needed because:

All four allotments lack current allotment management plans;

Recent Biological Opinions concerning threatened, endangered and candidate species indicate a need to change management practices such as allowable forage utilization or season of use.

Recent actual use on the Papago Allotment has been significantly less than permitted numbers, suggesting that permitted numbers for that allotment should be adjusted; and

Reconstruction and construction of infrastructure to improve cattle distribution and range condition is needed on all allotments.

This action responds to the goals and objectives outlined in the Coronado Forest Plan, and helps move the project area towards desired conditions described in that plan (pages 5, 15-22, 27-46, 62-74).

Existing Condition

General: The project area is located in the Canelo Hills section of the Huachuca Ecosystem Management Area. Basic descriptive information for the four allotments included in the current proposal is presented in Table 1. Maps 1 through 8 provide overview-level information on allotment location and conditions.

Table 1. Existing resource conditions within the analysis area.

	Seibold	Crittenden	Kunde	Papago
Total acres	3,313	9,607	3,873	12,553
Capable acres	2,947	7,713	3,477	12,205
5th Code Watershed	Sonoita Creek	Sonoita Creek	Sonoita Creek	Middle San Pedro Cienega Creek Sonoita Creek
Permitted Use	600 AM, (50 CYL)	1980 AM (165 CYL)	636 AM (53 CYL)	4,800 AM (400 CYL)
Stocking rate	4.9 acres/AM	3.9 acres/AM	5.5 acres/AM	2.5 acres/AM
Elevation (ft.)	4,200-5,300	4,400-5,953	4,400-5,700	5,000-5,953
Dominant cover types	Broadleaf Woodland Desert Grassland	Broadleaf Woodland Desert Grassland	Broadleaf Woodland Desert Grassland	Broadleaf Woodland Plains Grassland Chaparral
No. of pastures	4	3	4	17
Range (Veg) Condition and trend of capable acres	100 % Moderately low with upward trend	24% moderately low with upward trend 16% moderately high with upward trend 60% moderately high with static trend	56% moderately high with static trend 44% moderately low with upward trend	44% moderately high with upward trend 33% moderately high with static trend 20% moderately low with upward trend 1% low with upward trend
Range (Veg) condition and trend of non-capable acres	100 % moderately high with static trend	100% moderately high with static trend	100% moderately high with static trend	100% moderately high with static trend
Soil quality of capable acres	78% impaired 22% satisfactory	29% impaired 71% satisfactory	37% impaired 63% satisfactory	48% impaired 49% satisfactory 3% unsatisfactory
Soil quality of non-capable acres	100% satisfactory	100% satisfactory	100% satisfactory	100% satisfactory
Riparian areas	Redrock Canyon	Monkey Canyon Alamo Canyon	Redrock Canyon Lower Lampshire Canyon	Cienega Creek O'Donnell Creek
Riparian condition	Redrock Canyon is unsatisfactory but improving	Monkey Canyon is satisfactory; Alamo Canyon is unsatisfactory but improving	Redrock Canyon is unsatisfactory, but improving, esp. within exclosures Lampshire Canyon is unsatisfactory, but improving	Cienega Creek is unsatisfactory O'Donnell Creek is protected by exclosure fence
Condition class (fire-related)	2	2	2	2
Recent surveys or inspections	2001	2001	2001	2001

Seibold Allotment. The most recent Seibold AMP was developed in 1987. However, current management of the Seibold allotment is based on the 1991 Redrock Canyon Action Plan (Doc. 3), which supersedes the AMP. The most recent production and

utilization study for the allotment was completed in 1986 and estimated capacity at 38 cattle yearlong (CYL) or 458 animal months (AM). Between 1991 and 1998, actual use averaged 50 CYL. In 1998, the permit was reduced from 100 CYL to 50 CYL (600 AM) and issued to a new permittee who also holds the permit for the Crittenden allotment. Since 1998, the herd has been managed in combination with the Crittenden allotment. Livestock enclosure fences have been constructed at Oak Grove Spring and on Redrock Creek to protect topminnow habitat. In addition, grazing in pastures containing Redrock Creek has been restricted to approximately one month in winter. Intensive monitoring by the permittee in cooperation with the Forest has documented considerable improvement on the allotment since 1998. Assessments of key areas in 1998 and again in 2001 showed notable improvement in range condition, attributable to implementation of the Redrock Canyon Action Plan and attentive management on the part of the new permittee. Annual riparian area assessments conducted between 1998 and 2001 have documented increasing riparian vegetation and reductions in livestock impacts (see Riparian Condition, p. 20).

Crittenden Allotment. There is no official long-term management plan for the Crittenden allotment. The allotment has recently been managed through the use of annual operating instructions, and is managed in combination with the Seibold allotment. Production and utilization studies completed in 1984 estimated capacity at 167 CYL (2000 AM). Permitted use is 165 CYL (1980 AM). Actual use has averaged 113 CYL since 2000. Livestock management structures are in good condition. The southeastern part of the Crittenden pasture contains a large stand of mountain mahogany which is poisonous to cattle in the late fall months. There has been significant mortality of cows in the past as a result of ingesting this plant.

Since 1998, actual use on the combined Crittenden and Seibold allotments has averaged 159 CYL (1913 AM), forty seven percent below permitted use.

Kunde Allotment. Current management of the Kunde allotment is based on the Redrock Action Plan (Doc. 3). This plan called for a riparian area protection fence along Redrock Canyon, a livestock enclosure fence around Gate Spring, upland water developments and pasture division fences. Production and utilization studies completed in 1985 estimated capacity at 53 CYL (636 AM). Permitted livestock numbers are 53 CYL, reduced from 100 CYL prior to 1991. Management direction has been implemented through annual operating instructions; however, the allotment has not been grazed since 1996. As a result of non-use, combined with enclosures constructed under the Redrock Action Plan, riparian area conditions have improved over pre-1996 conditions (see riparian condition, p. 23). Livestock management structures are in good condition with the exception of the Holding Pasture trick tank and Redrock well, which are non-functional.

Papago Allotment. The Papago allotment has undergone a number of changes in management since the last AMP was developed. In 1997, the permittee combined management of the Z Triangle (formerly part of the O'Donnell allotment) with the Papago allotment. Although the two allotments are not contiguous, they are managed as one allotment with one herd and a single grazing permit for 400 CYL (4,800 AM). The allotment was stocked at approximately 225 CYL until 1999 and was in non-use from 1999 until 2003. Approximately 50 head were stocked in January 2003 by a new permittee. The Papago allotment has 68 structural range improvements. Of these, 45 are

now in need of maintenance or reconstruction in order to be in compliance with permit terms and conditions. Water sources in Pinto, Lampshire, West Mountain, Papago, Rincon and Mack O Wood pastures are unreliable, leading to problems with cattle distribution. A small section of the headwaters of Cienega Creek, and about 1/4 mile of O'Donnell Creek are located on the allotment. O'Donnell Creek has been fenced to exclude grazing in order to protect the endangered Huachuca water umbel, Canelo Hills ladies' tresses and Gila chub. Freeman Spring also contains Huachuca water umbel, and was fenced in 1999. An alternate water source for Freeman Spring was developed but suffered damage during the 2002 Ryan fire.

Although watershed conditions were found to be satisfactory over most of the allotment, there are serious erosion problems in the center of Middle pasture, the north and west portions of the Falda pasture and the west central basin of the Mac O Wood pasture. These problems are attributed to a combination of poor livestock management and off-road vehicle use.

The project area includes three Management Areas as delineated in the Coronado National Forest Plan.

Management Area 1 includes steep, rugged lands that are managed for visual resources and dispersed recreation. Slopes are generally in excess of 40% slope and are generally those areas mapped as not capable for grazing in the analysis.

Management Area 4 comprises the majority of the analysis area. These lands are generally capable and suitable for livestock grazing and include a variety of vegetation types on lands under 40% slope.

Management Area 7 are lands that have been identified as supporting flora and fauna associations that are unique enough to require special management consideration. Within the project area, these consist of the main stem of Redrock Canyon and Cienega Creek.

Desired Condition:

The Coronado Forest Plan (page 10) contains the following goals for the range program on the Forest.

- To restore rangeland to at least moderately high ecological condition (70% to 75% of potential production, fair range condition) with stable soil and a static to upward trend.
- Produce livestock products consistent with other resources and uses.
- Eliminate grazing from areas not capable of supporting livestock without significant detriment to range or other resources.
- Balance permitted grazing use with grazing capacity.

Grazing permits and allotment management plans will support these goals by using the best information available to provide for the following specific objectives, which constitute the desired condition in the analysis area:

1. Grazing activities contributing to impaired soil quality are corrected.
2. Occupied habitats for threatened and endangered species are maintained or improved and recovery objectives are being met.
3. Grazing activities contributing to unsatisfactory riparian conditions are corrected.
4. Habitats for Forest Service sensitive and management indicator species are maintained or improved.
5. All grazing improvements on all allotments are in proper working order.

Proposed Action

Public scoping and preliminary analysis by the ID Team identified potential modifications to the proposed action that could better meet project objectives or mitigate potential effects. These are incorporated in the revised proposed action described below.

The action proposed by the Forest Service to meet the purpose and need is to develop new AMPs for the Seibold, Crittenden, Kunde and Papago Allotments. Actions specific to each allotment are described below.

Seibold and Crittenden Allotments

- Combine the two allotments into a single management unit. Implement a six-pasture rotation with the combined herd through Corral Canyon, Red Bear, Oak Grove, Moonshine, East Redrock and West Redrock pastures. Use in pastures containing Redrock Creek will be limited to one month in the winter.
- Issue 10-year grazing permits for 165 CYL (2008 AM) on the Crittenden allotment and 608 AM (50 CYL) on the Seibold allotment. Animal months are used to reflect the fact that there may be more than 165 cattle at a time, but for a shorter period of time.
- Build an enclosure fence around Corral Canyon spring (Crittenden) and build a holding pasture of 40-80 acres around the enclosure. This will reduce grazing impacts in a low flat area where cattle tend to congregate, protect riparian resources and facilitate livestock management. The holding pasture will be used only when gathering the herd (approximately 80 head overnight, approximately 6 times a year), and will not be grazed at other times. An existing water line south of Corral Canyon Spring will be extended approximately one mile northwest to provide a water source northwest of the spring and to better distribute cattle.
- Build a holding pasture in the northeast corner of Crittenden Pasture (Crittenden) to limit cattle use of the Alamo Spring area and at the same time facilitate livestock management. Ride through gates will be included to ensure adequate access for equestrian users.
- Establish two upland water sources, one east and one west of Oak Grove Spring, to limit cattle impacts in drainage below Oak Grove Spring (Seibold). The spring was fenced to exclude livestock in 2001 in compliance with the terms and conditions of the Biological Opinion on ongoing grazing (Docs. 87, 102). Establishment of water sources away from the drainage will further mitigate grazing effects in the riparian area.
- Extend a pipeline from existing storage tanks to provide water to the southeast side of Red Bear Pasture, and also to the neighboring Kunde allotment (see first item in

Kunde allotment proposed action). This will help distribute cattle leading to overall improved rangeland condition.

- Winter (December-April) around 50 head of dry cows each year in Crittenden pasture. Every other year, an additional 50 head of replacement heifers will be raised in that pasture for 10 to 12 months. These cattle are part of the 1980 AMs permitted. The pasture will be rested during the summer growing season every other year. Raising heifers every other year will provide a drought reserve option because 1) cows from the base herd can easily be substituted for heifers during dry years, and 2) heifers (~600 lbs) consume less forage than mature (~1100 lb) cows.

Forage utilization levels will be maintained at 45% or less in designated key areas, with no more than 30% utilization on riparian trees and shrubs. Within Mearns' quail key habitat areas (Map 9) allowable use will be 35-40% with a maximum of 45%. These use levels will provide additional herbaceous cover. Key areas for monitoring will be verified or established and monitored to determine use levels. Moves between pastures will be regulated by water and forage availability as well as utilization levels. Annual operating instructions will be used to insure that pastures are not grazed during the growing season in consecutive years.

Kunde Allotment

- Build $\frac{1}{4}$ mile of drift fence from the southwest corner of the private parcel in Section 12, T22 S, R16 E to the Kunde allotment boundary to split the Redrock pasture in two and create a fifth pasture on the allotment. Implement a 5-pasture rotation. Moves between pastures will be regulated by water and forage availability and utilization levels, but will be consistent with the objectives of the Redrock Canyon Action Plan. Use in the Redrock Pasture will be limited to winter only to mitigate grazing impacts to riparian resources.
- Issue a 10-year grazing permit for 53 CYL (636 AM).
- Run a pipeline from Crittenden Allotment storage tanks to the upper and lower Lampshire pastures of the Kunde Allotment to help distribute livestock. Since the source of the water originates on the Crittenden allotment, water developments on the Crittenden allotment will receive first priority should the supply of water become insufficient for all developments. This would only be anticipated in the driest of years.
- Replace a trick tank in Holding Pasture with a trough fed by a pipeline from the adjacent private land. Replacement is desirable because the trick tank does not supply adequate water for livestock use.
- Establish an upland water source in Red Rock Pasture by installing storage tanks with a feeder pipeline from the neighboring Weiland Allotment. This will mitigate grazing impacts in the riparian area by drawing cattle up out of the canyon bottom.

Forage utilization levels will be maintained at 45% or less in designated key areas, with no more than 30% utilization on riparian trees and shrubs. Within Mearns' quail key habitat areas (Map 9) allowable use will be 35-40% with a maximum of 45%. These use levels will provide additional herbaceous cover. Key areas for monitoring will be verified or established and monitored to determine use levels. Moves between pastures will be regulated by water and forage availability as well as utilization levels. Annual

operating instructions will be used to insure that pastures are not grazed during the growing season in consecutive years.

Papago Allotment

- Issue a 10-year grazing permit 250 CYL (3000 AM), a reduction from 400 CYL (4800 AM).

The fence and water developments listed below will provide more control of livestock and increase the effectiveness of pasture rotation, leading to overall improved rangeland condition. They will need to be completed before the AMP can be fully implemented.

- Reconstruct Middle/North division fence (3/4 mile).
- Construct 1/4 mile of fence to divide Maloney and Falda pastures.
- Reconstruct Lampshire/Pinto division fence (1 mile).
- Remove the trap in North Pasture. It is not needed
- Construct a pipeline into Papago Pasture from well in NW end of Middle Pasture (~2.5-3 miles).
- Construct a pipeline into Rincon Pasture from Cave Well (~.75 mile).
- Clean sediment/debris from Double Tanks.
- Extend the pipeline in West Mountain Pasture (~1 mile).
- Extend the pipeline in Lampshire Pasture (~1.5 mile).
- Construct a pipeline into Pinto Pasture (~1.5 mile).
- Construct a pipeline from storage tank in 83 Pasture to troughs at the north and south side of 83/E.Cemetary division fence.
- Extend a pipeline into Roundup Pasture and install a trough on the east side.

Forage utilization levels will be maintained at 45% or less in designated key areas, with no more than 30% utilization on riparian trees and shrubs. Within Mearns' quail key habitat areas (Map 9) allowable use will be 35-40% with a maximum of 45%. These use levels will provide additional herbaceous cover. Key areas for monitoring will be verified or established and monitored to determine use levels. Moves between pastures will be regulated by water and forage availability as well as utilization levels. Annual operating instructions will be used to insure that pastures are not grazed during the growing season in consecutive years.

In order to move cattle between East and Roundup pastures in the Z-Triangle portion of the allotment, it will be necessary to drive cattle once or twice per year across O'Donnell Creek through the enclosure. This activity will take no longer than 1-2 days and cattle will not be allowed to linger within the enclosure.

Decision Framework

Given the purpose and need, the Sierra Vista District Ranger will review the proposed action and the other alternatives in order to make the following decisions:

- Whether to authorize grazing on the Seibold, Crittenden, Kunde and Papago Allotments.

- If grazing is authorized, which management practices and mitigation measures will be prescribed in each AMP, including permitted classes and numbers of animals, seasons of use, range facilities to be constructed, allowable utilization levels, the term of the new permit, and monitoring actions to be conducted.

These decisions may be made separately for each allotment. That is, the District Ranger may decide to authorize grazing on one or more allotments, and not on other allotments.

Public Involvement

The proposed action was presented to 199 potentially interested parties in the form of a Scoping Report (February 22, 1999; Docs. 18-20). Upon receipt of the Scoping Report, several parties expressed interest in a field trip to the project area. The District hosted two separate field trips to visit the project area (Docs. 40, 42-45). Additional meetings were held on January 5, 2001 (Doc. 59), May 15, 2001 (Doc. 76) and May 23 (Doc. 77) between the District Ranger, the Interdisciplinary Team (IDT), other Forest Service specialists, and representatives from the US Fish and Wildlife Service (USFWS, January 5 and May 15) and the Arizona Game and Fish Department (January 5 only). A meeting between the District Ranger, the ID team and permittees or their representatives took place on March 14, 2001.

Issues

Using the comments from the public, other agencies, and American Indian tribes, the interdisciplinary team developed a list of issues to address. The Forest Service separated the issues into two groups: significant and non-significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)...". A list of non-significant issues and reasons regarding their categorization as non-significant may be found in Doc. 106 in the project record.

As for significant issues, the Forest Service identified five topics raised during scoping. These include:

- **Grazing effects on riparian area condition:** Issuance of term grazing permits may prevent the attainment of satisfactory riparian area conditions within the allotments.
- **Grazing effects on fisheries:** Issuance of term grazing permits may have adverse effects on Gila topminnow.
- **Range condition:** Stocking and utilization levels in the proposed action may not permit the attainment of Forest Plan objective of restoring rangeland to moderately high ecological condition.
- **Grazing effects on wildlife:** Issuance of term grazing permits may have adverse effects on threatened, endangered, sensitive or management indicator wildlife species.

- **Economics:** 1) The proposed action includes range improvements that may be subsidized by taxpayers. 2) If a rancher is in a precarious economic position, there may be incentives to manage livestock in ways that are detrimental to the land and its resources.

The following initial measures were selected to evaluate issue resolution, attainment of objectives, and describe environmental impacts. In some cases, the measures are quantified. When measures cannot be quantified, a narrative discussion will be included in the environmental document.

- **Grazing effects on riparian area condition:** Narrative and tabular descriptions of effects, by alternative, based on analysis methods specified by the Forest Service Manual (RASES or Proper Functioning Condition assessment).
- **Grazing effects on fisheries:** Narrative, describing effects, by alternative, as identified through a Wildlife Specialist Report and Biological Assessment.
- **Range condition:** Narrative and tabular descriptions of effects, by alternative, as identified through a range condition and trend analysis.
- **Grazing effects on wildlife:** Narrative describing effects, by alternative, as identified through a Wildlife Specialist Report, Biological Assessment, Biological Evaluation, and Management Indicator Species Analysis.
- **Economics:** Economic efficiency and impact analysis, using Present Net Value, jobs, and government receipts. Narrative analysis of ranch economics.

Additional environmental components include soil, air, water, and heritage resources. Effects on these resources are discussed in narrative or tabular form.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Seibold, Crittenden, Kunde and Papago Allotment Management Plan project. This section defines the differences between each alternative and provides a clear basis for choice among options by the decision maker and the public.

Alternatives

Alternative 1

No Action/No Grazing

Under this alternative, use of the grazing allotments by domestic livestock would be discontinued. No term grazing permits would be issued. All existing structural improvements would remain in place but would not be maintained. Periodic monitoring of structural improvements (at least once every ten years) would be used to determine whether removal or maintenance is needed. Removal or maintenance would be authorized by a separate decision.

Alternative 2

Current Management

The permit for the **Seibold Allotment** is for 50 CYL (600 AM). A four-pasture deferred rotation is followed under this alternative. The two northern pastures are grazed from April through October. The two southern pastures containing Redrock Canyon are used from November through March. Maximum forage utilization on key species in key areas is limited to 45 percent, and no more than 30 percent utilization of riparian trees and shrubs. No new developments would be constructed under this alternative.

The **Crittenden Allotment** is currently permitted 165 CYL (1980 AM). There are three pastures. Under this alternative, the three pastures would be used in a rotation based on pasture size, approximately five to six months in Crittenden Pasture, three to four months in Corral Canyon and two to three months in Red Bear. Maximum forage utilization in key areas is limited to 45 percent on key species. Under this alternative no new developments would be constructed.

Permitted stocking on the **Kunde Allotment** is 53 CYL (636 AM). A four pasture deferred rotation is used. The upland pastures receive growing season rest at least every other year. The Redrock Pasture is used for four months in the winter in order to allow growing season rest every year. This grazing system was partially implemented as part of the Redrock Action Plan (Doc. 3) to improve riparian conditions and provide for Gila topminnow habitat. There is one division fence (Holding Pasture/Lower Lampshire division fence) that needs to be completed before this alternative is fully implemented. Utilization is limited to 45 percent of key species in key areas, with no more than 30

percent utilization on riparian trees and shrubs. No new developments other than the division fence would be constructed under this alternative.

The permit for the **Papago Allotment** is for 400 CYL (4800 AM). There are 17 pastures, but one (Roundup) has no water source, so is not currently being grazed. A 16-pasture rest rotation is scheduled. In most years the livestock are moved through the allotment as one herd. In dry years, due to more limited water availability, livestock are scattered through several pastures during the winter months. They are then consolidated during the summer growing season for quicker moves. Under this rotation, every pasture receives at least partial growing season rest every year, with some receiving total growing season rest. Utilization is limited to 45 percent of key species in key areas. Existing structures would be maintained or reconstructed, but no new developments would be built under this alternative.

Alternative 3

Proposed Action

The proposed action is described in detail in the first chapter.

Alternative 4

Redrock Pasture Exclosure (Preferred Alternative)

Public scoping and preliminary analyses by the ID Team identified potential modifications to the proposed action (Alternative 3) that could better meet project objectives or mitigate potential effects. These modifications were incorporated into Alternative 3 and were also used to develop Alternative 4, which is currently the Agency Preferred Alternative. The primary difference is the proposal to exclude grazing from the Redrock pasture on the Kunde allotment in order to mitigate effects to fisheries in Redrock Canyon. Actions specific to each allotment are described below.

Seibold and Crittenden Allotments:

The preferred alternative for the Seibold and Crittenden allotments includes all actions identified for the Proposed Action (pages 5-6), with the following additions.

- Build a fence around Red Bear tank (Crittenden) to aid in controlling distribution of cattle and provide aquatic wildlife habitat.
- Build a fence around Gasline tank (Crittenden) to aid in controlling distribution of cattle and to provide aquatic wildlife habitat.
- Build water lots (approximately 200 ft²) around the water storage and trough in the Crittenden pasture (Crittenden) and around the existing trough on the fence between Corral Canyon and Red Bear Pastures. Closing the water source will help keep cattle out of the area when utilization limits are approached. The fenced area can also be used to temporarily hold cattle during gathering and branding.

Forage utilization levels will be maintained at 45% or less in designated key areas, with no more than 30% utilization on riparian trees and shrubs. Within Mearns' quail key habitat areas (Map 9) allowable use will be 35-40% with a maximum of 45%. These use

levels will provide additional herbaceous cover. Key areas for monitoring will be verified or established and monitored to determine use levels. Moves between pastures will be regulated by water and forage availability as well as utilization levels. Annual operating instructions will be used to insure that pastures are not grazed during the growing season in consecutive years.

Kunde Allotment:

- Exclude grazing from the Redrock Pasture in order to reduce grazing impacts to the Gila topminnow and to improve riparian and watershed condition in Redrock Canyon. Permitted numbers of cattle would be reduced from 636 AM to 372 AM (31 CYL) to reflect the reduction in available capable acres. This action would preclude the need to construct the division fence proposed under Alternative 3.
- Issue a ten-year term grazing permit for 31 CYL (372 AM, cow/calf, year-long).
- Establish a three pasture rotational grazing schedule using Upper Lampshire, Lower Lampshire and Holding pastures that allows growing season rest in all pastures, at least every other year.
- Run a pipeline from the Crittenden Allotment storage tanks to Upper and Lower Lampshire Pastures of the Kunde Allotment to help distribute livestock improve rangeland and watershed condition (this project is referenced under the Crittenden Allotment Proposed Action also).

Forage utilization levels will be maintained at 45% or less in designated key areas, with no more than 30% utilization on riparian trees and shrubs. Within Mearns' quail key habitat areas (Map 9) allowable use will be 35-40% with a maximum of 45%. These use levels will provide additional herbaceous cover. Key areas for monitoring will be verified or established and monitored to determine use levels. Moves between pastures will be regulated by water and forage availability as well as utilization levels. Annual operating instructions will be used to insure that pastures are not grazed during the growing season in consecutive years.

Papago Allotment:

The preferred alternative for the Papago allotment is identical to that proposed under Alternative 3 (pages 7-8).

Alternative 5***No Range Improvements - Papago Allotment***

This alternative is identical to Alternative 3 (Proposed Action) for the Seibold, Crittenden and Kunde allotments. On the Papago allotment, no new range improvements would be constructed. Instead, permitted numbers would be reduced to 150 CYL. The reduced stocking allows for increased growing season rest and lower utilization in order to achieve desired rangeland condition. This alternative responds to concerns about the cost and feasibility of the range improvements proposed in Alternatives 3 and 4 and identified as a significant issue during scoping.

Mitigation Common to All Alternatives

In response to public and agency comments on the proposal, commitments made as a result of previous Biological Opinions, and consistent with Forest Plan guidance, mitigation measures have been developed to reduce or eliminate potential wildlife impacts under the various alternatives. The mitigation measures will be applied to any of the action alternatives, as appropriate.

Forest Plan standards and guidelines (page 34) and the Forest Service Manual (Chapter 2361, Supplement 2600-94-1; Doc. 95, project record) specify mitigation measures for livestock use of Mearns' quail habitat. These mitigation measures supplement standard forage utilization limits in areas of high quality Mearns' quail habitat. Mearns' quail key areas within identified high quality habitat have been identified by the District Biologist in cooperation with AGFD (Map 9). Allowable use within key areas will be 45% maximum with a desirable level of 35-40%. The objective of these use levels will be the maintenance of an average minimum standard of six inches of herbaceous stubble height as quail cover. This standard will be met within the normal cycle of wet and dry years.

As part of the consultation with the USFWS on the Forest's ongoing livestock grazing program (Biological Opinion AESO/SE 2-21-98-F-399-R1, Doc. 102), the Forest has committed to develop a monitoring program to assess the effects of livestock herbivory on flowering agaves in order to better understand the effects of such herbivory on the lesser long-nosed bat which depends on agaves for food. Monitoring will occur on allotments within 11 miles of two large bat roosts on the Forest. All four of the allotments in the analysis area are within 11 miles of one such roost. The Forest is in the process of developing the monitoring methodologies at this time and has committed to completing this task by March 2003. Under all grazing alternatives, the Forest will monitor the use of flowering agaves in allotments where livestock grazing occurs during the agave bolting season (April 1-June 15, annually). Should the density of flowering agaves fall below 0.2 plants/hectare (0.08 plants/acre), the Forest will reinitiate consultation with the USFWS. In addition, all range construction projects will be designed to avoid the destruction of agaves and the disturbance of bat roosts. If impacts to agaves are unavoidable, the Forest will ensure that no more than 1% of agaves within 800 meters of the project are impacted.

In an effort to minimize the take of Sonoran tiger salamanders as a result of routine stockpond maintenance, the Forest has adopted stockpond management and maintenance guidelines that are in effect on allotments in the San Rafael Valley and surrounding areas (Doc. 105). Although Sonoran tiger salamanders have not been confirmed on the allotments, they are found on adjacent allotments, and Arizona Game and Fish Department biologists recently reported finding salamanders at a location near Lampshire Canyon within the Papago allotment (Doc. 99). A specimen was collected in January 2003 but the results of genetic analysis are not yet available. Should Sonoran tiger salamanders be confirmed on allotments within the analysis area, the Forest will implement the stockpond management guidelines in potential habitats.

A portion of O'Donnell Creek on the Papago allotment is fenced to exclude livestock in order to protect habitats for the Gila chub, the Canelo Hills ladies tresses and the Huachuca water umbel. A portion of this fence burned in 2002. Under the reasonable

and prudent measures and terms and conditions of the BO for ongoing livestock grazing (Doc. 102), the Forest is required to repair the fence and to inspect and maintain the enclosure three times a year. This will occur under all grazing alternatives.

The 2002 Biological opinion on ongoing grazing (Doc. 102) specifies terms and conditions for livestock management activities on the Seibold allotment that are necessary to minimize the take of Chiricahua leopard frog. These measures include requirements to survey for and salvage frogs during stock pond cleaning activities; measures designed to minimize the introduction of non-native species or chytrid contamination into occupied sites; measures to reduce direct mortality and damage to aquatic cover as a result of livestock impacts and the requirement to monitor and report incidental take. These terms and conditions will be included in the annual operating instructions for the Seibold allotment.

The terms and conditions of the ongoing livestock grazing BO (Doc. 102) describe several actions necessary to minimize the take of Gila topminnow in Redrock Canyon under current management. These actions include the construction and maintenance of livestock enclosures, continued monitoring of fish and aquatic habitats and reporting data to the U.S. Fish and Wildlife Service. These reasonable and prudent measures and terms and conditions are displayed in their entirety in the project record. Under all grazing alternatives, these measures will be implemented if feasible. Alternatives that result in the removal of livestock from Redrock Creek will be subject to additional consultation with the US Fish and Wildlife Service.

Under all grazing alternatives, the Holding Pasture/Lower Lampshire Pasture division fence will be completed, as planned for in the Redrock Canyon Action Plan (Doc. 3).

All new or reconstructed water developments will include wildlife access and escape ramps.

All new fencing will be built to Forest Plan standards (page 35) that provide for wildlife passage through the fence. At a minimum, this will be a 4-strand fence with a smooth bottom wire 16 inches off the ground and a total fence height of 42 inches or less. The Arizona Game and Fish Department (Doc. 27) recommends using smooth wire on both top and bottom strands.

The following Best Management Practices for grazing (FSH 2209) will apply to all action alternatives: Annually prepare an operating plan with the permittee to allow for current allotment conditions; make periodic field checks to identify needed adjustments in season of use and livestock numbers, including stock counts, forage utilization, assessment of rangeland to verify soil and vegetative condition and trend; and use necessary techniques to achieve proper distribution or lessen the impact on areas which are sensitive or would naturally be overused.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 3. Alternative Effects Summary.

	Alternative 1 (No Action/No Grazing)	Alternative 2 (Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Action - Redrock Pasture Enclosure)	Alternative 5 (No Improvements- Papago Allotment)
Riparian area condition	Fastest rate of improvement	Lowest rate of improvement	Intermediate rate of improvement	Faster improvement than Alternatives 2, 3 and 5	Intermediate rate of improvement
Fisheries effects	No direct effects. Lowest overall effects (confined to cumulative) fastest improvement of occupied and potential habitat in Redrock.	Continued direct and indirect effects. Occupied habitats maintained, lowest rate of improvement.	Continued direct and indirect effects. Slight improvement over current mgmt.	Minimal direct effects compared to 2, 3, and 5. Indirect (watershed) effects reduced compared to 2,3 and 5. Improvement of occupied and potential habitat is less than Alternative 1, but greater than other alternatives.	Similar to alternative 3.
Range condition	Fastest rate of improvement	Lowest rate of improvement	Intermediate rate of improvement	Faster improvement than Alternatives 2, 3 and 5	Intermediate rate of improvement
Wildlife effects	No effect on listed or proposed species ¹	Lowest rate of herbaceous cover and riparian improvement	Intermediate rate of habitat improvement	Greater improvement in riparian and herbaceous cover than 2, 3 and 5	Intermediate rate of improvement
Cost of range improvements	No cost for improvements, FS bears all maintenance costs	No cost for new improvements; permittees share maintenance costs	Highest cost for new improvements; both construction and maintenance costs shared with permittees	Same as proposed action	Lowest cost for new improvements; both construction and maintenance costs shared with permittees

	Alternative 1 (No Action/No Grazing)	Alternative 2 (Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Action - Redrock Pasture Exclosure)	Alternative 5 (No Improvements- Papago Allotment)
Ranch economics	No permittee income	Highest permittee income	Lower permittee income than Alternative 2; higher income than remaining alternatives	Lower permittee income than Alternative 3	Lowest permittee income

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above. Past, present and reasonably foreseeable future actions that may contribute cumulative effects in the project area are discussed at the end of this section.

Riparian Area Condition

General

The analysis of riparian area condition in the project area is based on information gathered at established riparian area monitoring points. These points were all assessed for conformance to Forest Plan standards in 1999 (Doc. 70). In addition, riparian area monitoring transects in the Seibold Allotment (Redrock Creek) were established by the permittee in 1998, with guidance from the District Range Staff Officer.

Seibold Allotment

Affected Environment

Redrock Canyon is classified as Management Area 7 (riparian vegetation emphasis) in the Coronado National Forest Plan. A 1999 assessment of Redrock Canyon found it to be unsatisfactory, not meeting Forest Plan standards for riparian areas (Doc. 70). Tree density in the canyon is low. Canopy closure in the West Redrock Pasture is 12 percent, and in the East Red Rock Pasture is 2 percent. It is not known if there is potential for supporting a stand of riparian trees that meets Land Management Plan standards and guidelines for satisfactory riparian areas (30 percent canopy closure). Other than the sparse canopy, these areas are close to meeting Plan standards and guidelines. In West Redrock Pasture, the only vegetation composition parameter not met is the old and decadent age class. Vigor is excellent, and 57 percent of the bank is protected by deergrass. Notes made by the data collector indicate that livestock use was light (Doc. 70). In East Redrock Pasture, the vegetation parameters not met are total number of species, and the representation of three species in any age class. Vigor is good, and 60 percent of the bank is protected. Notes made by the data collector in East Redrock Pasture indicate that ash trees had been moderately hedged in previous years, and that cottonwood trees had 60 percent of their terminal buds grazed in previous years, but did not appear to be hedged (Doc. 70).

Riparian transects have been established and monitored by the permittee with FS guidance, primarily for measuring grazing effects. Forage utilization is measured on deergrass and other perennial grasses; utilization of woody species is estimated; bank disturbance is estimated; and photographs are taken before and after grazing periods. Annual assessments between 1998 and 2001 (Docs. 57, 63, 65, 69, 89) revealed light utilization of deergrass in canyon bottoms, light to moderate utilization of other perennial forage species on upland sites, minimal utilization of woody species, and minimal

trampling of creek banks. In January of 2001, the sites were assessed again by the Forest Service and the permittee with additional measurements for use on apical meristems and for bank disturbance (Doc. 63). These measurements, taken after the grazing period, showed less than 10 percent of the alterable stream bank disturbed and 13 percent browse on cottonwood and willow apical meristems. The observation was made that deergrass along the creek had effectively captured considerable amounts of sediment from recent flooding. The Pig Camp enclosure was inspected, the fences were up and there was no evidence that cattle had been in it. An assessment made in December of 2001 (Doc. 89) showed less than 8 percent of the alterable bank disturbed, 5 percent browse on young cottonwood and less than 4 percent browse on willow apical meristems. Utilization of herbaceous species was less than 15 percent. A semi-perennial portion of Redrock Creek in West Redrock pasture was fenced by the permittee in 2002 to exclude livestock and further protect riparian vegetation.

Oak Grove Spring is located in the Oak Grove pasture. It is not mapped as riparian, but supports a deergrass community and has been identified as important for protection of potential Gila topminnow habitat (Doc. 87). Utilization of deergrass was called heavy in 1998; management improvements since 1999 have resulted much lighter use of this area by cattle. As part of the Terms and Conditions of the Biological Opinion for on-going grazing, this area was partially excluded from grazing in 2001 (Doc. 87).

Environmental Effects

Alternative 1 (No Action/No Grazing) will have no impacts to riparian areas from grazing. Vegetation conditions have been improving and will continue to improve (see above). Because the potential for tree development is not known, it is not clear whether this alternative will lead to satisfactory condition over the analysis period (10 years).

Under Alternative 2 (Current Management), use of the East and West Redrock pastures is restricted to 6 months in the winter with 50 cattle (approximately 3 months of use each). To meet the Terms and Conditions of the Biological Opinion for on-going grazing (Doc. 102), a fence was built to exclude livestock from the perennial/semi-perennial stretch of Redrock Creek approximately $\frac{3}{4}$ mile upstream from the Forest Service boundary (T 22 S, R 16 E, NE $\frac{1}{4}$ of the NW $\frac{1}{4}$ Sec. 3). Although the period of use is longer than Alternatives 1, 3 and 4, actual use of herbaceous and woody vegetation and the percent of alterable streambank is the same.

Grazing as proposed under Alternatives 3 and 4 limits use of the East and West Redrock pastures to one month in the wintertime (dormant season). Each pasture would be used for two weeks. This is possible because of the combination of the Seibold and Crittenden Allotments into one management unit. These alternatives also include the enclosure fence along the perennial/semi-perennial stretch of Redrock Creek (see above). The management proposed under Alternatives 3-5 has been implemented on a trial basis for the past three years, although without the enclosure fence. Monitoring of the East and West Redrock pastures over these years shows good results (see "Affected Environment," above). A photo point assessment by the FS Zone Fisheries Biologist and USFWS Fisheries Biologist documents improvement to the area over the past 12 years (Doc. 101). The addition of the enclosure fence will eliminate even minimal impacts from grazing along the perennial/semi-perennial stretch of Redrock Creek referenced above. The

effects of Alternatives 3-5 to the riparian area in Redrock Canyon will thus be similar to the effects of Alternative 1 (No Action/No Grazing).

Crittenden Allotment

Affected Environment

Monkey Canyon, Alamo Canyon, Corral Canyon and Dark Canyon all flow through the Crittenden Allotment. None of these canyons are mapped as riparian vegetation or classified as Management Area 7 in the Forest Plan (Doc. 70). However, Alamo, Corral and Monkey Canyon support some riparian vegetation and were surveyed in 2000 for conformance to Forest Plan standards (Doc.70). Monkey Canyon has a six-acre riparian area, which was found to meet Forest Plan standards. Surveyed points in Alamo, Corral, and Dark Canyons revealed that these areas were not true riparian areas. Comments made by data collectors for Alamo and Dark Canyons indicate that grazing was heavy at surveyed points in 2000, but that overall, the management seems to be encouraging riparian development in these canyons (Doc.70). There is a small (less than 5 acre) riparian area around Corral Canyon Spring that has not been assessed for conformance to riparian area standards.

Environmental Effects

Alternative 1 (No Action/No Grazing) will have no impacts to riparian areas from grazing, and will allow the most rapid improvements of areas that have been negatively impacted by past use. Vegetation conditions have been improving and will continue to improve. The Monkey Canyon riparian area will remain in satisfactory condition. Riparian development in Alamo and Dark Canyons will continue.

Alternative 2 (Continue Current Management) is a three-pasture rotation with growing season rest possible at least every other year with no additional range improvements (fences, water sources, etc.). There are a number of new improvements in place that make this alternative better than historic management (that is, prior to implementation of the Redrock Action Plan, Doc. 3). From this it is reasonable to conclude that this management will not limit the maintenance or development of riparian vegetation. Alternatives 3-5 will combine management of the Seibold and Crittenden Allotments. There are several proposed pipeline extensions that will significantly improve cattle distribution, facilitating upland vegetation condition improvement. The Crittenden pasture, which includes Monkey, Alamo Canyon and Dark Canyons, will be rested for a full year every other year. Cattle use in the lower part of Alamo Canyon will be very limited, as it will be fenced and used as a holding pasture. Corral Canyon Spring, located in Corral Canyon Pasture will also be fenced, excluding cattle. Corral Canyon pasture will receive growing season rest two out of three years and a full years rest every three years. Alternatives 3-5 will allow more rapid improvement than Alternative 2 because of increased distribution control. These alternatives will not degrade the satisfactory riparian conditions in Monkey Canyon, not impede the development of riparian vegetation in Alamo and Dark Canyons.

Kunde Allotment

Affected Environment

Redrock Canyon passes through Redrock Pasture in the Kunde Allotment. It is mapped as Management Area 7 (riparian emphasis) in the Forest Plan. The area supports five different species of riparian trees but they are widely scattered and mostly mature. Mesquite trees of all ages dominate the site. Banks are poorly protected (6 percent of the alterable bank is vegetated) and the few herbaceous plants along the bank are generally upland grass species such as sand dropseed and sideoats grama. Seep willow plants are present, but many have exposed roots. Assessment of the area for conformance to Forest Plan standards in 1999 found it to be unsatisfactory, but the area appears to be improving (Doc 70). There is a large (approximately 100 acre) enclosure protecting one of the wettest sections of the creek (the Falls Enclosure). This enclosure was inspected in 2001 and no livestock use was noted, however, there was evidence of a smuggling trans-shipment camp. More recently, an assessment was made by the Forest Service Zone Fisheries Biologist and USFWS Fisheries Biologist (Stefferd and Stefferud 2002, Doc. 101). Their assessment protocol differs from the Forest Plan protocol; it is a comparison of photo points taken from 1989 to 2002. The results show marked improvement of the stream channel that they attribute to exclusion of livestock from the area.

Lampshire Canyon passes through Upper and Lower Lampshire pastures. It is not mapped as riparian vegetation nor is it mapped as Management Area 7 in the Forest Plan. The lower end, within Lower Lampshire Pasture, supports some riparian vegetation. A data point within Lower Lampshire Pasture indicates four species of riparian trees, mostly seedlings and saplings. Canopy closure and vigor both meet the Forest Plan standards, and bank protection is close to meeting the standards (within 6 percent). This area was found to be unsatisfactory, but improving. Photo point comparisons by Stefferud and Stefferud (Doc. 101) showed marked improvement over the sampled years, which they attribute to exclusion of livestock.

It is clear that the Kunde Allotment was not managed well even as recently as the early 1990s. As a result of the Redrock Action Plan of 1991, the management was changed to require winter use only in pastures along Redrock Creek (Doc. 3). Permitted numbers were reduced from 100 CYL to 53 CYL. In 1996, 130 head were removed from the allotment. The permit was waived to a new permittee, and has been in non-use for resource protection purposes since then.

Environmental Effects

Alternative 1 (No Action/No Grazing) will have no impacts to riparian areas from grazing, and will allow the most rapid improvements of areas that have been negatively impacted by past grazing use. Vegetation conditions have been improving and will continue to improve in both Redrock and Lampshire canyons. Whether Redrock Canyon could achieve satisfactory riparian condition, or whether Lampshire Canyon would develop riparian characteristics cannot be predicted with current data.

Alternative 2 (Continue Current Management) will be a four-pasture rotation with winter use only in Redrock Pasture. There are a number of new improvements in place that make this alternative better than historic management (prior to 1991) most notably the

Falls Exclosure. Also, permitted numbers are half of what they were in the past. For this reason it is possible to conclude that current management will allow the maintenance and development of riparian vegetation, although the rate of improvement will not be as rapid as with no grazing.

Alternative 3 (Proposed Action) adds an additional fence (a short drift fence that will, in effect, create a 5th pasture), an upland water source in the new pasture, and upland water sources in Upper and Lower Lampshire pastures. Upland water sources are intended to draw cattle away from the riparian bottom. The proposed water sources are pipeline extensions from neighboring allotments and will not reduce base flow in Redrock Canyon. Alternative 3 will allow more rapid improvement than Alternative 2 because of increased distribution control and upland water sources in Lampshire Canyon. For the Kunde Allotment, Alternative 5 will be comparable to Alternative 3 in effects on riparian areas.

Alternative 4 will exclude the entire Redrock Pasture from grazing. This alternative includes the upland water sources in Upper and Lower Lampshire pastures, which will help to limit use in Lampshire Canyon. Among the action alternatives (Alternatives 2, 3, 4 and 5), Alternative 4 will allow the most rapid improvement of riparian conditions in the Kunde Allotment. The effects of Alternative 4 in Redrock Canyon will be the same as the No Action/No Grazing Alternative, and the grazing effects in Lampshire Canyon will be mitigated by seasonal rest and installation of upland water sources.

Papago Allotment

Affected Environment

Cienega Creek Canyon in Cave Pasture is mapped as riparian vegetation and Management Area 7 in the Forest Plan. As with most canyons on the north end of the Patagonia Mountains, it supports only a few riparian trees; two species widely scattered with almost no reproduction (Doc. 70). Banks are populated with upland grass species, which provide marginal cover compared with riparian species. It does not appear to have the potential for a continuous stand of riparian trees. It rated as unsatisfactory as a riparian area (Doc. 70). It is, however, the headwaters of Cienega Creek, and as such is appropriately designated as Management Area 7.

Box Canyon is found in Lampshire Pasture. It is not mapped as riparian vegetation or as Management Area 7. It does not have any riparian tree species, and banks are protected, but with upland herbaceous species (Doc. 70). This pasture is supposed to have winter use only by cattle, but in the past (including the 1999 growing season) has been used in the growing season in times of water shortage. This canyon is tributary to Redrock Creek and so should be managed for channel protection (Doc. 70).

O'Donnell Creek runs through the Z-Triangle portion of the Papago Allotment, between East and Roundup Pastures. It was not assessed for conformance to Forest Plan standards. It is protected from livestock grazing by an exclosure fence. Under all action alternatives, livestock access to the riparian area will be limited to 1-2 day periods when cattle are herded across the creek in order to change pastures.

Environmental Effects

Alternative 1 (No Action/No Grazing) will have no impacts to riparian areas from grazing, and will allow the most rapid improvements of areas that have been negatively impacted by past grazing use. Riparian vegetation development will continue in Cienega Creek, Box Canyon and O'Donnell Creek.

Alternative 2 (Continue Current Management) has not been effective in limiting livestock use in Lampshire Canyon during the growing season. Livestock control has been lacking throughout the allotment, and lack of control will lead to deteriorating conditions under this management. Herding livestock across O'Donnell Creek will result in some trampling of vegetation and soil disturbance within the riparian zone. Because of the limited duration and extent and infrequent occurrence (1-2 days, once or twice per year), the effects of this action are not anticipated to impair the development of the riparian community in O'Donnell Creek.

Alternatives 3 and 4 add additional fencing and water developments (mostly pipeline extensions) that will provide more control of livestock and increase the effectiveness of pasture rotation. Also, the permitted numbers would be reduced to 250 CYL, which is what has been stocked on the allotment in recent years. The pipeline extension into Roundup Pasture effectively increases the number of capable acres. Areas that have been negatively affected by past grazing will improve, although at a slower rate than under the No Action Alternative, and riparian vegetation development will continue. Effects in O'Donnell Creek will be similar to those described under Alternative 2.

Alternative 5 (No New Improvements, Reduce Permitted Numbers) would not add any improvements, but would reduce numbers to 150 CYL. While impacts on riparian areas would be reduced in comparison to current management, this alternative would not control livestock distribution. The remaining cattle would tend to congregate in preferred areas, including riparian areas. Effects in O'Donnell Creek will be similar to those described under Alternative 2, although the number of livestock would be less.

Fisheries Effects

Affected Environment

Scoping identified effects on fisheries as a significant issue related to the proposed action (Doc. 49). Gila topminnow (*Poeciliopsis occidentalis occidentalis*) occupies Redrock Creek and its tributaries within the project area. The Seibold, Kunde and Crittenden allotments lie within the Sonoita Creek watershed. Additional topminnow populations potentially affected by the project are found 3-4 miles downstream of the project boundary in Sonoita Creek and approximately 14 miles downstream of the Papago allotment in Cienega Creek. In addition to topminnow, other fishes reported from Redrock Canyon include the desert sucker (*Pantosteus clarki*), speckled dace (*Rhynchithys osculus*) and the longfin dace (*Agosia chrysogaster*), as well as the non-native green sunfish (*Lepomis cyanellus*), bluegill (*L. macrochirus*) and the largemouth bass (*Micropterus salmoides*). The Gila chub (*Gila intermedia*) and Sonora sucker (*Catostomus insignis*) occupy O'Donnell Creek in the Papago allotment.

Gila topminnow. *Gila topminnow* was listed as an endangered species in 1967; there is no critical habitat designated. Redrock Canyon supports the only relict natural population of *Gila topminnow* in the National Forest System, and the only natural or reintroduced population on Coronado National Forest. Habitat occupied by *Gila topminnow* in Redrock Canyon waxes and wanes in accordance with the extent of surface water present. Locations commonly occupied by *topminnow* are regularly separated by long to short reaches of channel with ephemeral or subsurface flow, but that become connected by flowing water during periods of runoff. Both ephemeral and perennial reaches are important to the sustainability of *topminnow* in Redrock Canyon. Perennial reaches provide habitat that sustains the species through time, and during runoff the ephemeral reaches provide a migration corridor for the species to recolonize areas and allow genetic interchange between populations. Available information on *Gila topminnow*, as well as other fishes in Redrock Canyon, shows that there is substantial movement of individuals throughout the canyon when surface water is connected.

Currently, habitat for *Gila topminnow* in Redrock Canyon is fragmented both by natural causes and by past and present management actions. Natural fragmentation is by impassable barriers, typically long reaches of steep gradient channels. Dams (e.g., Lampshire Dam), spring developments or surface water diversion, groundwater pumping, and management actions that overwhelm or decrease the sediment processing capability of the channels continue to restrict movement by fish into suitable habitats when surface water is present.

Formal consultation with USFWS since 1990 has resulted in four Biological Opinions (BO) that specifically addressed activities in Redrock Canyon: the Redrock Canyon Action Plan (2-21-90-F-169b), the Canelo Pass to Patagonia Segment of the Arizona Trail (2-21-92-F-350), and the 1998 and 2002 supplemental Biological Assessment of On-going and Long-term Grazing on the Coronado National Forest (AESO/SE 2-21-98-F-399 and 2-21-98-F-399-R1). The 1991 Action Plan proposed projects to reduce effects of land management activities (grazing and roads) on habitat of *Gila topminnow*. The 1992 Arizona Trail project was concerned with construction and use of a new recreational trail through the drainage. The Grazing BOs addressed effects of on-going grazing. All consultations concluded with "no jeopardy" determinations by the FWS and included statements addressing take of *Gila topminnow*.

Morphology of the stream channel and condition of riparian vegetation have changed considerably during the past decade with changes in grazing and road management and implementation of terms and conditions in the various BO's. A series of photos taken at 1,000-foot intervals through Redrock Canyon in 1989 and repeated in 1996 and 2001 generally shows the channel becoming narrower with increased definition of channel banks, substrate particle size increasing (as fine sediments are either captured by streambank vegetation or passed through the system), and recruitment and growth of woody and herbaceous riparian plants (Stefferdud 2001, Doc. 101). In the exclosures, aquatic habitats dramatically improved with increases in overhanging vegetation, establishment of defined streambanks, and a trend towards enhanced channel stability and higher diversity of aquatic habitats. The extent of surface water in time and space, and the length of the "greenline" vegetation have expanded a considerable distance beyond the exclosures. In some reaches, herbaceous vegetation is beginning to catch and retain

fine sediments during overbank flows. In 2003, an additional ¾ mile reach of stream in lower Redrock Canyon (West Redrock pasture) was fenced to exclude livestock.

Existing soil quality in the 19,000-acre Redrock Canyon watershed (all or portions of Seibold, Crittenden, Kunde, Papago, and San Rafael allotments) is about 55% satisfactory, 37% impaired, and 8% unsatisfactory (R. Lefevre, email of 5/24/01). In general, current impaired and unsatisfactory soil conditions are on low gradient slopes near water, that is, along Redrock Canyon and tributaries. Improvement of soil quality is expected to occur under all alternatives mainly on the uplands, but very little in valley bottoms. Projections indicate that impaired and unsatisfactory soil quality conditions will remain along Redrock Canyon (Seibold, Kunde and San Rafael), Oak Grove tributary (Crittenden), Lampshire Canyon (Kunde and Papago), and Cott Tank drainage (San Rafael).

Environmental Effects

Potential direct and indirect effects to Gila topminnow that may be attributable to livestock grazing include direct trampling and incidental ingestion of individuals, modifications to aquatic, riparian, and upland areas that contribute to increased erosion and stream sedimentation, alteration of natural hydrographic patterns, decrease in extent of surface flows in time and space, changes in stream channel morphology, and loss of aquatic habitat pattern and complexity. These effects can result in impaired habitat conditions for Gila topminnow in occupied habitat, may restrict colonization by topminnow of potential habitat, and may continue fragmentation of migration pathways. The Forest Service Zone Fisheries Biologist prepared an analysis of the effects of the alternatives for consideration in the EA (Doc 95). This analysis was prepared prior to the development of Alternative 4, which is currently the Agency preferred alternative. His conclusions were that, based on the regional guidance criteria, all alternatives including no grazing would likely adversely affect Gila Topminnow in the Redrock and Sonoita Creek watersheds. Effects to occupied habitats 14 miles downstream from the Papago allotment are likely to be insignificant and discountable based on the distance between the allotment and occupied habitats.

Notwithstanding these determinations, some differences in effects to Gila topminnow can be predicted for the 5 alternatives. In order to help define the issues and to provide a clear basis for choice for the decision maker and the public, the alternatives are compared in the following section.

Under Alternative 1 (No Action/No grazing), direct and indirect effects to Gila topminnow would be minimized or precluded. The majority of the Redrock Canyon watershed occurs within the boundaries of the allotments. No livestock grazing in the project area would eliminate direct effects (trampling, ingestion) as well as indirect effects (sloughing off of banks, siltation, etc.) to the Gila topminnow and other fish species. It also would likely improve watershed function and reduce erosion rates. Hydrological function would be expected to improve due to elimination of direct livestock impacts and indirect livestock impacts that affect upland watershed and range condition. This alternative would result in eliminated or reduced effects, compared to other alternatives, to the Gila topminnow due to some reduction in downstream effects, removing direct effects within Redrock Canyon, and the increased rate of the potential for

watershed recovery and riparian vegetative species development. Over the long term, the amount of upland herbaceous vegetation would be optimized, compared to other alternatives. The top of the Redrock Canyon watershed occurs within the San Rafael allotment. This allotment is not under consideration in this EA, but ongoing grazing may contribute to effects within the analysis area through erosion and downstream sedimentation in Redrock Canyon. Therefore, potential grazing effects will not be entirely precluded, even under no grazing.

Alternative 2 (Current Management) has not been shown to be entirely effective at controlling livestock distribution or improving watershed and riparian conditions to Forest Plan standards (watershed report, Doc 70). Adverse effects to Gila topminnow and other fish would be greatest under this alternative. Impaired watershed condition would continue to impact aquatic habitats in Redrock Canyon and downstream. All four allotments were the subject of formal consultation with the US Fish & Wildlife Service (AESO/SE 2-21-98-F-399-R1) under the Forest-wide Biological Assessment of on-going and long term grazing effects based on current management. The BA resulted in determinations that grazing under current management is Likely to Adversely Affect Gila topminnow on all four allotments for the following reasons:

- **Seibold** - potential for direct take of individuals and habitat and indirect take of habitat due to continued grazing on soils in less than satisfactory condition.
- **Crittenden** - alteration of potential unoccupied habitat to a degree that may make it unsuitable for colonization by topminnow.
- **Kunde** - indirect take of habitat due to continued grazing on soils in less than satisfactory condition and grazing of unoccupied potential habitat that may decrease its suitability for colonization by topminnow.
- **Papago** - potential for indirect effect on habitat due to continued grazing on degraded watersheds.

The Service concluded that incidental take of Gila topminnow would occur under current management as a result of livestock-related impacts and of grazing-related construction, development and maintenance actions. Reasonable and prudent measures and associated terms and conditions designed to minimize take of topminnow were issued for grazing activities on all four allotments (Doc. 102). These measures are being incorporated into the allotment management plans for all grazing permits issued for the allotments. In 2003, the portion of Redrock Creek in West Redrock pasture was fenced to exclude livestock from approximately $\frac{3}{4}$ mile of the stream. Nevertheless, continuation of current management is expected to result in the least improvement in habitats for Gila topminnow. This conclusion is based on the assumption that grazing on watersheds in proximity to Redrock Creek will continue for up to six months per year and that livestock will have access to Redrock Creek outside of the exclosures in the Kunde allotment.

Alternative 3 (Proposed Action) would change management to allow for additional growing season rest in many pastures. This rest would result in some improvement in watershed and riparian condition over the 10-year term of the permit, but rates of improvement would be slow, compared to no grazing. An analysis of this alternative was prepared by the Forest Service Zone Fisheries Biologist (Doc 95). His conclusions, which form the basis for the discussion at the beginning of this section, were that the

proposed action would adversely affect Gila topminnow based on the determination that livestock grazing would be allowed on subwatersheds in less than satisfactory condition and because livestock would be allowed to graze in proximity to Redrock Creek. Under this alternative, use in East and West Redrock pastures combined would be limited to approximately one month during the winter dormant season, limiting the duration of use compared to current management and providing growing season rest for riparian recovery. The semi-perennial stretch of Redrock Creek in West Redrock pasture has been recently fenced to exclude livestock, which should further minimize direct effects to fish habitats.

Alternative 4 (preferred alternative) would preclude livestock grazing in the Redrock Pasture of the Kunde allotment and reduce permitted livestock numbers. No livestock grazing in the Redrock pasture would eliminate direct effects (trampling, sloughing off of banks, etc.) to the Gila topminnow and other fish species. It also would likely improve watershed function and reduce erosion rates. Erosion originating from this allotment would be reduced, resulting in lower sedimentation rates into drainages within the project area and downstream, and reduced effects for fish species and their habitats.

Hydrological function in the Redrock pasture would be expected to improve due to elimination of direct livestock impacts and indirect livestock impacts that affect upland watershed and range condition. This alternative would result in elimination or reduced effects, compared to alternatives 2 and 3, to the Gila topminnow due to some reduction in downstream effects, removing direct effects within this portion of Redrock Canyon, and the increased rate of the potential for watershed recovery and riparian vegetative species development.

Alternative 5 (No new improvements, reduced stocking) will result in effects similar to those described under Alternative 3 for the Seibold, Crittenden and Kunde allotments. Reduced stocking on the Papago allotment would be expected to remove less vegetation and improve soil conditions in uplands. Sediments originating from upland on the Papago allotment would be reduced, thereby reducing sedimentation into downstream aquatic habitats.

Gila chub. This species was proposed for listing as endangered with critical habitat by the USFWS on August 9, 2002. The Gila chub occurs in O'Donnell Creek on the Papago allotment. Critical habitat has been proposed for 2.4 miles of O'Donnell Creek, a portion of which occurs within the project area. Proposed critical habitat is also located in portions of Post Canyon and Turkey Creek, immediately downstream of the Papago and Canelo allotments, respectively. Potential direct and indirect effects to Gila chub that may be attributable to livestock grazing include direct trampling and incidental ingestion of individuals, modifications to aquatic, riparian, and upland areas that contribute to increased erosion and stream sedimentation, alteration of natural hydrographic patterns, decrease in extent of surface flows in time and space, changes in stream channel morphology, and loss of aquatic habitat pattern and complexity. These effects can result in impaired habitat conditions for Gila chub in occupied habitat, may restrict colonization by Gila chub of potential habitat, and may continue fragmentation of migration pathways. The population of Gila chub in O'Donnell creek is protected by a fenced enclosure. A portion of the enclosure burned in a 2002 wildfire and needs to be replaced prior to future

grazing. Within the analysis area, only the Papago allotment contains occupied or potential habitats. Therefore, the effects analysis is confined to the Papago allotment.

The Forest-wide biological assessment of on-going grazing determined that current management may adversely affect Gila chub on the Papago allotment and the USFWS conference opinion recommended the following reasonable and prudent measures and terms and conditions to minimize take. Should the species be listed, these measures will become the terms and conditions of the biological opinion.

- Rebuild the enclosure fence on O'Donnell Creek by March 31, 2003. Inspect and maintain the enclosure three times a year.
- Minimize channel and floodplain alteration during repair and maintenance of the existing fence.
- Monitor Gila chub and its habitat to document levels of take.

Provided that O'Donnell Creek is fenced to exclude grazing, and that livestock access to the creek is limited to periodic short-term crossings during pasture changes, no significant effects are anticipated under any of the alternatives. Some differences in future watershed condition can be anticipated under the different alternatives, but in no case will effects be more severe than those existing under current management.

Cumulative Effects – Fisheries

For the purposes of analyzing cumulative effects, activities within the entire Redrock Canyon watershed were considered. A large portion of the Redrock Canyon watershed is located on the San Rafael allotment. Soil conditions on this allotment are expected to contribute to watershed and riparian conditions downstream in Redrock Canyon. Current soil conditions on the San Rafael allotment are rated as 15% satisfactory, 50% impaired and 35% unsatisfactory. Soil loss originating from the San Rafael allotment may contribute to sediment loads within occupied topminnow habitats in the analysis area, and may inhibit the recovery of riparian conditions within Redrock Canyon. However, riparian conditions are improving under current management and effects to topminnow from the proposed action and alternatives are, on the whole, positive compared to current management.

Past activities accomplished on behalf of Gila topminnow include the construction of four enclosures that have had beneficial effects for the species. The exclusion of Redrock pasture under the proposed action is expected to contribute positive cumulative effects for topminnow as a result of exclusion of livestock from an additional reach of the stream.

Range Condition

General

Vegetation types present within the allotments are described in Table 1 and in the wildlife section that follows. Tables included with each of the following allotment descriptions display the existing condition, and the anticipated condition at the end of a 10-year permit term for each of the analyzed alternatives.

The effects of grazing are reflected in the assignment of one of four condition classes to rangeland vegetation: low, moderately low, moderately high, and high. Apparent trend (downward, static, upward) is also assessed. Condition ratings are based on comparisons to a reference plant community thought to reflect ungrazed conditions. The factors that contribute to vegetation condition and trend include climatic effects, the presence of non-native species or weeds, and fire occurrence. Condition ratings may be influenced by perceptions of site potential and site stability. Actual use numbers, utilization estimates and detailed precipitation data are essential to the accurate interpretation of vegetation condition and trend.

Seibold Allotment

Affected Environment

Table 4. Vegetation Condition and Trend, Seibold Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
MODERATELY HIGH						
Upward Trend		50%	20%	40%	40%	40%
MODERATELY LOW						
Upward Trend	100%	50%	80%	60%	60%	60%

Rangeland vegetation condition on the Seibold Allotment was found to be moderately low throughout the capable rangeland, with effects of historic overgrazing evident: grasses adapted to clay soils or tolerant of grazing characterize flatter areas; in all pastures at slopes greater than 15 percent, the vegetation composition, plant vigor and production of grasses were better than in flatter areas. Assessments of key areas in 1998 and again in 2001 showed notable improvement, with significant increases in mid-grasses in some areas that resulted in an upgrade of range condition to moderately high. Trend is generally upward, based on an increase of desirable plants, increases in litter and plant basal area cover, and decreases in bare ground.

Environmental Effects

Alternative 1 (No Action/No Grazing) eliminates effects from livestock grazing. Conditions are predicted to improve in problem areas. Because a shift in species composition is needed for some areas to reach moderately high condition, about half of the capable acreage will remain in moderately low condition for the 10-year duration of the analysis period.

Alternative 2 (Continue Current Management) will result in improved conditions, based on improved livestock management over the past ten years, and maintenance of species composition in spite of unfavorable weather conditions. The allotments have not been fully stocked in recent years. Actual use since 1998 has been around 147 CYL (1,764 AM) on the combined Seibold and Crittenden Allotments.

Alternative 3 (Proposed Action) permits additional improvement in vegetation condition (in relation to current management) by adding additional rest in Oak Grove and Moonshine pastures, and limiting grazing in the Redrock pastures to one month (approximately 2 weeks each) in the dormant season. This management was implemented on a trial basis since 1998, and accounts for some of the observed improvement in condition. The Proposed Action does not improve rangeland vegetation condition as rapidly as the No Action alternative. The difference is modest (10% of the capable acres after 10 years). For rangeland vegetation, Alternatives 4 and 5 will have the same effects as Alternative 3 in the case of the Seibold Allotment.

Crittenden Allotment

Affected Environment

Table 5. Vegetation Condition and Trend, Crittenden Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
MODERATELY HIGH						
Upward Trend	16%	30%	20%	25%	25%	25%
Static Trend	60%	60%	60%	60%	60%	60%
MODERATELY LOW						
Upward Trend	24%	10%	20%	15%	15%	15%

Vegetation condition on the Crittenden Allotment is rated as moderately low in some areas that have historically had heavy use (Map 4). The rating based on considerations such as the prevalence of curly mesquite, lack of mid-grasses and lack of ground cover on some sites. In all pastures, at slopes greater than 15 percent the vegetation composition, plant vigor and production of grasses was better than in flatter areas. Assessments of key areas in 1998 and again in 2001 showed notable improvement. The apparent trend in condition is upward in all areas capable for grazing. Trend assessment is based on improved livestock management over the past ten years, and maintenance of species composition in spite of unfavorable weather conditions.

Environmental Effects

Alternative 1 (No Action/No Grazing) eliminates effects from livestock grazing. Conditions are predicted to improve in problem areas. Because a shift in species composition is needed for some areas to reach moderately high condition, some areas will probably remain in moderately low condition for the duration of the analysis period.

Alternative 2 (Current Management) will result in a positive change in condition, based on improvement observed compared to historic management. (Actual use since 1998 has been around 147 CYL/1,764 AMs on the combined Seibold and Crittenden Allotments).

Alternative 3 (Proposed Action) will increase the rate of improvement by adding additional control in Crittenden and Red Bear Pastures. The area around Corral Canyon

Spring will be fenced and used only intermittently. Corral Canyon and Red Bear Pastures will receive growing season rest two out of three years, and Crittenden Pasture will receive growing season rest every other year. This management was implemented on a trial basis since 1998, and accounts for some of the improvement in range condition. The Proposed Action does not improve rangeland vegetation condition as rapidly as the No Action alternative. The difference is modest (5% of the capable acres after 10 years). For the Crittenden Allotment, Alternatives 4 and 5 will have the same effects as Alternative 3.

Kunde Allotment

Affected Environment

Table 6. Vegetation Condition and Trend, Kunde Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
MODERATELY HIGH						
Upward Trend		22%	10%	16%	19%	16%
Static Trend	56%	56%	56%	56%	56%	56%
MODERATELY LOW						
Upward Trend	44%	22%	34%	28%	25%	28%

Rangeland vegetation condition on the Kunde Allotment was found to be moderately low along the flatter (mostly 0-15 percent) slopes. The basis for the moderately low rating includes low plant cover, lack of mid-grasses, and encroachment of woody species (*Prosopis* spp.). The allotment has not been grazed since 1996; the moderately low condition is an artifact of past overgrazing. The trend appears to be upward based on improved plant vigor. Steeper slopes in the capable rangeland are in moderately high condition with a static trend.

Environmental Effects

Alternative 1 (No Action/No Grazing) eliminates effects from livestock grazing. Conditions are predicted to improve in problem areas. Because a shift in species composition is needed for some areas to reach moderately high condition, some areas will probably remain in moderately low condition for the duration of the analysis period.

Alternative 2 (Current Management) will result in improved condition, based on improvement observed compared to historic management, as the improvement was documented prior to the period of no grazing which started in 1996.

Alternative 3 (Proposed Action) will increase the rate of improvement in relation to current management, by adding additional control in the Redrock Pasture (the expected result of a short drift fence that will effectively divide the pasture in two). Also, upland water sources will be established in all three pastures, leading to better livestock

distribution. Alternative 5 would have the same effects as Alternative 3 for the Kunde Allotment.

Alternative 4 would eliminate any grazing impacts in Redrock Pasture, and establish upland water sources in the Lower and Upper Lampshire Pastures. This will result in a slightly faster rate of improvement of the rangeland in moderately low condition, in comparison to current management or the proposed action. The difference is modest (6%-9% of the capable acres after 10 years).

Papago Allotment

Affected Environment

Table 7. Vegetation Condition and Trend, Papago Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
MODERATELY HIGH						
Upward Trend	44%	57%	44%	52%	52%	52%
Static Trend	33%	33%	33%	33%	33%	33%
MODERATELY LOW						
Upward Trend	20%	13%	20%	18%	18%	18%
LOW						
Upward Trend	1%		1%			
Downward Trend	2%		2%			

Rangeland vegetation condition on the Papago Allotment is rated as low in some areas in Middle and Papago Pastures. The low rating is based on poor species composition (few perennial plants) or low plant vigor. In Middle Pasture there were signs of accelerated erosion in an area that also exhibited vehicle use and dispersed camping. Moderately low rangeland conditions were found in all pastures on areas with slopes less than 15 percent. Contributing factors to the moderately low rating were fair species composition and low plant cover. Areas throughout the allotment that have greater than 15 percent slope were mostly rated in moderately high rangeland condition. In the Middle Pasture, apparent trend is downward due to accelerated soil loss. Apparent trend throughout the rest of the capable acres is upward. Species composition has been maintained in spite of unfavorable weather conditions, however improved management has not been implemented. It is relevant that this assessment was made in 1998. The allotment is currently under non-use. Ocular assessments have indicated improvement of problem areas since they have been rested .

Environmental Effects

Alternative 1 (No Action/No Grazing) eliminates effects from livestock grazing. Conditions are predicted to improve in problem areas. Because a shift in species

composition is needed for some areas to reach moderately high condition, some areas will probably remain in moderately low condition for the duration of the analysis period.

Alternative 2 (Current Management) will not result changes in condition. Problems caused by historic heavy stocking and poor distribution will not be resolved. Note that the Papago Allotment was stocked at around 225 CYL (2,700 AMs) until 1999, and has been in non-use since then.

Alternative 3 (Proposed Action) will allow improvement or rangeland condition, primarily by adding additional upland water sources, which will increase the effectiveness of the pasture rotation leading to increase opportunities for pasture rest. That is, the alternative will maintain stocking but improve distribution. For the Papago Allotment, the effects of Alternative 4 would be equivalent to those of Alternative 3.

Alternative 5 would reduce the permitted numbers significantly, but would not provide for construction of new water sources. That is, it would reduce stocking but not necessarily improve distribution. There will be no measurable differences in rangeland condition between alternatives 3, 4 and 5 at the end of the analysis period, and only modest differences relative to Alternative 1 (5% of the capable acres after 10 years).

Cumulative Effects – Range Condition

In terms of cumulative effects related to planned projects in the area, improvement will be more dramatic than depicted in Tables 4-7 if prescribed fire is used. There are several trails and a few miles of road in the Seibold Allotment. Cattle use on these roads and trails under Alternatives 2 and 3 will not lead to adverse cumulative effects. The area as a whole gets significant use from participants in illegal activities (smuggling). The presence of a livestock manager on the ground (permittee or employee) probably reduces this use somewhat. Much of the evidence (and impacts) of illegal trafficking is found around water sources that are protected from cattle use and so effects are not additive. Treatment of noxious weeds will be limited in extent and will have beneficial effects on the vegetation. Cattle grazing will not interfere with the effectiveness of treatments because of predicted improvement of vegetation condition and low level of predicted disturbance under all alternatives. Historic grazing impacts are evident, however conditions are improving and are projected to continue to improve under all alternatives.

Wildlife Effects

General

Within the broad category of wildlife, effects to the following categories of wildlife are considered and analyzed in the following section.

- **General wildlife and habitats, including Management Indicator Species**
- **Threatened, Endangered, Proposed, and Sensitive (TEPS) species**

The primary issues related to Management Indicator Species (MIS) and general wildlife are the effects of grazing on riparian vegetation and on upland herbaceous cover, specifically as it relates to impacts on Mearns' quail and riparian obligate species. The primary TEPS issues identified through the scoping process are the potential effects to

the lesser long-nosed bat that result from grazing during the agave bolting (flowering) season and effects to native fish, specifically Gila topminnow. The analysis of the effects on the Gila topminnow forms the basis for the fisheries effects discussion, above, and will not be repeated here.

National Forest Management Act (NFMA) implementing regulations (36 CFR 219.19) and Forest Service Manual (FSM) 2600 guidance require that Forest Plans identify certain vertebrate and/or invertebrate species as management indicator species (MIS), and that these species be monitored “in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent (FSM 2620.5).” Thirty-three MIS and one group (primary and secondary cavity nesters) in 8 indicator groups are identified in Appendix G of the Coronado Forest Plan (U.S. Forest Service 1986, pages 128-129). In general, the Forest Plan direction for MIS is to “maintain or improve occupied habitat for...management indicator species.” Of the 33 total MIS on the Forest, 17 species and one group (cavity nesters) were selected for analysis as management indicators at the project level based on their known occurrence within or near the project area or presence of suitable habitats. The remaining 16 were eliminated from consideration in this analysis because their known distributions are well outside of the project area or the project area does not contain suitable habitats for those species (Doc. 98).

Forest-wide trends of all MIS have been assessed and are reported in the Forest-wide Status Report for Management Indicator Species (Coronado National Forest 2002). The background information and conclusions of this reported are incorporated by reference. Project level impacts to selected MIS as a result of this proposal have been evaluated and are reported in the Analysis of Effects to Management Indicator Species, found in the project record (Doc. 98).

By definition, MIS are species that can represent a broader suite of species that have similar habitat affinities and for which the effects of the proposed action are considered similar. The analysis area supports an abundance of species that may be affected by the proposed action and alternatives. For the purposes of this analysis, effects to MIS are presumed to be representative of effects to other species with similar habitat needs.

Affected Environment

The following vegetation types provide wildlife habitats within the analysis area and constitute the effected environment for wildlife in general and MIS in particular. Descriptions of range, vegetation, soil and watershed condition are based on range, soil and watershed condition and trend reports in project files and field observations made during 2001 and 2002 by the project wildlife biologist. Conditions by allotment are also summarized in Table 1.

Chaparral: (3% of analysis area or 890 acres, Map 3). Dominant shrubs include Arizona white oak, Emory oak, beargrass, desert ceanothus, mountain mahogany, Wright’s silktassel, and cliff rose. Forbs are usually not a major component within this vegetation type. Based on field observations made in the summer of 2001 (Doc. 100), the project biologist reported that there was a lack of herbaceous ground cover (6-15% basal cover) and litter cover within this vegetation type. Vigor of grasses was often low,

as was herbaceous (warm season perennial grasses) production. Sheet erosion was common in areas with little herbaceous or litter cover and there were areas where plants were pedestaled, a sign of erosion. There were many more vegetative increasers than decreaseers.¹ Soil condition in this vegetation type is about equally divided between impaired and satisfactory. In good condition, this plant community provides an important source of forage and cover for species like white-tailed deer and black bear.

Broadleaf Woodland (Evergreen): (77% of the analysis area or 22,556 acres, Map 3). Madrean oaks, including Emory, Mexican blue and Arizona white, and alligator juniper are dominant or co-dominant in this plant community. Tree densities increase in and near drainages and depressions, and on north-facing slopes. Shrubby species include younger age classes of oaks, sumac species, mountain mahogany, cliff rose, manzanita, desert ceanothus, sages, and fairy duster. Herbaceous plant composition is generally diverse. Perennial grass species include blue grama, black grama, sideoats grama, plains lovegrass, Lehmann lovegrass, cane beardgrass, curly mesquite, wolftail and green sprangletop. Invader species were noted as are common in many areas (Doc. 100) and include rabbitbrush, cacti, Russian thistle and ragweed. There was a significant and widespread occurrence of the annual native forb, goldeneye (*Viguiera annua*), present in moderate to heavy amounts in many areas of these allotments in 2001. The species blooms in response to above average winter precipitation and was observed to have increased into both grazed and ungrazed sites in 2001 (Doc. 90). The species shows an affinity for clay soils, which occur throughout the project area. Historic soil loss on many sites in the project area as a result of historic heavy grazing may have contributed to an increase in the occurrence of goldeneye.

Mostly satisfactory soil conditions exist within this vegetation type on the Seibold, Kunde and Crittenden allotments, except for on the Crittenden pasture where there are large areas of impaired soil. There are also large areas of impaired soils on the Papago allotment within this vegetation type. Accelerated erosion, as evidenced by pedestaled plants, headcuts and gullies is common in some areas.

In good condition, this vegetation type provides quality fawning cover for white-tailed deer and will provide sufficient herbaceous understory for Mearns' quail and other ground-nesting birds. Mast (acorns and berries) produced in this plant community is an important source of forage for deer and black bears. The presence of numerous large trees provides habitat for cavity nesting birds.

Desert Grassland (16% of analysis area or 4575 acres, Map 3). Mesquite and catclaw acacia are typically the dominant overstory species in the desert grassland uplands. Curly mesquite, grama grasses (primarily sideoats, hairy, and sprucetop) and lovegrass species (Lehmann and Plains) are typically the dominant perennial herbaceous species. Annual grasses are common. Annual forbs, especially goldeneye, ragweed, and Russian thistle

¹ Decreasers: highly palatable plants that decline in abundance with grazing pressure.

Increasers: Increaser I types are moderately palatable and serve as secondary forage plants. They may increase slightly or remain stable under moderate grazing. As grazing pressure increases or as range condition reaches fair condition, these species also decline. Other plant species present in the climax vegetation but are unpalatable may increase under grazing pressure or as site deterioration occurs. These species are classified as increaser II plants. Invader species are species that encroach onto the site from adjacent sites in later stages of deterioration (Holechek et al. 1998)

are seasonally extensive in some areas, especially in years with normal or above winter precipitation. Most of this vegetation type is found on 0-40% slope where livestock use has been historically heavy. There are many more increasers than decreasers. Plant vigor (of perennial grasses) is typically low. There has been an increase in the juniper, mesquite and catclaw component since the 1970's.

Bare ground is common, accounting for 35-60% of the land area, while basal vegetation cover accounts for 2-20% of the land area. Nearly this entire vegetation type has impaired soil condition. Soils are typically shallow and there is often insufficient litter to protect soils. Sheet erosion is common in some areas and soil loss is occurring; however, no accelerated erosion was observed. The watershed function is entirely unsatisfactory within this vegetation type.

In good condition, this plant community provides abundant herbaceous cover for a variety of ground-nesting birds and small mammals, as well as fawning cover for white-tailed deer. Forbs produced in the understory are a seasonally important source of forage for white-tailed deer.

Plains Grassland (*4% of analysis area or 1240 acres, Map 3*) This vegetation type is found only on the Papago allotment. This type is similar in woody species composition but more open and usually with a wider variety of perennial grass species. All of this vegetation type is found on 0-40% slopes. Although there is a fairly diverse range of perennial grass species, vigor of plants is often poor to fair, with few new grass seedlings. Plant pedestalling is common, although there did not appear to be any active soil movement. Bare ground is common accounting for about 55% of the land area. Mesquite appears to be expanding onto the grasslands. The entire vegetation type has impaired soil condition and unsatisfactory watershed condition. Goldeneye is present in moderate to heavy amounts, but often there is a diverse mix of perennial grass species growing in conjunction with the goldeneye.

In good condition, this vegetation type provides herbaceous cover and forage for ground-nesting birds and small mammals. The Baird's sparrow is found only in plains grassland where it winters in Arizona.

Riparian (*1% of analysis area or ~ 238 acres*). The riparian component consists mainly of Redrock Canyon, Monkey Canyon, Alamo Canyon, Lampshire Canyon, Cienega Creek, and O'Donnell Creek. The riparian component in this analysis area is isolated and typically discontinuous or patchy. Redrock Canyon contains the most extensive riparian vegetation in the analysis area. Vegetation is most developed within and adjacent to livestock exclosures and includes Fremont cottonwood, Arizona ash, Arizona walnut, Arizona sycamore, Gooding willow, yew willow, carex species, deergrass, and sedges. Redrock Canyon has been degraded by past heavy livestock use. Based on documented increases in riparian conditions over the past ten years resulting from reductions in grazing and livestock exclosures, it is believed that the potential exists for further recovery and expansion of riparian vegetation in Redrock Canyon. More complete descriptions of riparian area condition in the analysis area are found in the Riparian Condition section (EA pp.18-23), Wildlife Specialists Report (Doc. 100) and the Redrock Canyon Photopoint and Aquatic Habitat Survey (Doc. 101).

The Gila topminnow, Gila chub, longfin dace, sonora sucker, desert sucker, Huachuca springsnail, Mexican meadowfly, garter snakes, yellow-billed cuckoo, Gray hawk, Canyon treefrogs, Chiricahua leopard frogs, lesser long-nosed bats, Huachuca water-umbel and Canelo Hills ladies tresses are known native inhabitants of, or adjacent to riparian areas. Management indicator species needing dense canopy are closely tied to healthy riparian communities, as are several cavity nesters. Healthy riparian areas are also important as thermal cover and movement corridors for larger wildlife.

Environmental Effects

A thorough discussion of the general effects of livestock grazing with reference to the project area is included in the Wildlife Specialist's Report (Doc 100) and the MIS Report (Doc. 98) and is summarized briefly below. The detailed discussions in these reports form the basis for the effects determinations described herein.

Direct effects to wildlife from grazing can include direct disturbance of nesting birds; trampling or consumption of fish and amphibians and their eggs or larvae; trampling of hibernating or otherwise immobile species, displacement of native species and direct competition for limited food or water resources. Direct impacts to wildlife are thought to be occurring under current management, primarily as a result of livestock use in the bottom of Redrock Canyon.

Indirect effects to wildlife from livestock grazing are generally related to changes in habitat structure or composition. Grazing removes herbaceous vegetation that provides security and thermal cover for species ranging from rodents and ground-nesting birds to white-tailed deer. The excessive removal of vegetation by livestock may increase the susceptibility of individuals or nests to depredation or reduce the abundance of insects or other invertebrates important for the growth and survival of nestlings. The loss of herbaceous cover can also change natural fire regimes, leading to widespread changes in plant community composition. Long term heavy grazing can lead to decreases in the density and diversity of preferred native plant forage species. Livestock will actively select for palatable species, leading to the loss or reduction of these species and their replacement with less palatable species like burroweed, turpentine bush, annual weeds and non-native species like Lehmann lovegrass. Grazing removes herbaceous vegetation and soil litter necessary for nutrient cycling and watershed protection. Degraded watershed condition results in increased susceptibility of soils to erosion, decreased infiltration, greater surface runoff and flooding. Increased flooding results in gullying and down cutting of streams and the loss of perennial flows. Several of these effects are noticeable in the project area. Portions of all allotments have undergone significant soil erosion as evidenced by pedestalling and headcuts. Soil quality on the Redrock Canyon watershed is estimated to be 55% satisfactory, 37% impaired and 8% unsatisfactory. Along the length of the channel in Redrock Canyon, 80% of soils are impaired or unsatisfactory. Invasive plant species, especially goldeneye, are present in uplands and along the stream channel. Existing rangeland condition throughout the allotments is either moderately low (poor) or moderately high (fair).

In riparian areas grazing can reduce vegetative diversity and species richness through the consumption of vegetation and trampling of stream banks. Consumption of seedlings can lead to reductions in tree recruitment and the loss of canopy cover. Livestock can impact

riparian ecosystem functioning through changes in streamside vegetation, channel morphology, water temperature and quality and accelerated erosion. Changes in water chemistry and temperature in turn, render habitats unsuitable for native species. Riparian areas are particularly important to wildlife and most vulnerable because livestock tend to congregate in riparian areas for the same reasons wildlife do, i.e. water availability, forage availability, thermal cover, hiding cover, and as movement corridors. Riparian conditions in Redrock Canyon are currently unsatisfactory due to the lack of canopy cover.

Human activities and developments related to livestock management include the removal of livestock killing predators (mountain lion, coyote and bear) in some areas, fencing that disrupts or precludes wildlife movements and the development of artificial waters. Effects of water developments, both positive and negative, are often matter of season of use, dependability, and number of livestock utilizing the waters.

MIS Selection. In general, the MIS selected for analysis are highly correlated to the presence of adequate cover, especially adequate herbaceous cover, dense riparian canopy or mid-story cover. Grazing management that retains sufficient residual herbaceous plant material and/or promotes the development of riparian vegetation should benefit MIS and, by extension, those numerous additional species they represent.

Species that require or prefer dense riparian canopy cover include the *Gray hawk*, *Rose-throated becard*, *Thick-billed kingbird*, *Northern beardless tyrannulet*, *Bell's vireo* and *black bear*. Species that require sufficient herbaceous cover include *Mearns' quail*, *white-tailed deer*, *black bear* and *Baird's sparrow*. The *five-striped sparrow* requires a dense shrubby understory. *Gila topminnow* and *Arizona tree frog* are riparian obligates that require healthy aquatic habitats.

The findings of the project-level MIS analysis and the Wildlife Specialist's Report (Doc. 98) are summarized below by alternative. Effects of the proposal on Mearns' quail are documented separately because effects to this species were identified as a distinct issue.

Alternative 1 (No action/No grazing) is expected to result in the greatest development of woody and herbaceous riparian vegetation. Riparian canopy is expected to improve because no grazing would occur on riparian trees. Occupied habitats for cavity-nesting birds are expected to improve at a higher rate relative to other alternatives because of increases in riparian tree recruitment, but changes may not be quantifiable over the 10-year life of the project. Development of upland herbaceous cover would also be greatest under this alternative for all allotments. This prediction is based partially on field observations of the Kunde allotment, which has been rested for 4 years, that show a distinct increase in vegetation structure and plant litter in the herbaceous layer compared to the adjacent Seibold allotment which has been grazed. Increases in upland herbaceous vegetation should benefit downstream riparian habitats by slowing runoff, increasing water infiltration and attenuating peak flood flows. Aquatic habitat would be maintained or improved.

Under Alternative 2 (Current management) riparian regeneration will be lowest of all alternatives for all allotments. Herbaceous cover throughout the four allotments, especially in flatter areas where livestock concentrate will continue to be insufficient for some species. The invasion of woody upland species would most likely be higher under

this alternative, resulting in long term reductions in available herbaceous material. This may benefit the five-striped sparrow, a species that needs dense shrubby cover, but will reduce occupied habitats for a variety of species that require herbaceous cover. Fawning cover for white-tailed deer will be less than that available under other alternatives. Heavy use in some areas will continue to contribute to degraded watershed conditions and may slow or prevent recovery of riparian areas to full potential. The quality and quantity of aquatic habitats is not expected to change over current conditions. Because livestock remain in pastures for relatively longer periods of time (up to six months in the case of the Crittenden pasture), the potential for overuse of the forage base and reductions in plant vigor are greatest under this alternative. Alternative 2 will maintain occupied habitats at the current level, but is likely to result in little improvements in occupied habitats for MIS over the life of the project or to move conditions on the allotment to the level desired within the ten-year term of the project.

Alternative 3 (Proposed action) will result in some improvements in upland herbaceous cover and increases in riparian vegetation above that expected under Alternative 2. Proposed pipelines and fencing designed to reduce impacts in livestock concentration areas may improve rangeland condition in these areas but may also result in reductions in herbaceous vegetation in previously little-used areas. Use of the Redrock pastures for only one month during the winter should retain more herbaceous riparian cover compared to Alternative 2 and may result in additional recruitment of riparian vegetation in Redrock Canyon to the benefit species needing canopy cover. Overall, Alternative 3 should maintain occupied habitats for MIS and other wildlife in the analysis area, but projected benefits of the alternative are based on numerous proposed management activities that are designed to distribute livestock more evenly across the allotments. These activities may have the effect of spreading impacts across a larger area and are dependant on careful implementation and require a higher degree of monitoring to insure success. Assuming the proposed improvements achieve their desired effect and are maintained over the life of the project, this alternative should result in reduced impacts to wildlife compared to Alternative 2 on all four allotments, but will not be as effective at achieving desired conditions on the Kunde allotment as would Alternative 4.

Under Alternative 4 (Redrock pasture exclosure) occupied habitats for MIS species are expected to improve faster than all alternatives except Alternative 1. The exclusion of cattle from the Redrock pasture in the Kunde allotment will contribute to watershed improvement and riparian regeneration in Redrock Creek. This will increase potential habitats for herbaceous cover species and riparian canopy species. Additional livestock exclosures and waters should increase riparian regeneration in Corral Canyon Spring and Oak Grove Spring. Increased rest should result in greater plant vigor and increases in herbaceous vegetation in uplands. Potential and occupied habitats for aquatic species are expected to improve. Overall, Alternative 4 is expected to maintain or improve occupied habitats for MIS in the analysis area.

Alternative 5 (No range improvements – Papago allotment) is expected to have effects similar to Alternative 3 on the Seibold, Crittenden and Kunde allotments. Reduced stocking on the Papago allotment will result in increases in residual herbaceous standing plant biomass and litter on this allotment. Therefore, species needing herbaceous cover may realize a slight increase in suitable habitats. Additional residual plant material

should also provide soil and watershed protection. The lack of new improvements will result in no increases in livestock distribution. This may result in continued overuse of some areas, but may also benefit wildlife habitats, especially herbaceous cover, because many areas will be minimally grazed or not at all.

Mearns' (Montezuma) quail

Effects of the proposed action and alternatives were identified as a distinct issue during scoping, so effect to the species are discussed separately in the following section.

Affected Environment

Mearns' quail belongs to the management indicator groups *Species needing herbaceous cover, game species, and special interest species*. This species was selected as a MIS because it requires high quality grassland in encinal oak habitats (Doc. 98).

On the Coronado National Forest, Mearns' quail are commonly found in Madrean evergreen woodlands at elevations from 3500 to 5500 feet. Highest densities are found in the Atascosa, Tumacacori, Santa Rita, Patagonia, Huachuca, Chiricahua and Peloncillo Mountains. Portions of the Kunde, Seibold, and Papago allotments are mapped as high-density Mearns' quail habitat. The amount of high-density habitat in each of the four allotments is displayed in Table 8. Areas within this high-density habitat have impaired soil condition, lack of ground cover, lack of historical herbaceous species diversity, and contain extensive stands of invasive herbaceous species such as goldeneye (*Viguiera annua*) or Lehmann lovegrass (*Eragrostis lehmanniana*) (Doc. 100).

Table 8. Acreage of High Density Mearns' Quail habitat in the allotments.

Allotment Name	Acres
Seibold	261
Crittenden	0
Kunde	1406
Papago	7290
Total	8851

Past research into management of this species emphasized the importance of leaving 6" of stubble height to ensure hiding cover (Doc 98). Guidance in the Forest Plan and Forest Manual Supplement (Doc. 95) calls for 45% maximum allowable utilization in areas of high density Mearns' quail habitat with 35-40 % as a target and stubble height as the primary indicator for meeting habitat needs in key habitat areas.

Environmental Effects

As a mitigation measure common to all action alternatives, Mearns' quail key habitat areas have been identified (Map 7) and will be monitored for conformance to Forest Plan guidelines. Key habitat areas will be located in wooded areas with 20% or greater crown cover of oak or manzanita or open grassland within 45 meters of such overstory. Within Mearns' quail key areas, utilization of 35-40% will be desirable, with the objective of leaving 6 inches or greater herbaceous stubble height to provide cover for quail. Although there may be years of exceptional circumstances where implementation may

not be possible, the guidelines will be met within the usual cycle of wet and dry years (Doc. 95). Should monitoring demonstrate that the guidelines are not being met, management will be modified to reduce utilization in key habitat areas.

Alternative 1 (No Action/No Grazing) - Implementation of the No Action alternative will result in the elimination of grazing impacts to high-density Mearns' quail habitat on all four allotments. This alternative would maximize the amount of residual herbaceous cover that provides quail habitat within the analysis area and would be expected to meet Forest Plan standards and guidelines for the quail (Doc 98). However, light to moderate grazing that leaves adequate cover apparently benefits habitat quality when compared to ungrazed areas by increasing the availability of food resources (Doc. 92), so that the No Action alternative may not be optimum for Mearns' quail. In addition, Mearns' quail populations are highly correlated to the amount and timing of summer precipitation. The elimination of grazing impacts is predicted to increase the amount of available cover, but in the absence of sufficient precipitation, the effects of management changes alone on long-term trends for quail populations are difficult to predict.

Alternative 2 (Current Management) - While mitigation provides for high-density Mearns' quail habitat per FSM 2631.1 – 2631.07, this alternative does not improve livestock distribution and provides less pasture rest than other action alternatives. Therefore, it complicates the task of retaining sufficient residual herbaceous cover.

Alternative 3 (Proposed action) - Mitigation provides for high-density Mearns' quail habitat per FSM 2631.1 – 2631.07. Certain pastures in all four allotments would receive more rest than provided by current management and proposed structural improvements should reduce overuse in canyon bottoms by achieving more even distribution. This is expected to improve range vegetation condition, and should simplify the task of meeting the quail standards, relative to current management.

Alternative 4 (Kunde allotment) - Mitigation provides for high-density Mearns' quail habitat per FSM 2631.1 – 2631.07. Certain pastures in the Seibold, Crittenden and Papago allotments would receive more rest than current management and livestock would be excluded from the Redrock pasture on the Kunde allotment. This is expected to improve range vegetation condition and increase the amount of herbaceous understory in the Redrock pasture, and should simplify the task of meeting the quail standards, relative to current management within key areas where grazing occurs.

Alternative 5 (Papago allotment) - Mitigation provides for high-density Mearns' quail habitat per FSM 2631.1 – 2631.07. Certain pastures in the Seibold, Crittenden and Kunde allotments would receive more rest than provided by current management, and effects to Mearns' quail habitats would be similar to those anticipated under Alternative 3. A reduction in livestock numbers on the Papago allotment is expected to result in improved conditions, in the absence of new range improvements (Doc. 98).

Threatened, Endangered, Proposed and Forest Service Sensitive Species

Affected Environment

Based on records available through the Arizona Heritage Data Management System and discussions with the District Biologist, a total of 73 threatened, endangered, proposed and Forest Service sensitive (TEPS) species have been identified as occurring within the project area or for which suitable habitats may be present (Appendix 3).

Federally protected species that may be affected by the proposed action and alternatives are listed in Table 9. The table describes what habitats are present within the four allotments, where Federally-listed species are known to occur; and which allotments are known to contain these species, contain suitable habitat or fall within the range of the species.

Table 9. Federally protected species occurring in the analysis area or for which suitable habitats are present.

Species	Habitat Present	Population Present	Allotment Present
Salamander, Sonora Tiger	Stock tanks Wetted areas	None known Occurs in adjacent 6 th Code watershed	None confirmed Possibly P, but awaiting results of genetic testing
Eagle, Bald	Redrock Canyon Dense canopied canyons	Winter use possible	Potential occasional Foraging may in occur S, K, C, P
Owl, Mexican Spotted	Restricted habitat in Redrock Canyon, other riparian areas	Nearest PAC = 1 mile south of Kunde allot.	Potential occasional Foraging may occur in S, K, C, P
Topminnow, Gila	Redrock Canyon Lampshire Canyon	Occupied habitat in Redrock Canyon	S, K
Wolf, Mexican Gray	Throughout all 4 allotments	Not likely (known only On A-S and Gila NF)	None likely yet
Ocelot	Throughout all 4 allotments	Not likely	None likely
Jaguarundi	Throughout all 4 allotments	Not likely	None likely
Bat, Lesser Long-Nosed	Foraging habitat Throughout all 4 allotments	North Saddle Mountain	S, C, K, P
Jaguar	Throughout all 4 allotments	None known	Occasional transients may Occur
Umbel, Huachuca Water	Redrock Canyon O'Donnell Creek Other wetted areas	O'Donnell Creek and Freeman Spring	P, potential habitat in S, K
Ladies' Tresses, Canelo Hills	Redrock canyon Lampshire canyon	O'Donnell Creek	O'Donnell Creek - P
Frog, Chiricahua Leopard	Redrock Canyon Lampshire canyon O'Donnell Canyon Stock tanks Other wetted areas	Redrock Canyon and Near Oak Grove spring, Freeman Spring and O'Donnell Creek	S, K, P

* S = Seibold, C = Crittenden, K = Kunde, P = Papago

Formal consultation with the U.S. Fish and Wildlife Service for the preferred alternative has not occurred, but a BAE for the preferred alternative is in preparation. The effects of

current grazing activities (Alternative 2) were evaluated in the Forest-wide Biological Assessment of on-going and long term grazing (USFS 2002). Because of changes in the proposed actions for the allotments, effects determinations in the project level BAE may be different from those contained in the Forest-wide BAE.

Environmental Effects

The following discussion focuses on species that are likely to be adversely affected by the proposed action or alternatives. More extensive discussions, including determinations for species that are not affected or not adversely affected, can be found in the Wildlife Specialist's Report (Doc. 100) and the BAE (Doc. 101) for the project.

Lesser long-nosed bat (Endangered)

At least three large bat roosts (greater than 250 bats) occur within eleven miles of the allotments and suitable foraging habitat in the form of paniculate agaves occurs on all four allotments. Potential effects to Lesser long-nosed bats are thought to arise as a result of livestock herbivory on agave flowering stalks, although no long-term investigation has quantitatively documented the effect of grazing on agave mortality or flowering stalk herbivory (Doc 102, page 127). Agave stalks are rich in carbohydrates, and are particularly palatable to livestock and wild herbivores when they begin to bolt in the early spring. Exact distribution and densities of Palmer's agave are not known and no surveys for bats or bat food plants have been conducted in the analysis area. As described in the Mitigation Common to All Alternatives, the Forest has committed to monitor the density of agave flowering stalks on allotments within 11 miles of this roost. The Forest is in the process of developing the methodologies to be used. Under all action alternatives, flowering agave densities will be monitored in pastures grazed during the bolting season. If flowering agave densities fall below 0.2 plants/hectare (0.08 plants/acre) as a result of livestock herbivory, the Forest will reinitiate consultation and management may need to be adapted to reduce impacts (Doc 102, page 130).

Alternative 1 (No Grazing) will have no effect on lesser long-nosed bat, as grazing will not occur on any of the allotments.

Alternative 2 (Current Management) will result in livestock grazing in pastures containing agaves. In any given year, approximately two thirds of the pastures will be rested during the April-July agave flowering season, but some level of herbivory on agave stalks is expected to occur in pastures being grazed.

Alternative 3 (Proposed action) will also allow grazing in areas containing agaves during the time agaves are producing flower stalks and will result in effects similar to Alternative 2 on the Seibold, Crittenden and Kunde allotments. Effects on the Papago allotment are difficult to predict. Additional improvements proposed under this alternative are anticipated to increase cattle distribution across the allotment. This may reduce effects in pastures that have been traditionally grazed each year during the agave bolting season, but may also result in increased use in pastures that historically have been lightly grazed. Assuming the proposed improvements are effective at making more pastures useable, the additional pastures should add flexibility to management and allow for adaptive management to minimize agave impacts.

Alternative 4 (Preferred alternative). Under this alternative the Redrock pasture (Kunde allotment) will not be grazed. This pasture is the closest to the Patagonia bat roost, so impacts to bat food resources in proximity to the roost would decrease. Long-nosed bats are relatively long distance foragers and the amount by which this pasture contributes to total food resources is not known. Implementation of this alternative would be likely to result in livestock herbivory on agaves; however effects would be expected to be less than under Alternatives 2, 3 or 5 because of reduced stocking in the Kunde allotments and exclusion of livestock from the Redrock pasture.

Alternative 5 (No range improvements – Papago allotment) will result in effect similar to Alternative 3 on the Seibold, Crittenden and Kunde allotments. Reductions in stocking on the Papago Allotment may result in decreased herbivory on agave stalks, but the amount of change cannot be quantified. Flowering agave densities will be monitored in pastures grazed during the bolting season and adaptive management strategies will be used if livestock herbivory exceeds acceptable levels.

Chiricahua leopard frog (Threatened)

The Chiricahua leopard frog (CLF) was listed as Threatened on June 13, 2002. All four allotments contain occupied, likely to be occupied or potential habitat for the species. O'Donnell Creek supports an extant population of the species. There are two records of observation of the species in the Redrock Canyon watershed: a 1994 observation from Redrock Creek on the Kunde allotment and a 1995 observation of frogs at a spring in the Seibold allotment. Grazing occurs in or near most habitats occupied by the frogs and maintenance of viable populations appears to be compatible with well-managed livestock grazing (Doc. 102). Potential adverse effect to the species arising from grazing include trampling of egg masses, tadpoles and active and hibernating frogs by cattle; deterioration of the watershed, erosion or siltation of stream courses; loss of wetland vegetation; stock pond maintenance activities that result in the death or injury of frogs; and the spread of disease (Chytrid fungus).

Alternative 1 (No grazing) would be expected to preclude effects to the species because livestock would not be present on the allotments and no management activities would occur.

Alternative 2 (Current management) was analyzed in the 2002 BA of ongoing livestock grazing on the Forest (Doc. 102). Current management was determined to be Likely to Adversely Affect CLF on the Seibold allotment and Not Likely to Adversely Affect the species on the Kunde, Papago and Crittenden allotments. These determinations were based on the fact that grazing occurs in subwatersheds (Redrock Canyon: Seibold, Kunde, Crittenden and O'Donnell Creek: Papago) that contain suitable habitats. Under this alternative, livestock use will continue in potential habitats. On the Papago allotment, livestock will continue to be excluded from O'Donnell Creek and Freeman Spring, pursuant to the terms and conditions of the USFWS Biological Opinion, so direct impacts are not anticipated.

Alternative 3 (Proposed Action) will implement several measures designed to reduce livestock use in riparian areas, but will not exclude livestock access to all suitable or potential frog habitats in Redrock Canyon. Watershed condition is predicted to improve

over current conditions, but direct effects to CLF habitats are expected to continue. On the Papago allotment, effects will be similar to Alternative 2.

Alternative 4 (preferred alternative) would preclude livestock grazing in the Redrock Pasture of the Kunde allotment and reduce permitted livestock numbers. Decreased stocking levels will remove less herbaceous vegetation, allowing more residual vegetation and litter to remain. Erosion originating from this pasture would be reduced, resulting in reduced sedimentation rates into drainages. No livestock grazing in the Redrock pasture would eliminate direct effects (trampling, sloughing off of banks, etc.) to the CLF. It also would likely improve watershed function and reduce erosion rates. Hydrological function would be expected to improve due to elimination of direct livestock impacts and indirect livestock impacts that affect upland watershed and range condition. This alternative would result in reduced effects (compared to alternatives 2 and 3) to the CLF on Redrock Creek. On the Papago allotment, effects will be similar to Alternatives 2 and 3.

Alternative 5 (No range improvements – Papago) will result in effects similar to Alternative 3 on the Seibold, Kunde and Crittenden allotments. Reductions in stocking on the Papago allotment may result in a slight improvement in watershed condition over the 10-year term of the permit, but since known habitats are already fenced to exclude livestock, direct effects are not anticipated.

Sonora Tiger Salamander (Endangered)

The Sonoran Tiger salamander has not been documented from within these allotments; however, salamanders were located in a tank near Lampshire Canyon on the Papago allotment during surveys in the summer of 2002 (AGFD unpublished, Doc. 99). Testing to determine the genetic origin of the individual is in progress. The closest documented extant population is on the San Rafael allotment south of the project area in the upper Santa Cruz watershed.

Potential habitats in the form of stock tanks are present on all allotments, but they are currently outside of the known range of the species. Potential grazing effects include habitat degradation from reduced shoreline cover at and near tanks or contributions to increased erosion and siltation. Additionally, livestock may trample salamander larva, adults and/or eggs, and maintenance or cleaning of stock tanks may result in mortality of salamanders and eggs.

Alternative 1 (No grazing) will have no effect on the species since no livestock grazing or management activities will occur.

Alternatives 2, 3, 4 and 5: The Seibold, Crittenden and Kunde allotments are outside of the known range of the species and the species has not been documented on the allotments. The Papago allotment is also outside of the known range of the species, but is located adjacent to a watershed supporting occupied habitats and thus has the greatest potential for the occurrence of salamanders. Should the species be confirmed on the allotment, livestock management activities will be conducted in accordance with the Forest's stockpond management and maintenance guidelines (Doc 105).

Huachuca water-umbel (Endangered)

Plants and habitats can be affected by livestock grazing directly through trampling or consumption of plants, or indirectly through disturbance in riparian soils, causing bank instability. The effects of ongoing grazing to this species (Alternative 2) were evaluated in the Forest-wide BA and associated USFWS BO (Docs. 102, 104). These analyses determined that ongoing grazing would have No Effect on the species on the Seibold, Kunde and Crittenden allotments, and was not likely to adversely affect the species on the Papago Allotment because the population is protected from grazing. There is no critical habitat designated for this species in the project area.

Although this species has not been documented, there are suitable habitat conditions within Redrock Canyon (pers. comm. with M. Falk (USFWS), P. Warren and D. Gori (TNC)). Continued frequent scouring of the Redrock drainage may prohibit its long-term establishment. The continued potential for severe flooding is directly related to extensive poor soil conditions. These conditions are not anticipated to be substantially or sufficiently changed in 10 years (even under the No Action alternative) to allow for improvement or establishment of Huachuca water umbel habitat or populations.

Sensitive Species

All of the sensitive species identified in Appendix 3 may occur within or near the proposed project area. Some of these species are not documented as occurring here, but are included in the analysis because (1) potentially suitable habitat exists, (2) the analysis area is within the range of the species, or (3) it is currently unclear what composes their preferred habitats. A more detailed analysis is found in the Wildlife Specialist Report (Doc. 100) and will be included in the BAE for the preferred alternative.

All of the sensitive species that occur or may occur within the area of the proposed project may be impacted by the implementation of this proposal. The preliminary findings of the BAE for the project concluded that the potential impacts associated with the implementation of this project are not likely to result in a trend toward federal listing or contribute to a loss of population viability for any of the sensitive species under consideration. This determination is valid only if all grazing utilization standards are complied with, all monitoring identified in the environmental assessment is completed, and monitoring data show that range, soil, and riparian conditions remain static or measurably improve over the next 10 years.

Migratory Birds

Executive Order 13186, of January 10, 2001 directs Federal agencies to support migratory bird conservation and to “ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern”. Birds of Conservation Concern are identified by the U.S. Fish and Wildlife Service Office of Migratory Bird Management by Bird Conservation Region (USFWS 2002. Birds of Conservation Concern. Div. of Migratory Bird Management <http://migratorybirds.fws.gov/reports/bcc2002>). The Project area lies within the Sierra Madre Occidental Region. Thirty-nine birds of conservation concern are identified for this region. Effects to selected migratory bird species were analyzed in the Biological

Evaluation (Doc. 107) and the Analysis of Effects to Management Indicator Species (Doc. 98) by species and habitat type. Under all alternatives, effects to migratory birds are anticipated to be positive or insignificant as a result of projected improvements in riparian habitats and herbaceous cover.

The closest Important Bird Area (IBA) identified by the National Audubon Society is the lower San Pedro River, approximately 15 miles from the project boundary. Activities within the project area are not expected to affect the San Pedro River IBA.

Cumulative Effects – Wildlife and Plants

Past, present and foreseeable future projects or actions that have affected or will affect resources in the project area include historic grazing activities, prescribed and natural fires, wildlife suppression, invasive plants, recreation and water diversions. These activities and occurrences have contributed incrementally to changes in ecological conditions in the project area and may continue to influence conditions in the project area over the term of the project. Livestock grazing has occurred within the analysis area for over 100 years. Grazing-related losses of herbaceous cover and litter have resulted in increased erosion, greater surface runoff, flooding and down-cutting of streams. There is considerable evidence that widespread unregulated livestock grazing after about 1880 resulted in the removal of much of the herbaceous fine fuels necessary to support fires. The reduction in fine fuels, combined with active fire suppression beginning in the early 1900's contributed to a decreased fire frequency and subsequent invasion of many grasslands by woody plants. Increases in herbaceous plants projected under some of the alternatives should help to establish a more "natural" fire regime.

There are several stock ponds within the Redrock Canyon watershed (e.g. Cott Tank) that support populations of non-native fish. The spread of non-natives into Redrock Canyon, either through natural dispersal or through intentional introduction by humans, could impact the recovery of topminnow populations notwithstanding improvements in riparian and stream conditions. Increased flows and expansion of aquatic sites that result from improvements in management could, in fact, provide habitat conditions conducive to the spread of non-native species.

Human activities in the project area include hiking, hunting and vehicle use on unsurfaced roads. Portions of the area show evidence of trailing by undocumented aliens and/or drug traffickers. In addition, the area has seen a substantial but unquantified increase in vehicle traffic related to drug and immigration interdiction efforts on the part of the U.S. Border Patrol and other enforcement agencies. These activities result in localized disturbance within the project area, but the proposed action is not expected to contribute adversely to the existing level of effects resulting from these activities.

Rural and urban development on private lands in the project area has resulted and will continue to result in the loss or fragmentation of wildlife habitats. Movement corridors between mountain ranges have been disrupted or reduced as a result of off-Forest developments. The proposed action and alternatives are not expected to contribute cumulatively to habitat fragmentation since no developments are planned.

Non-native invasive plant species are known from the project area. These include Lehmann lovegrass in the uplands and Johnson grass, salt cedar and tree of heaven in

riparian areas near Redrock Creek. The removal of noxious weeds or invasive plants may be proposed in Redrock Canyon and effects of any treatments will be analyzed under a separate analysis. Grazing under the proposed action is not expected to preclude projects designed to eliminate invasive plants, nor is grazing as proposed expected to contribute significantly to the spread of invasive species over current levels. As currently proposed, invasive plant treatments are not expected to result in significant impacts to wildlife resources. Cattle can contribute to the distribution of invasive plant seeds and can disturb soils, thereby creating conditions conducive to the growth of invasive plants. However, except for Lehmann lovegrass, invasive plant infestations in the project area are limited in extent. There is no documentation that cattle have contributed significantly to the spread of invasive exotic plants in the project area. Monitoring of rangeland by the Forest Service and the permittee will lead to early identification of invasive exotic plant populations.

Economics

Affected Environment

Livestock grazing can impact local and regional economies, government receipts and expenses, and permittee income. It is therefore Forest Service policy to consider the economic efficiency and impacts of proposed actions (Forest Service Manual 1970.3). In keeping with the scope of the proposed action, the economic efficiency and impacts considered in the analysis were limited to the Crittenden, Kunde, Papago and Seibold Allotments. Participants in the proposal (used to calculate costs and benefits) include:

- The permittees, who contribute funds for the construction of range improvements, pay grazing fees and receive economic returns on their investments in livestock grazing;
- The USDA-Forest Service, which collects grazing fees and expends grazing receipts and appropriated tax dollars to construct range and watershed improvements, and to administer the livestock allotments; and
- Santa Cruz County, which receives 25% of the grazing fees collected by the Federal Government.

Environmental Effects

Tables 10 through 14 summarize the improvement costs associated with each alternative. Costs are based on data provided by District personnel (Bill Edwards, personal communication, March 2001). Tables 15 and 16 show the economic differences between alternatives based on the permitted numbers identified in each alternative, and constitute a relative comparison of economic efficiency. It is based on Present Net Value, which is the Forest Service's preferred method for assessing efficiency. Changes in discount rates may cause economic efficiency to depart from estimates. Hence, two tables using different discount rates are presented to indicate the degree of sensitivity of the analysis to changes in discount rates. The costs considered include the costs of proposed range improvements, grazing fees and ranch expenses. Federal funds for the construction of range improvements are limited. Therefore, the permittees have been informed that they will likely bear all improvement costs (W. Edwards, District Range Specialist, personal

communication, March 14, 2001). The permittee on the Seibold and Crittenden allotments has applied for and received a Water Protection Fund grant from the Arizona Department of Environmental Quality to defray the costs of improvements that benefit riparian resources. Benefits considered include ranch revenues, grazing receipts and payments to counties. Tables 17 and 18 display economic impacts in the forms of payments to counties and jobs created by grazing the allotments.

Table 10. Cost of Planned Improvements by Alternative, Seibold Allotment

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Construct enclosure in W. Redrock Pasture	N/A	N/A	\$4,000 (\$2,000 USFS; \$2,000 permittee)	\$4,000 (\$2,000 USFS; \$2,000 permittee)	\$4,000 (\$2,000 USFS; \$2,000 permittee)
Establish upland water source near Oak Grove Sprint	N/A	N/A	\$750	\$750	\$750
Total	N/A	N/A	\$4,750 (\$2,000 USFS; \$2,750 permittee)	\$4,750 (\$2,000 USFS; \$2,750 permittee)	\$4,750 (\$2,000 USFS; \$2,750 permittee)

Table 12. Cost of Planned Improvements by Alternative, Crittenden Allotment

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Fence Corral Canyon Spring	N/A	N/A	\$1,000	\$1,000	\$1,000
Build holding pasture in NE Crittenden Pasture	N/A	N/A	\$6,000	\$6,000	\$6,000
Build holding pasture S of Corral Canyon Spring	N/A	N/A	\$6,000	\$6,000	\$6,000
Extend pipeline to provide water NW of Corral Canyon Spring	N/A	N/A	\$1,000	\$1,000	\$1,000
Extend pipeline to provide water to SE Red Bear Pasture	N/A	N/A	\$3,500	\$3,500	\$3,500
Fence Red Bear Tank	N/A	N/A	\$1,000	\$1,000	\$1,000

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Fence Gasline Tank	N/A	N/A	\$1,000	\$1,000	\$1,000
Fence main Crittenden Pipeline storage	N/A	N/A	\$1,000	\$1,000	\$1,000
Total (all costs will be borne by the permittee)	N/A	N/A	\$20,500	\$20,500	\$20,500

Table 13. Cost of Planned Improvements by Alternative, Kunde Allotment

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt.2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Extend pipeline to provide water to SE Bear Pasture	N/A	N/A	Included in Crittenden Allotment	Included in Crittenden Allotment	Included in Crittenden Allotment
Establish upland water source in Red Rock Pasture	N/A	N/A	\$5,500	\$5,500	\$5,500
Construct exclosure fence in Redrock Pasture	N/A	N/A	N/A	\$4,000	N/A
Total (all costs will be borne by the permittee)	N/A	N/A	\$5,500	\$9,500	\$5,500

Table 14. Cost of Planned Improvements by Alternative, Papago Allotment

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Reconstruct Middle/North Pasture division fence	N/A	N/A	\$6,000	\$6,000	N/A
Construct Maloney/Falda Pasture division fence	N/A	N/A	\$2,000	\$2,000	N/A
Construct pipeline from Middle to Papago Pastures	N/A	N/a	\$3,000	\$3,000	N/A
Construct Cave Well/Rincon Pasture pipeline	N/A	N/A	\$750	\$750	N/A

Improvement Description	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Clean sediment from Double Tanks	N/A	N/A	\$2,000	\$2,000	N/A
Extend pipeline in West Mountain Pasture	N/A	N/A	\$1,000	\$1,000	N/A
Extend pipeline into Roundup Pasture and install trough	N/A	N/A	\$1,000	\$1,000	N/A
Extend pipeline in Lampshire Pasture	N/A	N/A	\$1,500	\$1,500	N/A
Construct pipeline into Pinto pasture	N/A	N/A	\$1,500	\$1,500	N/A
Construct pipeline from East Pasture to troughs at 83/E. Cemetery division fence	N/A	N/A	\$6,500	\$6,500	N/A
Remove trap in North Pasture	N/A	N/A	\$500	\$500	N/A
Total (all costs will be borne by the permittee)	N/A	N/A	\$25,750	\$25,750	N/A

Table 15. Present Net Values by Partner and Alternative; 4 Percent Discount Rate

Partner	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
All	N/A	-\$156,428.27	-\$172,432.79	-\$116,240.16	??
Seibold & Crittenden Permittee	N/A	-\$79,727.68	-\$88,073.89	-\$88,073.89	-\$88,073.89
Kunde Permittee	N/A	-\$19,653.80	-\$29,153.80	-\$18,029.01	-\$88,073.89
Papago Permittee	N/A	-\$148,330.57	-\$118,456.61	-\$55,623.96	??
Santa Cruz County	N/A	\$22,989.99	\$16,433.71	\$12,992.10	??
USDA-FS	N/A	\$68,293.79	\$46,817.79	\$36,594.17	??

Table 16. Present Net Values by Partner and Alternative; 10 Percent Discount Rate

Partner	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
All	N/A	-\$210,416.43	-\$211,062.78	-\$144,363.48	??

Partner	No Action/No Grazing (Alt. 1)	Continue Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Seibold & Crittenden Permittee	N/A	-\$91,265.53	-\$97,476.48	-\$97,476.48	-\$97,476.48
Kunde Permittee	N/A	-\$22,498.01	-\$31,998.01	-\$19,263.29	-\$19,263.29
Papago Permittee	N/A	-\$169,796.34	-\$131,872.71	-\$63,673.63	??
Santa Cruz County	N/A	\$18,421.31	\$13,167.93	\$10,410.25	??
USDA-FS	N/A	\$54,722.14	\$37,116.50	\$28,924.56	??

Table 17. Annual Payments to Counties by Alternative (Year 2001 Dollars)

Allotment	No Action/No Grazing (Alt. 1)	Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Seibold	\$0	\$204	\$208	\$208	\$208
Kunde	\$0	\$216	\$216	\$94	\$94
Crittenden	\$0	\$673	\$504	\$504	\$504
Papago	\$0	\$1632	\$1020	\$612	\$608

Table 18. Number of Jobs Per Alternative

Allotment	No Action/No Grazing (Alt. 1)	Current Management (Alt. 2)	Proposed Action (Alt. 3)	Preferred Alternative (Alt. 4)	No New Improvements, Papago Allotment (Alt. 5)
Seibold	0	0.6	0.6	0.6	0.6
Kunde	0	0.6	0.6	0.3	0.3
Crittenden	0	1.9	1.4	1.4	1.4
Papago	0	4.6	2.9	1.7	??

The No Action/No Grazing Alternative (Alternative 1) by definition does not generate the costs or benefits analyzed for the action alternatives, and hence measures such as Present Net Value, Benefit/Cost Ratio and internal rate of return are not applicable.

For all partners combined, and both 4% and 10% discount rates, all action alternatives have a negative Present Net Value. This is a reflection of the cost of improvements and average long-term losses per Animal Unit Year among Arizona commercial livestock operations. Alternative 2 has the lowest loss, since it does not include any range improvements. Alternative 3 incurs the lowest PNV, because it includes range improvement costs and proposes the highest number of permitted livestock. Alternatives 4 and 5 have intermediate PNVs.

For all action alternatives, Santa Cruz County displays a positive PNV, as it receives a portion of the grazing fees but does not incur any measured costs related to the permit. While the Forest Service also displays a positive PNV for the action alternatives, the

actual value will be less than displayed, because of recurring administration and maintenance costs for which data were lacking.

The negative Present Net Value associated with the action alternatives is based primarily on data showing an economic loss per Animal Unit Year for Arizona livestock operations, averaged over the years 1980 to 1993. How and why do ranches remain viable and ranchers remain in the business? Answers to the “how” question lie partly in the difficulties involved with applying statewide or regional average data to specific allotments. For example, hired labor, taxes, insurance and interest are costs considered among the expenses, and these costs for these permittees may be lower than the Arizona averages. Outside income is also important, as on average Arizona ranches derive about half of their income from outside (non-ranching) sources. The permittees have not indicated that the action alternatives are not economically viable. However, economies of scale are important to the overall costs and returns of ranching operations, and alternatives providing for less than approximately 100 CYL are likely to lose money.

Selection of the No Action/No Grazing alternative would likely result in sale of the ranches. Loss of the permits would require either substantial reduction of the herds or acquiring alternative forage. There are not sufficient local alternative sources of forage to support the overall cattle operations (personal communication, Bill Edwards, Sierra Ranger District Range/Watershed Staff; February 9, 2001). Reductions in herd numbers may eliminate economies of scale that allow returns to exceed costs.

Domestic livestock grazing contributes to the economy of local communities and counties. Individual allotments provide incremental contributions to the economy, and changes in several allotments may have cumulative impacts. The analysis (Tables 17 and 18) does not suggest that there will be significant cumulative economic impacts to local communities and counties from adoption of any of the alternatives considered, and other reasonably foreseeable actions. Jobs attributable to the allotments are a small part of the labor force in Santa Cruz County, which had a civilian labor force of 13,628 in 1998. In 1999, the Forest Service payment to Santa Cruz County was \$46,500.

Other Environmental Components _____

Soil

General

Livestock grazing for 10 years may impact soil function by compacting the soil surface (hydrologic function), removing plant material (stability), or changing the plant community composition (nutrient cycling). These effects are reflected in an evaluation of soil quality. (The term “soil quality” used here is interchangeable with the term “soil condition”.) Research has shown that grazing at even light to moderate levels can increase soil bulk density, reduce water infiltration, increase overland flow and increase erosion when compared with grazing exclusion, although these effects may be small and can be mitigated by natural processes.

Affected Environment

The assessment of soil quality for the project area is based on site specific surveys completed in 1999, following the methods outlined in FSM 2309.18 Soil Management, R-3 Supplement No. 2509.18-99-1. Information about slope, vegetation community and rangeland condition was also used as a basis for ratings. Ratings reported here are for areas of the allotments that are capable for grazing. Soils in non-capable areas are rated as satisfactory by definition, because they are minimally affected by management activity, including grazing. For this reason, soil quality in non-capable areas is predicted to remain static for all alternatives over the life of the project (10 years).

Tables 19 through 22 below display the existing and anticipated soil quality for the capable acres. Empty rows are not included in the tables. Each table includes a brief discussion of the causes for observed soil impairment.

Table 19. Soil Quality, Seibold Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
SATISFACTORY	22%	61%	42%	56%	56%	56%
IMPAIRED	78%	39%	58%	44%	44%	44%

Soil impairment on the Seibold allotment was attributed mostly to factors related to sparse vegetation and some evidence of soil movement. Areas of soil impairment are mostly in flatter sites that were historically overused.

Table 20. Soil Quality, Crittenden Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
SATISFACTORY	71%	100%	80%	90%	90%	90%
IMPAIRED	29%	0%	20%	10%	10%	10%

Areas of soil impairment are mostly in sites that were historically overused.

Table 21. Soil Quality, Kunde Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
SATISFACTORY	63%	83%	73%	78%	79%	78%
IMPAIRED	37%	17%	27%	22%	21%	22%

Areas of soil impairment are mostly in flatter sites that were historically overused.

Table 22. Soil Quality, Papago Allotment, Percent of Acres Capable for Grazing

Condition Class	Existing Condition	Alternative 1 (No Action/No Grazing)	Alternative 2 (Continue Current Management)	Alternative 3 (Proposed Action)	Alternative 4 (Preferred Alternative)	Alternative 5 (No New Improvements, Papago Allotment)
SATISFACTORY	49%	73%	49%	61%	61%	61%
IMPAIRED	48%	26%	48%	38%	38%	38%
UNSATISFACTORY	3%	1%	3%	1%	1%	1%

The unsatisfactory rating reflects heavy livestock impacts, caused by an historic lack of adequate livestock management and control, compounded by OHV use. Soil impairment was attributed to factors related to soil structure (compaction) sparse vegetation and some evidence of soil movement. The areas of soil impairment are mostly in flatter areas that were historically overused.

Environmental Effects

Because of similarities in soil conditions and projected effects across the analysis area, environmental effects are discussed below for the four allotments combined. Site-specific effects are identified where possible.

Alternative 1 (No Action/No Grazing) will lead to improved soil quality at a faster rate than the action alternatives in some areas: cattle bed grounds, around water sources, and to a lesser extent in areas that are from 0-15% slope. At the end of the analysis period (10 years) the difference in soil quality between Alternative 1 and Alternatives 3-5 will be slight at slopes greater than 15 percent.

Alternative 2 (Current Management) will result in less improvement on the Seibold allotment because the length of time cattle are on the allotment is significantly greater (yearlong versus 4½ months), increasing the chance that flatter areas will be overused. On the Crittenden allotment, Alternative 2 will result in less improvement than the other alternatives because there is less opportunity for pasture rest, and a critical water source in Red Bear Pasture would not be developed. Similarly, Alternative 2 will result in less improvement on the Kunde allotment because waters would not be developed to improve livestock distribution. On the Papago allotment Alternative 2 will not result in improvement because of the high stocking rate, and lack of predictable upland water sources, increasing the chance that flatter areas will be overused.

Alternative 3 (Proposed Action) will result in more improvement than Alternative 2 (Current Management) because upland water sources will be developed. These water sources will help mitigate grazing impacts in flat areas throughout the allotments. At the end of the analysis period (10 years) the difference in soil quality between Alternative 1 and Alternatives 3-5 will be slight at slopes greater than 15 percent.

Alternative 4 will result in effects similar to Alternative 3 as a result of more even livestock distribution projected through the development of additional waters and greater pasture rest in some areas. Under this alternative the Redrock pasture on the Kunde allotment would not be grazed. However, the difference in projected soil quality between this alternative and alternative 3 is projected to be slight because the main area of soil impairment is outside the Redrock Pasture.

Alternative 5 is projected to result in effects similar to Alternative 3 on the Seibold, Crittenden and Kunde allotments. On the Papago allotment, Alternative 5 would reduce the permitted numbers significantly, but would not provide for construction of new water sources.

In terms of cumulative effects related to planned projects in the area, improvement will be more dramatic than depicted in Tables 19-22 if prescribed fire is used. The Project area has several trails and roads. In some areas, vehicle use on and off roads is causing damage. Cattle use on these roads and trails under Alternatives 2, 3 and 4 will not lead to adverse cumulative effects. The area as a whole gets significant use from participants in illegal activities (smuggling). Historic grazing impacts are evident, however conditions are improving and are projected to continue to improve under all alternatives.

Air

Affected Environment

The project area is not located in an air quality non-attainment area for any air quality constituent. This means that air quality is excellent. The project is not located in a Class I Wilderness Area.

Environmental Effects

There will be no measurable effects to air quality under any of the alternatives considered in this assessment. Because there are no measurable effects, there will be no cumulative effects to air quality as a result of any of the alternatives considered here.

Water

Water Quality

Livestock use is identified as a source of concern for water contamination in Arizona where appropriate management of cattle is lacking. Implementation of Best Management Practices (BMPs) will be effective in managing cattle grazing to maintain or improve water quality. Appropriate BMPs have been implemented on all four allotments.

Middle San Pedro Watershed

Affected Environment

Part of the Papago Allotment is within the Middle San Pedro 5th Code Watershed (HUC 1505000251). This watershed is 795,000 acres in size, of which 97,000 acres (12 percent) are National Forest. There are 7,958 project area acres in the watershed (or 1 percent). The City of Sierra Vista and numerous small towns are within this watershed. Uses on private land are those associated with agriculture and rural and urban development. Uses on Federal and State lands are primarily grazing and recreation.

Environmental Effects

No tests have been made within the project area to determine water quality parameters that may be affected by grazing. However, the drainages in the analysis area contribute to the Babocomari River, which was reported in the 2000 Arizona Department of Environmental Quality 305(b) Report to be fully supporting of all uses. This means that

the project area is contributing to a high quality system. Because the action alternatives will either maintain, further mitigate or remove grazing impacts, there will be no detrimental effect to water quality. Because there are no detrimental effects, there will be no adverse cumulative effects to water quality as a result of any of the alternatives considered here.

Cienega Creek Watershed

Affected Environment

Part of the Papago Allotment is within the Cienega Creek 5th Code Watershed (HUC 1505030259). This watershed is 304,000 acres in size, of which 73,500 acres (24 percent) are National Forest. There are 2,856 project area acres in the watershed (or 1 percent). Part of the town of Sonoita is within this watershed. Land uses on private land are those associated with agriculture and rural development. Uses on Federal and State lands are primarily grazing and recreation.

Environmental Effects

The reach of Cienega Creek that lies partially within the project area was reported in the 2000 ADEQ 305(b) Report to be fully supporting of all uses. This means that the project area is contributing to a high quality system. Because the action alternatives will either maintain, further mitigate or remove grazing impacts, there will be no detrimental effect to water quality. Because there are no detrimental effects, there will be no adverse cumulative effects to water quality as a result of any of the alternatives considered here.

Sonoita Creek Watershed

Affected Environment

The Seibold, Crittenden and Kunde Allotments and part of the Papago Allotment are within the Sonoita Creek 5th Code Watershed (HUC 1505030156). This watershed is 170,000 acres in size, of which 107,000 acres (63 percent) are National Forest. There are 20,288 project area acres in the watershed (or 12 percent). The town of Patagonia and part of the town of Sonoita are within this watershed. Land uses of private land are those associated with agriculture and rural development. Uses on Federal and State lands are primarily grazing and recreation.

Environmental Effects

The reach of Redrock Creek that lies partially within the project area was reported in the 2000 ADEQ 305(b) Report to be fully supporting of all uses. Corral Canyon and other un-named drainages are tributary to Sonoita Creek. Three reaches of Sonoita Creek were evaluated by ADEQ. One was found to be partially supporting, with one sample out of six exceeding lead standards. The source of the lead is attributed to mining activity. The other two reaches were reported to be fully supporting of all uses. This means that the project area is contributing to a high quality system. Because the action alternatives will maintain, further mitigate or remove grazing impacts, there will be no detrimental effect to water quality. Because there are no detrimental effects, there will be no adverse cumulative effects to water quality as a result of any of the alternatives considered here.

Water Use

The amount of water used for grazing operations in Redrock Canyon was examined as part of the Terms and Conditions of the Biological Opinion for On-Going Grazing for the Coronado National Forest (Doc. 103) because of concern for the Gila topminnow. A Redrock Creek Water Balance was developed (Doc 60).

Affected Environment, Redrock Creek

The Redrock Creek watershed has three main sources of water: surface flow, base flow and groundwater. Water sources for grazing operations (stock pond storage, spring developments, wells) were evaluated for effects to base flow, which is critical to the survival of the Gila topminnow.

Environmental Effects

Average surface flow was determined to be about 990 acre-feet/year. Maximum storage in stock ponds is 24.53 acre-feet, less than 2 percent of total surface water yield. Diversion from surface springs into storage tanks or troughs is potentially 4.7 acre-feet/year, or less than 1 percent of water produced annually. Wells tap into groundwater, which does not contribute to base flow. The water developments in the action alternatives are not dependent on base flow, and will not intercept significant amounts of overland flow that may contribute to base flow (Doc. 60).

Heritage Resources

Affected Environment

Heritage resources (also called “cultural resources”) include archaeological and historical sites, and properties important to maintaining the traditional beliefs and lifeways of local social groups (“traditional cultural properties”). The Huachuca Management Area (EMA) has a long history. Remains of the prehistoric Archaic and Hohokam cultures have been found within the EMA, with indications that inhabitants of the San Rafael Valley maintained contacts with populations in the Tucson Basin to the north, and the Trincheras and Casas Grandes areas to the southwest and southeast. Pithouse villages, temporary campsites and petroglyph sites have been recorded in the Patagonia Mountains, Canelo Hills and Huachuca Mountains. Ceramics found on these sites include a variety of poorly known types from surrounding areas, and document the extent of prehistoric contacts with those areas. The Forest Service conducted test excavations at an Archaic site in the Canelo Hills northeast of the allotments in 1984. The site appeared to represent a camp where animals were butchered and seeds and berries ground.

Historically, the EMA was within Sobaipuri territory, and was visited by Chiricahua and Western Apache. Although there has been some mining in the EMA, the principal economic activity was stock raising. Today, archaeological and historical sites in the area are of interest to the Hopi Tribe, Pueblo of Zuni, Western Apache (primarily San Carlos Apache and White Mountain Apache), Chiricahua Apache (Fort Sill Chiricahua and Mescalero Apache), Tohono O’odham, and the descendants of nineteenth-century settlers.

Environmental Effects

Concentration of livestock on archaeological and historical sites can result in damage to artifacts and structures, and alteration of the spatial relationships between artifacts. The latter impact can compromise the ability of the remains to provide historical information. Concentration of livestock generally occurs around range improvements. Construction of those improvements can itself damage artifacts or structures, and alter spatial relationships between artifacts. Proposed improvements have been surveyed and no archaeological or historical sites were found. A report with a determination of “no effect” has been submitted to the Arizona State Historic Preservation Office for comment, and would cover the improvements included in Alternatives 3, 4 and 5.

The Elder’s Cultural Advisory Council of the San Carlos Apache Tribe commented that “The general area where these allotments are located is a very important one to some Apache groups. We ask you be respectful to this country, and make your plans accordingly” (Doc. 20). The concerns in the Council comment can be addressed by noting that all action alternatives provide for improved soil, vegetation and riparian area conditions; and both the proposed action and preferred alternative provide a greater rate of improvement than current management. The “no action” alternative would provide the greatest rate of improvement.

The Cultural Preservation Office of the Hopi Tribe commented that livestock grazing can cause adverse impacts on archaeological sites and native plants such as tobacco, and asked whether the allotments would be surveyed, and how the allotments would be managed to avoid impacts to the sites (Doc. 25). The letter also inquired how the allotments would be managed to avoid impacts to native plants, such as tobacco. The Tribe also pointed out the need for intensive traditional cultural property studies and ethnohistorical research, in order to fully identify Hopi interests and needs. Survey and grazing impacts on archaeological sites are discussed in the preceding paragraph. Since there are no plant inventories for the allotments, there are insufficient data to arrive at a definitive statement of impacts on ethnobotanical plants (Mima Falk, personal communication, 1999). However, allotments will be managed to maintain or increase acres of upland vegetation in satisfactory condition (see “Range Condition,” above), which should also minimize changes in existing native plant populations. While it might be expected that No Action/No Grazing (Alternative 1) would be more beneficial to the growth of plants of interest to the Hopi, this is not always the case. For example, tobacco is a disturbance species on local rangelands (Mima Falk, personal communication, 1999; Josh Taiz, personal communication, 1999), and would be favored by grazing levels that could be detrimental to other native plants. With regard to ethnohistorical research, the Forest has negotiated a Memorandum of Understanding with the Hopi Tribe that, among its provisions, recognizes the need for financial support of research on traditional use issues.

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- Laura Dupee, Range Staff, Sierra Vista R.D.
- Josh Taiz, Biologist, Coronado N.F.
- Denis Humphrey, Range Technician, Sierra Vista R.D.

CONSULTATION AND COORDINATION

The proposed action was presented to 199 potentially interested parties in the form of a Scoping Report (February 22, 1999; Docs. 18-20). Upon receipt of the Scoping Report, several parties expressed interest in a field trip to the project area. The District hosted two separate field trips to visit the project area (Docs. 40, 42-45). Additional meetings were held on January 5, 2001 (Doc. 59), May 15, 2001 (Doc. 76) and May 23 (Doc. 77) between the District Ranger, the Interdisciplinary Team (IDT), other Forest Service specialists, and representatives from the US Fish and Wildlife Service (USFWS, January 5 and May 15) and the Arizona Game and Fish Department (January 5 only). A meeting between the District Ranger, the ID team and permittees or their representatives took place on March 14, 2001. A Heritage Resource Report (Doc. 75) was provided to the State Historic Preservation Officer and interested American Indian tribes.

APPENDIX 1.

Special status species that occur or could occur on the Seibold, Kunde, Crittenden and Papago Allotments.

Scientific Name	Common Name	Status
<i>Ambystoma tigrinum stebbinsi</i>	Salamander, Sonora Tiger	USFWS Endangered
<i>Haliaeetus leucocephalus</i>	Eagle, Bald	USFWS Threatened
<i>Strix occidentalis lucida</i>	Owl, Mexican Spotted	USFWS Threatened
<i>Poeciliopsis occidentalis occidentalis</i>	Topminnow, Gila	USFWS Endangered
<i>Canis lupus baileyi</i>	Wolf, Mexican Gray	USFWS Endangered
<i>Felis pardalis</i>	Ocelot	USFWS Endangered
<i>Felis yagouraroundsi tolteca</i>	Jaguarundi	USFWS Endangered
<i>Leptonycteris curasoae yerbabuena</i>	Bat, Lesser Long-Nosed	USFWS Endangered
<i>Panthera onca</i>	Jaguar	USFWS Endangered
<i>Lilaeopsis schaffneriana ssp. Recurva</i>	Umbel, Huachuca Water	USFWS Endangered, Designated Critical Habitat
<i>Spiranthes delitescens</i>	Ladies' Tresses, Canelo Hills	USFWS Endangered
<i>Rana chiricahuensis</i>	Frog, Chiricahua Leopard	USFWS Proposed Threatened
<i>Eleutherodactylus augusti cactorum</i>	Frog, Western Barking	Forest Service Sensitive
<i>Accipter gentilis apache</i>	Goshawk, Apache	Forest Service Sensitive
<i>Asturina nitida maxima</i>	Hawk, Northern Gray	Forest Service Sensitive
<i>Buteogallus anthracinus</i>	Black-Hawk, Common	Forest Service Sensitive
<i>Coccyzus americanus occidentalis</i>	Cuckoo, Western Yellow-Billed	Forest Service Sensitive
<i>Meleagris gallopavo mexicana</i>	Turkey, Gould's	Forest Service Sensitive
<i>Passerculus sandwichensis rufofuscus</i>	Sparrow, Chihuahua Savannah	Forest Service Sensitive
<i>Catostomus clarki</i>	Sucker, Desert	Forest Service Sensitive
<i>Catostomus insignis</i>	Sucker, Sonora	Forest Service Sensitive
<i>Gila inermis</i>	Chub, Gila	Forest Service Sensitive
<i>Agathymus aryxna</i>	Skipper, Aryxna Giant	Forest Service Sensitive
<i>Agathymus evansii</i>	Skipper, Brigadier	Forest Service Sensitive
<i>Agathymus polingi</i>	Skipper, Poling's Giant	Forest Service Sensitive
<i>Anthocharis pima (A. cethura pima)</i>	Orange Tip, Pima	Forest Service Sensitive
<i>Apodemia phyciodoides</i>	Metalmark, Crescent	Forest Service Sensitive
<i>Calephelis arizonensis</i>	Metalmark, Arizona	Forest Service Sensitive
<i>Limenitis archippus obsoleta</i>	Butterfly, Obsolete Viceroy	Forest Service Sensitive
<i>Megathymus ursus</i>	Skipper, Ursine Giant	Forest Service Sensitive
<i>Piruna polingii</i>	Skipperling, Spotted	Forest Service Sensitive
<i>Sympetrum signiferum</i>	Meadowfly, Mexican	Forest Service Sensitive
<i>Pyrgulopsis thompsoni</i>	Springsnail, Huachuca	Forest Service Sensitive
<i>Sorex arizonae</i>	Shrew, Arizona	Forest Service Sensitive
<i>Thomomys umbrinus intermedius</i>	Gopher, Huachuca Mountains Pocket	Forest Service Sensitive
<i>Crotalus willardi willardi</i>	Rattlesnake, Arizona Ridgenosed	Forest Service Sensitive
<i>Thamnophis eques megalops</i>	Snake, Mexican Garter	Forest Service Sensitive
<i>Agave parviflora ssp. Parviflora</i>	Agave, Santa Cruz	Forest Service Sensitive
<i>Ammoreuxia gonzalizi</i>	Saiya	Forest Service Sensitive
<i>Amsonia grandiflora</i>	Star, Large-Flowered Blue	Forest Service Sensitive
<i>Asclepias lemmonii</i>	Milkweed, Lemmon	Forest Service Sensitive

Scientific Name	Common Name	Status
<i>Asclepias uncialis</i>	Milkweed, Greene	Forest Service Sensitive
<i>Astragalus hypoxylus</i>	Vetch, Huachuca Milk	Forest Service Sensitive
<i>Browalia eludens</i>		Forest Service Sensitive
<i>Capsicum annuum</i>	Chiltepin	Forest Service Sensitive
<i>Carex chihuahuensis</i>	A Sedge	Forest Service Sensitive
<i>Carex ultra</i>	A Sedge	Forest Service Sensitive
<i>Coryphantha recurvata</i>	Cactus, Santa Cruz Beehive	Forest Service Sensitive
<i>Coursetia glabella</i>		Forest Service Sensitive
<i>Erigeron arsolius</i>		Forest Service Sensitive
<i>Graptopetalum bartramii</i>	Stonecrop, Bartram's	Forest Service Sensitive
<i>Hedoma dentatum</i>	Pennyroyal, Mock	Forest Service Sensitive
<i>Heterotheca rutteri</i>	Aster, Huachuca Golder	Forest Service Sensitive
<i>Heuchera glomerulata</i>	Alum Root, Arizona	Forest Service Sensitive
<i>Hexalectris revoluta</i>		Forest Service Sensitive
<i>Hexalectris warnockii</i>	Spike, Texas Purple	Forest Service Sensitive
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i>	Morning Glory, Huachuca	Forest Service Sensitive
<i>Ipomoea tenuiloba</i> var. <i>lemmonii</i>	Morning Glory, Lemmon's	Forest Service Sensitive
<i>Ipomoea thurberi</i>	Morning Glory, Thurber's	Forest Service Sensitive
<i>Laennecia eriophylla</i>	Fleabane, Woolly	Forest Service Sensitive
<i>Macroptilium supinum</i>	Bean, Supine	Forest Service Sensitive
<i>Marina diffusa</i>	Escoba	Forest Service Sensitive
<i>Metastelma mexicanum</i>	Vine, Wiggins Milkweed	Forest Service Sensitive
<i>Muhlenbergia dubioides</i>	Box Canyon Muhly	Forest Service Sensitive
<i>Pectis imberbis</i>	Chinch Weed, Beardless	Forest Service Sensitive
<i>Penstemon superbus</i>	Beardtongue, Superb	Forest Service Sensitive
<i>Samolus vagans</i>	Chiricahua brookweed	Forest Service Sensitive
<i>Sisyrinchium cernuum</i>	Blue-eyed Grass, Nodding	Forest Service Sensitive
<i>Solanum lumholtzianum</i>	Nightshade, Lumholtz	Forest Service Sensitive
<i>Stevia lemmonii</i>	Stevia, Lemmon's	Forest Service Sensitive
<i>Talinum humile</i>	Flame Flower, Pinos Altos	Forest Service Sensitive
<i>Talinum marginatum</i>	Flame Flower, Tepic	Forest Service Sensitive
<i>Tephrosia thurberi</i>	Pea, Thurber Hoary	Forest Service Sensitive
<i>Tragia laciniata</i>	Noseburn, Sonora	Forest Service Sensitive

APPENDIX 2, GLOSSARY

Animal Month: A month's tenure on the range by one animal. With a cow/calf operation, one cow/calf pair equals one animal month, as the un-weaned calves do not directly consume range resources.

Best Management Practices (BMPs): Practices determined by the Arizona Department of Environmental Quality to be the most effective and practicable means of preventing or reducing pollution generated by non-point sources to a level compatible with water quality goals. In the case of grazing, these include preparation of annual operating plans, monitoring, techniques to achieve proper distribution, and other practices.

Grazing Capability: A qualitative expression of the ability of a land area to support grazing on a sustained-yield basis, and the optimum use of that land area by grazing cattle. In the project area, slopes above 40% are not capable for grazing and have no capacity assigned, even though light livestock use may occur in these areas.

Grazing Suitability: A determination of whether livestock grazing is an appropriate use of capable rangeland, made during the Forest planning process and not during project-level analysis.

Rangeland Condition: Rangeland condition is a subjective expression of the status or health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are determined through analysis of composition, density and vigor of the vegetation and physical characteristics of the soil.

Riparian Condition: - The following standards must be met in order for the area to be rated as satisfactory:

80% of natural bank protection is present

80% of natural shade over water is present in fish-bearing streams

60% or more of the woody stems are in three or more riparian tree species

At least three age classes of riparian woody plants are present, with at least 10% of the woody plant cover in sprouts, seedlings, and saplings of riparian species

60% of natural shrub and tree crown cover is present

Soil Condition: An evaluation of soil quality based on an interpretation of factors that affect vital soil functions. Ecological land units are assigned a soil condition category that is an indication of the status of soil functions. Soil condition categories reflect soil disturbances resulting from both planned and unplanned events. Following is a brief description of each soil condition category:

a. *Satisfactory* - Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of soil to maintain resource values and sustain outputs is high.

b. *Impaired* - Indicators signify a reduction of soil function. The ability of soil to function properly has been reduced and/or there exists an increased vulnerability to degradation.

c. *Unsatisfactory* - Indicators signify that loss of soil function has occurred. Degradation of vital soil functions result in the inability of soil to maintain resource values, sustain outputs, and recover from impacts.

Soil Quality: The capacity of the soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

Stream Condition (Proper Functioning Condition):

a. *Functional:* riparian-wetland areas where there is adequate vegetation, landform, or large woody debris to:

Dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality;

Filter sediment, capture bedload, and aid floodplain development;

Improve flood-water retention and ground-water recharge;

Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses;

Support greater biodiversity.

b. *Functional-at risk:* riparian-wetland areas that are in functional condition but an existing soil, water or vegetation attribute makes them susceptible to degradation.

c. *Nonfunctional:* - riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to meet the criteria listed for functional.

Water Quality Limited: A water body that does not maintain surface water quality standards for its designated uses, and neither existing technology nor permit controls is sufficient to maintain water quality standards. In the case of water bodies within the project area, designated uses include aquatic and wildlife, partial body contact (non-swimming recreation), and agricultural livestock watering.

MAP 1. PROJECT AREA LOCATION



