



United States
Department of
Agriculture

Forest
Service

December 2005



Environmental Assessment

Farrell, Harshaw, Lewis, McFarland and Weiland Range Allotment Analysis

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

Township 22 South, Range 15 East, Sections 25 and 36
Township 22 South, Range 16 East, Sections 3, 10-36
Township 22 South, Range 17 East, Sections 18, 19, 30, 31
Township 23 South, Range 15 East, Sections 1 and 12
Township 23 south, Range 16 East, Sections 1-12, 15, 16

For Information Contact: Richard A. Gerhart
Coronado National Forest
300 West Congress
Tucson, AZ 85701
520-388-8374

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Table of Contents

Chapter 1 – Purpose and Need	1
Background.....	1
Purpose and Need for Action.....	1
Existing Conditions	1
Management Direction.....	2
Range Suitability and Capability	4
Proposed Action.....	4
Decision Framework.....	4
Public Involvement.....	4
Issues	5
Chapter 2 - Alternatives, Including the Proposed Action.....	6
Alternatives Eliminated From Detailed Study.....	6
Alternatives Considered in Detail.....	6
Alternative 1	6
Alternative 2	6
Alternative 3	7
Adaptive Management.....	10
Comparison of Alternatives.....	11
Chapter 3. Environmental Consequences.....	12
Actions Considered for Cumulative Effects	12
Wildlife.....	13
Soil and Watershed Condition	22
Upland Vegetation	25
Riparian Condition.....	27
Other Environmental Components	29
Air.....	29
Water Quantity and Quality	29
Wild and Scenic Rivers	32
Heritage Resources.....	32
Economics	33
Environmental Justice	35
4. Consultation and Coordination.....	36
Appendix 1. Glossary of Terms	37
Appendix 2 – Maps	41

CHAPTER 1 – PURPOSE AND NEED

Background

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 (EA) discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. Supporting documentation, including more detailed analyses of project area resources, is on file in the project planning record in the Coronado National Forest Supervisor's Office in Tucson, Arizona. Throughout this EA, references to supporting documentation are shown in parentheses. For example, a reference "(PR# 21)" would indicate that a specific passage in the EA is linked to information contained in document No. 21 in the project record.

Purpose and Need for Action

The Farrell, Harshaw, Lewis, McFarland and Weiland Allotments encompass lands identified as suitable for domestic livestock grazing in the Coronado National Forest Land and Resource Management Plan (LMP). Where consistent with the goals, objectives, standards and guidelines of LMPs, it is Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators (*FSM 2202.1, FSM 2203.1, 36 CFR 22.2(C), Multiple Use and Sustained Yield act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974*).

The purpose of the proposed action is to authorize livestock grazing consistent with Forest Service policy in a manner that maintains or improves project area resource conditions and achieves the objectives and desired conditions described in the Coronado National Forest LMP. This authorization is needed here and now because:

- The allotments currently lack sufficient environmental analysis to comply with the Rescission Act (*P.L. 104-19, 1995*).
- There is a need for change from current management on some of the allotments in order to move toward desired conditions. Specifically:
 - Poor livestock distribution contributes to overuse of forage in some areas. Additional waters and fences are needed to improve distribution.
 - Permitted use on some allotments exceeds what is considered sustainable. LMP direction to balance permitted use with capacity is not being met.

Existing Conditions

Location and Setting. The five allotments are located in the northern end of the Patagonia Mountains southeast of the town of Patagonia in portions of Townships 22 and 23 South, Ranges 15, 16 and 17 East, G&SRM (Figures 1 and 2). The five allotments share common boundaries and combined encompass approximately 21,144 acres, of

which 16,135 are considered capable for grazing¹. Elevations range from 4,200 feet to over 6,300 feet near Red Mountain. Topography ranges from steep peaks to broad alluvial valleys. The majority of capable rangelands are found on gentler hills and valleys at elevations under 5,500 feet. Broadleaf evergreen woodland is the dominant vegetation type in the project area (Figure 3). Stands of chaparral vegetation occur on ridges in the eastern portion of the analysis area and at upper elevations on Red Mountain. Open valleys in the eastern portion of the Farrell allotment support plains grassland communities. At lower elevations near Patagonia, the woodlands grade into desert grassland. Harshaw Creek runs from south to north generally through the center of the project area. The creek runs seasonally in response to precipitation events, but water persists year round in only a few locations. Vegetation associated with the stream course is a mixture of evergreen riparian and deciduous riparian trees, primarily sycamore (*Platanus wrightii*).

Grazing Management. Information on recent livestock use is summarized in Table 1. All allotments are permitted for grazing year-round under a deferred rotation that provides periodic growing season rest.

Table 1. Allotment information and recent grazing use.

		Farrell	Harshaw	Lewis	McFarland	Weiland
Total Acres		6,429	9,302	2,282	1,042	2,089
Capable Acres		6,303	6,024	1,422	756	1,630
Current Permitted Use (CYL) ²		60 CYL	262 yearlings year long	22 CYL	20 CYL Forest 2CYL Private	32 CYL Forest 5 CYL Private
Recent Actual Use	2000	60 CYL	100 CYL	17 Oct.-June	22 CYL	12 CYL
	2001	60 CYL	77 CYL	18 Oct.-June	22 CYL	13 CYL
	2002	60 (9 mo.)*	102 CYL	19 CYL***	22 CYL	18 CYL
	2003	60 CYL	102 (3 mo.)**	19 CYL	8 CYL****	20 CYL
	2004		25 CYL			

* Cattle removed in June 2002 due to overuse. Rested through growing season (July-September).

**Cattle removed in June 2003 due to overuse. Rested through growing season (July-September).

*** Red Mountain Allotment pastures (approx. 2000 acres) added to Lewis allotment in 2002.

****Numbers reduced in June 2002 due to lack of forage and water.

Management Direction

The Coronado LMP identifies the following goals for the range, wildlife, soil, water and lands programs on the Forest.

Range

- 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.

¹ Capable rangelands are those areas under 40% slope and capable of producing 100 lb. dry forage per acre. Areas considered "not capable" are not used to calculate grazing capacity.

² CYL: cattle year long

- Balance permitted grazing use with grazing capacity.

Wildlife

- Provide habitat for wildlife populations consistent with the goals outlined in the Arizona and New Mexico Department of Game and Fish Comprehensive Plans and consistent with other resource values.
- Provide for ecosystem diversity by at least maintaining viable populations of all native and non-native wildlife, fish and plant species through improved habitat management.
- Improve the habitat of and protection for local populations of Threatened and Endangered species to meet the goals of the Endangered Species Act.

Soil and Water

- Provide a favorable flow of water in quantity and quality for off-forest users by improving or maintaining all watersheds to a satisfactory or higher level.

Lands

- Allow the use of available National Forest lands for appropriate public or private interests consistent with National Forest Policies.

The project proposals and action alternatives were designed to conform to LMP direction, goals, standards and guidelines, which are incorporated by reference.

The allotments fall within LMP management areas 1, 4 and 7 (Figure 4). Management emphasis for these areas is described below.

Management Area (MA) 1 includes steep, rugged lands that are managed for visual resources and semi-primitive dispersed recreation. Slopes are generally in excess of 40% and sites included in this management area are generally considered unsuited and not capable for livestock grazing. Range management standards and guidelines (LMP pp. 47-49) call for no assigned permitted use for livestock. Approximately 19% of the project area (4,050 acres) is identified as MA1.

Management Area 4 comprises a majority of the project area. These lands include a variety of vegetation types on lands under 40% slope. They are generally considered capable and suitable for livestock grazing. Management emphasis is on a "sustained harvest of livestock forage and fuelwood while maintaining or improving game animal habitat". Approximately 72% (15,000+ acres) of the project area is designated as MA4. Standards and guidelines for MA 4 are identified on pages 62-66 of the LMP.

Management Area (MA) 7 includes lands that have been "identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes riparian ecotypes." Management emphasis is to manage these areas to benefit riparian dependant resources. Nine percent (9%) of the project area (approximately 1,900 acres), primarily Harshaw Creek and its tributaries are designated as MA7. Standards and guidelines for MA7 are identified on pages 67-74 of the LMP.

Range Suitability and Capability

Determination of rangeland capability and suitability is a two-step process. The first step (capability) represents the determination of those areas of land that can sustain domestic livestock grazing. Capable rangelands are defined as rangelands under 40% slope and capable of producing 100 pounds per acre of dry forage. The second step (suitability) refers to the appropriateness of livestock grazing in an area when considered with all resource values and management objectives. Suitability is determined on those acres classified as capable, and is a determination made during the Forest planning process. However, analysis at the project level may identify additional areas considered unsuitable for grazing.

The number of capable acres on each allotment is shown in Table 1. In the project area, approximately 5000 acres (24% of the project area) are considered not capable of supporting grazing because of steep slopes. While livestock may occasionally use these areas, no grazing capacity is assigned. Areas comprising approximately 4,000 acres are identified as both unsuited and not capable for grazing in the LMP because they are designated as Management Area 1. At the project level, a portion of Harshaw Creek is considered unsuitable based on riparian resources and has been identified for exclusion under the proposed action.

Proposed Action

The Sierra Vista Ranger District proposes to authorize grazing on and develop allotment management plans for the Farrell, Harshaw, Lewis, McFarland and Weiland allotments. Allotment management will be designed to achieve light to moderate utilization³ and to provide periodic growing season rest or deferment for grazed plant recovery, increases in herbage production and retention of herbaceous litter to protect soils. Range improvements would be constructed to the degree necessary to achieve management objectives and move the project area toward desired condition. Impacts to sensitive resources will be avoided through the development of resource-specific mitigation measures. Implementation and effectiveness of management will be monitored over the life of the project. The proposed action is described in greater detail in Chapter 2.

Decision Framework

The Sierra Vista District Ranger is the official responsible for decisions regarding management of the Farrell, Harshaw, Lewis, McFarland and Weiland Allotments. Based on the results of the NEPA analysis, the Ranger would decide whether the proposed action would proceed as proposed, as modified by an alternative, or not at all. If it proceeds, the Ranger would determine the terms under which grazing would occur.

Public Involvement

The proposal has been listed in the Forest's Schedule of Proposed Actions continuously since September 2003. On April 13, 2004, a Forest interdisciplinary team met to develop proposed actions and to identify preliminary issues, concerns and measures to carry

³ See Chapter 2 for a definition of light to moderate utilization.

forward into the analysis. The proposal was provided to the public and other agencies for comment during scoping on August 2, 2004 (PR# 10). Seven comment letters were received in response to scoping (PR#s 11-18). Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues and concerns to address.

Issues

The Forest Service categorized and sorted comments received into issues and non-issues. Issues are defined as a concern or debate about the effects of the proposal. Issues were further categorized as key issues (significant issues used to develop alternatives to the proposed action) and other issues (concerns that are addressed through mitigation measures or project design). The effects analysis in Chapter 3 is built around the identified issues. Comments not considered issues to analyze in this EA were identified as those that were:

- 1) outside the scope of the proposed action and thus irrelevant to the decision being made;
- 2) already decided by law, regulation, Forest Plan, or other higher level decision;
- 3) conjectural and not supported by scientific or factual evidence.

The Council on Environmental Quality 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)..." An analysis of the issues and scoping responses is included in the Project Record as PR# 18.

Key Issues

No issues were identified that could not be addressed through mitigation or project design modifications.

Other Issues

Other issues and concerns are identified below. Project design features and mitigation measures have been developed to address these other issues.

Wildlife – Continued grazing in the project area could result in adverse effects to wildlife and wildlife habitats, including listed and sensitive species, as a result of modification of habitats and disturbance during critical periods.

Soil and watershed condition – continued grazing in the project area could impair soil condition, damage riparian areas and impair the achievement of Forest standards for riparian areas. Water developments for livestock may affect hydrological function in watersheds and may take water away from wildlife or vegetation.

Upland vegetation – Continued grazing at the utilization levels proposed could lead to resource degradation and keep the Forest from achieving desired conditions for upland vegetation.

CHAPTER 2 - ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the management of the Farrell, Harshaw, Lewis, McFarland and Weiland Allotments. This section presents the alternatives in comparative form, in order to define the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Mitigation and monitoring measures incorporated into the alternatives are also described.

Alternatives Eliminated From Detailed Study

No issues were identified during scoping that could not be addressed through mitigation or project design. Therefore, no additional alternatives were developed. One commenter suggested using permit buyouts or raising grazing fees as an alternative for achieving conservation goals (PR# 17, 18). This alternative was not analyzed because it is beyond the decision authority of the deciding official and would require congressional action to implement.

Alternatives Considered in Detail

Alternative 1

No Action

Forest Service Policy (Forest Service Handbook 2209.13 (92.31)) requires the Forest Service to analyze a *no grazing* alternative. Because the proposed action is to authorize grazing, no action would not authorize grazing. Under this alternative, use of the allotments by domestic livestock would be discontinued. Existing structural improvements would remain in place but would not be maintained. Improvements contributing to resource protection or enhancement, such as water developments important for wildlife, would be maintained where feasible using other program funds. Periodic inspection of structural improvements would be used to determine whether maintenance or removal is needed. Removal or maintenance of improvements would be authorized by a separate decision. Where necessary, maintenance of allotment boundary fences would be reassigned to adjacent permittees with the understanding that livestock are to be kept off of the allotments.

Alternative 2

Continue Current Management

Livestock grazing would continue on all allotments as currently permitted. New permits would be issued for the classes and numbers of livestock currently allowed. New allotment management plans would be developed and authorized use would continue to be controlled through annual operating instructions. Existing fences, water developments and other range improvements would be maintained, but no new infrastructure would be proposed or developed.

Alternative 3

The Proposed Action

The proposed action consists of three components: authorization, mitigation and monitoring. Authorization describes the terms and conditions under which the proposed action would occur and identifies needed improvements; mitigation features are intended to reduce or avoid impacts to resources as a result of project implementation; and monitoring is used to determine whether the proposed action is achieving the desired conditions.

Authorization

Grazing would be authorized on the five allotments under the following terms and conditions.

- **Duration and timing of grazing.** Use on the allotments will be authorized year-round using rotational grazing. Grazing management will be designed to insure that pastures receive periodic growing season rest or deferment in order to provide for grazed plant recovery. The sequence and timing of pasture moves will be based on monitoring of range readiness, ecological condition, and utilization.
- **Frequency and intensity of grazing.** Forage utilization will be managed at a level corresponding to light to moderate intensity⁴ in order to provide for grazed plant recovery, increased herbage production and retention of herbaceous litter to protect soils.

New allotment management plans would be developed for each allotment. The plans would incorporate an adaptive management strategy under which the number of permitted cattle, season of use and pasture rotations could vary from year to year depending on resource conditions and management objectives.

Proposed permitted use (Table 2) is based on knowledge of actual use on the allotments over the past 10 years and the effects of this use on resource conditions. It reflects the estimated annual forage production (AUMs) available for livestock on the allotments considering the duration, timing, frequency and intensity of grazing proposed, and assumes proper livestock distribution as a result of proposed improvements.

Proposed improvements for each allotment are shown in Table 3. Some of these have been slightly modified from what was described in the scoping report. Not all of the projects shown in Table 3 would be implemented immediately; funding constraints may require the projects to be completed over a period of years, or monitoring may indicate that the projects are no longer necessary. In the absence of completed developments to promote proper distribution and/or intensive management, actual use on the allotments would likely be less than the maximums shown in Table 3.

⁴ Based on review of numerous grazing intensity studies, Holechek (1999, 2004) identifies light to moderate grazing as 32-43% average annual use of primary forage species. These averages are based on pasture-wide utilization averaged over time, often under year-round grazing. The Forest Service monitors utilization based on the use of key forage species in key areas. Key areas are selected to be representative of management effectiveness over the entire pasture. A guideline of 45% use of key species in key areas will be used, which should insure pasture-wide *average* use of less than 45%.

Table 2. Proposed Grazing Management

Allotment	Grazing System	Animal Unit Months	Cattle Yearlong (cow/calf)	Change from Current Permit
Farrell	7 pasture deferred rest rotation	950	60	No change in numbers, 1 additional pasture.
Harshaw	3 pasture deferred rotation	824-1220	52-77 (includes private land permit for 2 horses)	Reduced from 262 yearlings (2515 AUM)
Lewis	4 pasture deferred rotation	348	22	No change
McFarland	3 pasture deferred rotation	238-364	15-23 (includes 3 head private land permit)	Change to a range of numbers.
Weiland	6 pasture deferred rotation	443	28 (includes 5 head private land permit)	Reduced from 37 Cattle yearlong (CYL).

Table 3. Proposed Improvements

Allotment	Proposed Improvement	Purpose/Objective
Farrell	One mile of pipeline, one 10,000-gallon storage tank and two troughs in the Best Pasture.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
Farrell	Cross fence Best pasture (1 mile of fence).	Increase pasture rest and management flexibility by creating an additional pasture.
Farrell	Develop upland waters in upper Best and Corral Canyon pastures.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
Harshaw	0.6 mile of pipeline from Corral Canyon well to storage and trough in uplands of Bergier pasture.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
Harshaw	Extend a pipeline from the Weiland Allotment south to the Middle pasture of the Harshaw allotment.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
Harshaw and McFarland	Extend a pipeline from a well on the Weiland allotment to the boundary fence between the Sorrell pasture on McFarland and the Bergier pasture on the Harshaw allotment. Install 2 drinkers.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
McFarland	Extend an existing pipeline on the Weiland allotment into the Harshaw pasture on McFarland.	Improve livestock distribution and reduce use in bottoms by providing upland waters.
McFarland	Construct and enclosure fence on Harshaw creek (Figure 9).	Protect riparian resources by excluding cattle from the creek bed.
Weiland	Increase water storage at East well and extend a pipeline from the well into upland on the Bible pasture.	Improve livestock distribution and reduce use in bottoms by providing upland waters.

Mitigation measures

To mitigate resource impacts, the following measures will be implemented under all action alternatives. These measures have been used on previous projects and are considered to be effective at reducing environmental impacts. They are consistent with

applicable Forest Plan standards and guidelines and the terms and conditions and conservation measures of existing biological opinions. Implementation of the mitigation measures, in combination with project design criteria, should preclude the occurrence of potentially significant environmental impacts.

Soil, Water and Vegetation – the objective is to mitigate effects of livestock grazing management and to assure that management is responsive to changing resource conditions. The objective will be accomplished through the use of Best Management Practices (FSH 2509.22, PR# 30) and adaptive management. Practices include, but are not limited to the following.

- Utilization of key upland herbaceous forage species in key areas will be limited to 45% of current years' growth by weight, which should achieve the goal of light to moderate grazing as a pasture average. The objective is to protect plant vigor, provide herbaceous residue for soil protection and to increase herbage producing ability of forage plants.
- Prepare annual operating plans with permittees that consider current conditions and management goals. Conduct periodic field checks to identify needed management adjustments, including stock counts, range readiness and utilization monitoring. The objective is to assure achievement of management objectives.
- Necessary techniques will be used to achieve proper distribution or lessen the impact on sensitive areas. Practices include herding, salting and controlling access to waters. Salt will be placed on good feed, one quarter to one half mile from waters and salting locations will be moved annually.

Wildlife and Plants – the objective is to mitigate impacts to wildlife and sensitive plants from livestock grazing and from disturbance associated with construction of range facilities.

- All new or reconstructed water developments will include wildlife access and escape ramps.
- All new fencing will be built to LMP standards (LMP, p. 35) to provide for wildlife passage through the fence. At a minimum, this will be a 4-strand fence with smooth bottom wire 16 inches off of the ground and a total height of 42 inches or less.
- All proposed range facilities will be surveyed for threatened, endangered or sensitive species prior to any ground-disturbing activities. Facilities will be designed and constructed to have no adverse effect on listed species.
- Range construction projects will be designed to avoid the destruction of agaves and disturbance of lesser long-nosed bat roosts. If impacts to agaves are unavoidable, the Forest will insure that no more than 1% of agaves within 800 meters of a project are impacted.
- Within areas meeting the definition of high quality Mearns' quail habitat, herbaceous vegetation will be managed to maintain a minimum of 6 inches of herbaceous stubble height, which is generally interpreted as less than 45% utilization of key herbaceous species with desired use targeted at 35-40% (PR# 32). The objective is to provide herbaceous vegetation as cover for quail and other wildlife.

Heritage Resources – the objective is to protect heritage resources (historic and prehistoric sites) from impacts caused by range construction projects or livestock concentration.

- All proposed range facilities will be surveyed for heritage resources prior to any ground-disturbing activities. Facilities will be built or modified to avoid impacts to sites. If unrecorded sites are discovered during the course of project implementation, activities will cease and the forest Archeologist will be notified.
- Range facilities, if needed, will be located so as to avoid concentrations of livestock on identified heritage resource sites.
- No salting will occur within or adjacent to identified heritage sites.

Monitoring

Monitoring will be used to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Annual utilization will be measured on key species in key areas (see Appendix 2 for definition of terms). Key areas have been established and will be identified the Allotment Management Plans for each allotment. Key species will be native perennial grasses that are palatable to livestock. These may include, but are not limited to, plains lovegrass (*Eragrostis intermedia*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*B. hirsuta*), blue grama (*B. gracilis*), Texas bluestem (*Andropogon cirratus*), wolftail (*Lycurus phleoides*), cane beardgrass (*Bothriochloa barbinoides*), green sprangletop (*Leptichloa dubia*) and three awn (*Aristida sp.*).

Utilization will be measured after the growing season; however, grazing intensity will be monitored throughout the grazing period in order to practice adaptive management and make necessary management changes needed for plant development and recovery. The Sierra Vista District Range Staff Officer and the permittees will be responsible for monitoring livestock grazing intensity.

Over time, implementation of the proposed action is expected to result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned.

Long term trend monitoring will include, but is not limited to measurements to track upland range condition and watershed condition (hydrologic function). Techniques may include, but are not limited to dry weight rank, comparative yield, pace transects, Parker 3-step, repeat photography, grazed plant count, Grazing Response Index and clipping and weighing. Permittees will be encouraged to participate in the monitoring activities. Records of livestock numbers, movement dates, shipping records, and rainfall dates and amounts will be kept by the permittee and will be provided to the USFS annually.

Adaptive Management

The proposed action is intended to provide sufficient flexibility to adapt management to changing circumstances. If monitoring indicates that desired conditions are not being achieved, management will be modified. Changes may include administrative decisions such as the specific number of livestock authorized annually, specific dates for grazing, class of animal or modifications in pasture rotations, but such changes will not exceed the

limits for timing, intensity, duration and frequency defined for the proposed action and analyzed herein.

In the case that changing circumstances require physical improvements not disclosed or analyzed herein, further interdisciplinary review would occur. The review will consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the Ranger will determine whether correction, supplementation or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1 and 96.2).

Comparison of Alternatives

Table 4 provides a comparison of the alternative in terms of their ability to meet the purpose and need for the proposal and their ability to comply with Forest Service policy and LMP goals. It also briefly summarizes the more detailed effects analysis contained in Chapter 3.

Table 4. Comparison of the Alternatives

Attribute	Alternative 1	Alternative 2	Alternative 3
National Forest Policy and Forest Plan (LMP) Consistency	Consistent with LMP. Not consistent with policy (FSM 2202.1, 2203.1)	Consistent with LMP and policy.	Consistent with LMP and policy.
Meets Purpose and Need	Yes. Eliminates effects of grazing. Capacity issue becomes moot.	No. Does not resolve distribution issues; permitted use is not balanced with capacity.	Yes. Resolves distribution issues and balances use with capacity.
Effect on Wildlife and Plants	No Effects.	Effects mitigated, but poor distribution may impair achievement of desired conditions.	Effects mitigated. Improved distribution reduces localized effects to habitats.
Effects on soil and watershed condition	No effects.	Continued livestock concentration in some areas contributes to less than desirable watershed condition.	Additional waters and pastures increase management flexibility and contribute to improved distribution. Fencing of Harshaw Creek reduces grazing in riparian area.
Effects on upland vegetation	No effects.	Continued livestock concentration in bottoms, resulting in localized heavy use.	Additional waters and pastures increase management flexibility and contribute to improved distribution. Increased use in uplands.

CHAPTER 3. 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. The section is organized by resource. Within each section, the affected environment is briefly described, followed by the environmental consequences (effects) of implementing each alternative.

Actions Considered for Cumulative Effects

Cumulative effects are the past, present and reasonably foreseeable future actions that add to the direct and indirect effects considered in this EA. The following activities have been identified as potentially contributing to the effects analyzed herein. 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. Foreseeable future actions are those for which a proposed action has been approved or those proposed for NEPA analysis in the future. Other possible future actions are considered too speculative to include in this analysis.

Grazing and fire suppression. Livestock grazing has occurred within the analysis area for over 100 years. In many parts of the southwest, widespread unregulated livestock grazing from about 1880 until the early 20th century resulted in losses of herbaceous cover, increased erosion and surface runoff, flooding and down-cutting of streams throughout the southwest. The removal of herbaceous cover that provides fuel for low intensity ground fires, combined with active fire suppression beginning in the early 1900's, has contributed to a decreased fire frequency and subsequent invasion of many grasslands by woody plants.

Vegetation management. In the late 1800's to the early 1900's, large-scale woodcutting occurred throughout the project area to supply local mines and towns with charcoal for smelters and general-purpose fuelwood. The widespread removal of overstory species likely contributed to the increase in shrubby species such as manzanita and catclaw and loss of topsoil in many areas.

The Forest has proposed to mechanically treat up to 12,000 acres of manzanita-dominated mesas and ridgetops in the vicinity of the San Rafael Valley with a rubber-tired mower (hydro-axe) in order to reduce woody fuels and increase herbaceous vegetation. Portions of this project occur in the project area. Implementation of this project may contribute some short-term impacts as a result of disturbance. Over the long term, the project is expected to result in increases in herbaceous vegetation and soil stability.

Invasive Species. There are stock ponds within the watershed that support populations of non-native fish or bullfrogs. The presence of non-natives in aquatic sites could impact the recovery of native amphibian and fish populations in the area, notwithstanding anticipated improvements in riparian and stream conditions.

Non-native invasive plant species are known or suspected from the project area. These include Lehmann lovegrass in the uplands and Johnson grass, salt cedar and tree of heaven in various locations on the allotments. The removal of noxious weeds or invasive plants may be proposed in the future and effects of any treatments have been analyzed under a separate analysis (USFS 2003, Invasive Exotic Plant Management Program EA). 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 some 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.

Human Activities. The project area is within the Patagonia Mining District and many historic lead, silver, gold and copper mines are located in or adjacent to the allotments. Active commercial work commenced in the late 1800's and faded in the 1940's and 1950's. In the late 1800's, much of the project area was largely de-forested to provide fuelwood and charcoal for local mines. Within the forest system lands, many private property in-holdings are present that originated from patented mining claims (Figure). Other activities in the project area include hiking, hunting bird watching and vehicle use on unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas. There are no developed campgrounds, nor are there plans for future development.

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.

Utility Development. The Verizon telecommunications company has proposed to install a powerline to its facility on top of Red Mountain in 2005. This project will result in short-term disturbance associated with burying an underground line along an existing road. This project is not expected to contribute significant impacts, so no cumulative effects are anticipated.

Wildlife

Affected Environment

The five allotments are located within Game Management Units 35A and 35B. Broadleaf woodland, chaparral, plains grassland and riparian vegetation provide habitat for a variety of native wildlife. Larger species found in the area include white-tailed and mule deer, javelina, mountain lion and black bear. Avian fauna include Montezuma quail, Gambel's

quail, mourning dove, band-tailed pigeon, a variety of raptors and songbirds. Harshaw Creek is well known as a birding location and has been nominated as an Important Bird Area by the Audubon Society (<http://tucsonaudubon.org/azbaprogram>). Portions of the area provide suitable habitat for Gould's turkey, although the species has not been documented in the area. Other smaller species that may occur within the project area include coyote, gray fox, bobcat, coati, striped, hooded and spotted skunks, raccoon, badger, and ringtail. The area may be used for foraging and roosting by a variety of bat species including cave myotis, western red bat, Mexican free-tailed bat, pallid bat, Townsend's big-eared bat, the endangered lesser long-nosed bat and several other species. Aquatic habitats are limited on the allotments, but a portion of Harshaw Creek supports a population of native longfin dace (*Agosia chrysogaster*).

Threatened, Endangered and Sensitive Species. Listed or proposed threatened or endangered species that potentially occur in the project area are shown in Table 5.

Table 5. Threatened or Endangered Species Considered for Analysis.

Common Name	Status	Comments
Mammals		
Lesser long-nosed bat <i>Leptonycteris curasoae yerbabuenae</i>	LE	Large roost: McFarland. Foraging habitat on all allotments (low densities of agaves).
Jaguar <i>Felis onca</i>	LE	1965 record from Patagonia Mts. south of project area (hunter kill). No recent records.
Birds		
Mexican spotted owl <i>Strix occidentalis mexicana</i>	LT	3 PACs in analysis area: Harshaw, Lewis and Weiland.
Amphibians		
Chiricahua leopard frog <i>Rana chiricahuensis</i>	LT	Documented from adjacent Santa Cruz watershed. No occupied or likely to be occupied habitat in the project area. No historic records from the project area.
Sonora tiger salamander <i>Ambystoma tigrinum stebbensi</i>	LE	Occurs on adjacent allotments in Santa Cruz watershed. No occupied or suitable habitats in the project area.
Fish		
Gila topminnow <i>Poeciliopsis occidentalis</i>	LE	Occurrence downstream in Sonoita creek.

The **lesser long-nosed bat** feeds on the nectar and pollen of paniculate agaves during late summer on the Forest. A large post-maternity roost is located on the McFarland allotment. This roost is generally occupied from July to September. Exit surveys in 2004 estimated over 20,000 bats in the roost in late August. Suitable foraging habitat in the form of mixed grasslands and woodlands with stands of agaves is present throughout the three allotments. Unsurveyed mine adits and caves in the project area represent potential roost sites, but not all have been surveyed.

Since 1996, **jaguars** have been photographed in the Peloncillo and Baboquivari Mountains (both 1996) and the Pajarito Mountains (2002 and 2004). The Pajarito Mountain observations are approximately 30 miles west of the project area; the others are close to 100 miles to the east. Given the relative orientation to historic and recent jaguar observations, the remote, rugged characteristics of the allotments and the wide-ranging

habits of jaguars, all five allotments are considered to have some potential as travel corridors or hunting areas.

Three **Mexican spotted owl** protected activity centers (PACs) are located within the analysis area. Occupancy in these PACs has not been verified since 1998. Within its range, the owl is found in forested mountains and canyons. Forests are typically uneven aged, multi-storied mixed conifer with canopy closures greater than 50%. On the Forest, the owl is also found in Madrean pine-oak forests and steep rock-walled canyons, sometimes with little tree cover. Portions of the analysis area are mapped as proposed critical habitat (FR 68 65020).

None of the allotments in the analysis area contain occupied habitats for **Chiricahua leopard frog and Sonora tiger salamander**. There are records of occupied habitats on adjacent Duquesne, San Rafael and Hayfield allotments, but these records are all from the Santa Cruz River watershed and not from the Harshaw Creek/Sonoita Creek watershed that drains the project area. Stock tanks on the allotments in the project area typically go dry during some portion of the year and are not dependable sources of year-round aquatic habitat. Only perennial portions of Harshaw Creek remain wet year-round. Harshaw Creek represents potential habitat for the frog, but it is not considered likely to be occupied, because it is 4-5 miles overland from the nearest occupied habitats.

Gila topminnows do not occur in the project area, but have been documented in two sites in the Sonoita Creek drainage downstream from the Forest and within the action area. (AGFD 2001, USFWS 1998, PR#s.). One of these sites is located on the Patagonia Sonoita Creek Preserve and is protected from grazing. The only topminnow population on the Forest occurs in Redrock Creek, a tributary to Sonoita Creek on the adjacent Kunde and Seibold allotments. This population is in a separate sub-watershed and is not affected by actions in the project area.

A total of 24 Forest Service Sensitive Species⁵ have been identified as occurring in the project area or for which suitable habitats may be present (Table 6). Many species have been listed as Sensitive because their distribution and habitat requirements are poorly known. Not all species have been documented in the project area and their presence or absence may not be detected within the time frame of the analysis. In the absence of definitive surveys for all species, their presence is assumed based on the availability of suitable habitat.

Table 6. Forest Service Sensitive Species included in the analysis

Common Name	Status	Comments
Mammals		
Southern pocket gopher <i>Thomomys umbrinus intermedius</i>	S	Suitable habitat present.
Birds		
Northern goshawk <i>Accipiter gentilis apache</i>	S	Management area mapped in adjacent vacant allotment (Bender). Suitable foraging habitat in canyons in project area.
Northern gray hawk <i>Asturina nitida maxima</i>	S	Harshaw Creek and Sonoita Creek downstream from action area.
Amphibians		

⁵ USDA Forest Service Region 3. Regional Forester's Sensitive Species List. July 21, 1999.

Common Name	Status	Comments
Lowland leopard frog <i>Rana yavapaiensis</i>	S	A single 1979 record from adjacent allotment.
Western barking frog <i>Eluetherodactylus augusti cactorum</i>	S	Suitable habitat present; recently documented in Harshaw Canyon.
Reptiles		
Arizona ridge-nosed rattlesnake <i>Crotalus willardi willardi</i>	S	Suitable habitat present. Documented south of project area.
Mexican garter snake <i>Thamnophis eques megalops</i>	S	Suitable habitat present.
Fish		
Gila topminnow <i>Poeciliopsis occidentalis</i>	LE	Occurrence downstream in Sonoita creek.
Plants		
<i>Asclepias lemmoni</i> Lemmon milkweed	S	Suitable habitat present.
<i>Amsonia grandiflora</i> Large-flowered blue star	S	Occurs in project area. Suitable habitat present.
<i>Astragalus hypoxylus</i> Huachuca milk-vetch	S	Occurs in project area. Suitable habitat present.
<i>Agave parviflora parviflora</i> Small-flowered agave	S	Occurs in project area. Suitable habitat present.
<i>Graptopetalum bartramii</i> Bartram's stonecrop	S	Occurs in project area. Suitable habitat present.
<i>Hedeoma dentatum</i> Mock pennyroyal	S	Occurs in project area. Suitable habitat present.
<i>Heterotheca rutteri</i> Huachuca golden aster	S	Suitable habitat present.
<i>Ipomoea plummerae</i> var. <i>cuneifolia</i> Huachuca morning glory	S	Suitable habitat present.
<i>Laennecia eriophylla</i> Wooly fleabane	S	Suitable habitat present.
<i>Marina diffusa</i> Escoba	S	Suitable habitat present.
<i>Metastelma mexicanum</i> Milkweed vine	S	Occurs in project area. Suitable habitat present.
<i>Pectis imberbis</i> Beardless cinchweed	S	Occurs in project area. Suitable habitat present.
<i>Senecio carlomasonii</i> Seeman groundsel	S	Suitable habitat present.
<i>Stevia lemoni</i> Lemon's stevia	S	Occurs in project area. Suitable habitat present.
<i>Tephrosia thurberi</i> Thurber hoary pea	S	Occurs in project area. Suitable habitat present.
<i>Tragia lacianata</i> Sonoran noseburn	S	Occurs in project area. Suitable habitat present.

Management Indicator Species. Thirty-three MIS and one group (primary and secondary cavity nesters) in 8 indicator groups are identified in Appendix G of the LMP (U.S. Forest Service 1986, pages 128-129). In general, LMP direction for MIS is to maintain or improve occupied habitat for management indicator species. Eleven MIS 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

typo

of suitable habitats (Table 7). The remaining species were eliminated from consideration in this analysis because their known distributions are well outside of the project area or the area does not provide suitable habitat. Forest-wide trends of all MIS have been assessed and are reported in the Forest-wide Status Report for Management Indicator Species (USFS 2005, PR# 20). The background information and conclusions of this reported are incorporated by reference.

Table 7. Management Indicator Species considered for the analysis.

Species	Evaluation for Analysis
White-tailed deer	Occurs within analysis area; widespread suitable habitat. Monitored annually by AGFD.
Black bear	Occurs within analysis area; suitable habitat available. Monitored through harvest data and incidental observations.
Mearns' quail	Occurs within analysis area; suitable habitat available. Population trends and recruitment monitored through harvest data.
Baird's sparrow	Limited suitable habitat present in plains grassland habitats. Recorded nearby. Surveys in mid 1990s and annually through Christmas bird counts.
Primary and secondary cavity nesters	Occur within analysis area; suitable habitat available. Monitored through breeding bird survey routes.

Environmental Consequences

Effects of the ongoing grazing activities on the five allotments have been evaluated in Biological Assessments (BA) of Ongoing and Long-term Grazing on the Coronado National Forest (USFS 1998, USFS 2002) and in the associated Biological Opinions from the U.S. Fish and Wildlife Service (USFWS 1999, USFWS 2002). These assessments were based on management practices in place on the allotments at the time. Because changes in management are proposed on the five allotments, effects of the proposed action on TEPS species have been re-evaluated using the Framework for Informal consultation (USFS 2004) and knowledge of local resource conditions. Consultation was reinitiated for all allotments in the Patagonia Mountains in 2005 (PR# 22). An amended Biological Opinion was received on September 14, 2005 (PR# 34). For species likely to be affected by the proposed action or alternatives, effects are described and disclosed below. More extensive discussions, including determinations for species not affected, can be found in the wildlife specialist's reports included in the project record (PR#s. 19-22, 34).

Lesser long-nosed bat. Grazing potentially affects this species through removal of food plants either as a result of ground-disturbing livestock management activities or herbivory by livestock on agaves. Within the project area, agaves occur in both lower gradient areas and in steep inaccessible sites. No quantitative measurements of agave density or estimates of the extent of livestock herbivory have been made on the allotments. Field reconnaissance indicates that agaves are not well distributed throughout the allotments.

Alternative 1 would have no effect on lesser long-nosed bat as grazing will not occur on any of the allotments. Alternative 2 (current management) and 3 (proposed action) would

result in livestock grazing in pastures containing agaves during the time agaves are blooming (April 1-June 15), although on any given year, more than half of the pastures will be deferred during the April-June agave bolting season. Pasture deferments and mitigation measures that avoid destruction of agaves will minimize effects, but it is likely that some level of herbivory on agaves will occur under alternatives 2 and 3. In the absence of quantifiable data to the contrary, effects of grazing cannot be considered insignificant or discountable. Therefore, the BA determined that the proposed action is *likely to adversely affect* the lesser long-nosed bat. No effects to roosts or agaves as a result of construction or management activities are anticipated.

Mexican spotted owl. Under the proposed action, grazing would *not likely adversely affect* the Mexican spotted owl. Grazing will occur within portions of PACs in some years on the Harshaw, Lewis and Weiland allotments. However, the deferment schedule would assure that pastures receive at least partial growing season rest. Utilization would be limited to 45% of key species in key areas, insuring sufficient residual biomass to provide prey cover and support natural fires. Water developments would be constructed to pull livestock into uplands, reducing use in canyon bottoms preferred by owls. No developments within PACs are proposed under the action alternatives, so no disturbance related to construction activities is anticipated.

Jaguar. Historically, the primary threat to the species in the U.S. was shooting. Other impacts may occur from the fragmentation of habitats and loss of movement corridors that allow dispersal into unoccupied habitats. Livestock grazing as proposed under the two action alternatives is *not likely to adversely affect* the Jaguar. Proposed grazing and livestock management should not reduce cover in riparian areas. Movements of jaguars, if they occur in the area, are not restricted to riparian corridors. Livestock management activities will not permanently disrupt connectivity corridors within the U.S. and between the U.S. and Mexico or within the project area. The No Action alternative will have no effect on jaguar.

Chiricahua leopard frog and Sonora tiger salamander. There are no records to indicate that these species occur in the project area. Occupied habitats in the form of stock tanks are located on adjacent allotments, but in a separate watershed (Upper Santa Cruz). Suitable habitats do not occur in the project area within a reasonable distance from occupied sites to allow for dispersal. Therefore, the proposed action will have *no effect* on these species because there are no occupied habitats and the species will not be exposed to livestock grazing.

Gila topminnow. Direct effects to topminnow from the proposed action are not anticipated because there are no occupied habitats present. Indirect effects related to watershed condition may occur. Poor watershed condition can contribute to flooding, erosion and sedimentation in stream channels, which, in theory can affect downstream fish populations and habitats. Allotment monitoring conducted in 2003 and 2004 indicates that the allotments are all in fair or better ecological condition with stable or upward trend and that 995 of soils are in satisfactory condition (PR#s 9, 23-27, 29, 30). Basal vegetation and litter are increasing in response to conservative stocking over the past few years. These components are important for protecting and stabilizing soils. The proposed action incorporates reductions in permit numbers and range improvements intended to reduce use in areas that have historically been overused. In addition, the

Forest proposes to exclude livestock from approximately one mile of Harshaw Creek. These measures are expected to contribute positively to the current trends in ecological condition of uplands and improve riparian condition in Harshaw Creek. The proposed action is not likely to adversely affect the Gila topminnow because topminnows are not present on the project area, but are found approximately 4-10 miles downstream in the subwatershed that drains the allotments. Subwatershed condition in the project area is stable or improving and is predicted to improve as a result of project implementation.

Sensitive Species. All of the sensitive species identified in Table 6 may occur within or near the proposed project area. Occurrence has not been confirmed for several species, but the species 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 Biological Evaluation (PR# 19) and is summarized below.

The proposed allotment management plan is anticipated to have *no impact* on the following species:

Southern pocket gopher	American peregrine falcon
Apache northern goshawk	Lowland leopard frog
Western Barking frog	Mexican garter snake
Lemmon milkweed	Woolly fleabane
Seeman groundsel	Milkweed vine

These species are found in habitats that are not affected by the proposed action, have not been found in suitable potential habitats on the allotments, or for plants, because of growth form or palatability, are not affected by livestock grazing.

For the following species, the proposed allotment management plan may impact individuals, but will not result in a trend toward federal listing or a loss of viability.

Gould's turkey	
Arizona ridge nosed rattlesnake	Huachuca milkvetch
Bartram's stonecrop	Mock pennyroyal
Huachuca golden aster	Lemmon morning glory
Escoba	Beardless cinchweed
Thurber hoary pea	Sonoran noseburn

These species either occur on the allotments or have potential habitat on the allotments that could be affected by the proposed action. Detailed surveys and life history studies to determine distribution and specific habitat needs are, in many cases, lacking. In general, possible effects are confined to trampling and herbivory by livestock (for plants) or minor disturbance by grazing cattle (for animals). Where impacts are anticipated, these are expected to be short term and minor, limited mainly to disturbance or damage to individuals.

The proposed management includes several measures that are predicted to improve soil, watershed, vegetation and riparian condition over the term of the project. These include light to moderate grazing, increased pasture rest and fencing of sensitive aquatic sites. Implementation of these measures should improve habitats for sensitive species.

Management Indicator Species. Effects of the proposed action and alternatives are evaluated in the project-level analysis (PR# 21) and are summarized below. For all Management Indicator Species considered, the proposed action and alternatives are not expected to cause a detectable change in species population trends or a loss of occupied habitat.

Cavity Nesters. Habitat for cavity nesters (mature trees and snags) is widespread across the Forest and is estimated to be increasing as a result of several large fires and insect infestations that have killed thousands of trees over the past decade. Grazing-related activities in the project area would affect cavity nesters only if they are of sufficient scale and intensity to change the rate of regeneration of cavity bearing trees. No removal of trees is proposed and riparian protection measures (Harshaw Creek enclosure) should result in a slight, but positive increase in potential cavity bearing trees.

Black Bear. Black bears are wide ranging habitat generalists that prefer areas of dense cover and high vegetative diversity. They are included in the Riparian Species, Species Needing Diversity, and Game Species indicator groups in the LMP. Black bear populations are highly correlated to annual precipitation and its effect on the production of preferred foods such as oak acorns and manzanita berries (mast). None of the alternatives would have any effect on mast production or shrub cover used by bears as cover. Grass has been shown to be an important component of bear diets in the spring (April-June), which may force both bears and livestock to use the same areas to meet nutritional requirements. Given the moderate use levels proposed, competition for forage would not be expected under any of the action alternatives.

White-tailed deer. Coues white-tailed deer is included in the Species Needing Diversity, Species Needing Herbaceous Cover, and Game Species indicator groups. The species seems to favor rugged and steep slopes of the mountains but are also found in lower desert areas. White-tailed deer tend to use mixed-oak habitats more than other types, and tend to avoid open, grassy areas used by cattle. The entire project area (approximately 21,000 acres) is considered suitable habitat, and represents 1.4 percent of the total occupied habitat on the Forest. Habitat and population trends are considered stable. Heavy grazing prior to and during the fawning period reduces hiding cover and may reduce fawn survival and recruitment (Ockenfels et al. 1991). Overgrazing by livestock may reduce available grass forage and lead to increased livestock use of browse plants and forbs used by deer. However, grazing as proposed under either of the action alternatives would not be of sufficient intensity or duration to affect large scale reductions in cover or result in forage competition. In addition, steep slopes throughout much of the analysis area restrict the movement of livestock into many areas that are readily used by white-tailed deer.

Montezuma (Mearns') Quail. Montezuma quail is included in the Species Needing Herbaceous Cover, Game Species, and Special Interest Species indicator groups. The 1986 Forest Plan identified 225,410 acres of occupied habitat within several vegetation types. This species is identified as a priority bird species in the Arizona Partners in Flight Bird Conservation Plan. Overgrazing, especially during the growing season has been shown to be deleterious to Montezuma quail due to its effects on cover. The maintenance of grass height over 6" is necessary to provide sufficient cover for the birds to hide from predators. The project area provides approximately 20,000 acres of Montezuma quail

habitat in the form of broadleaf evergreen woodland, deciduous and evergreen riparian forest. The amount of potential habitat has not changed significantly since 1986, but habitat suitability has likely improved as a result of improved livestock management over the past two decades.

Alternative 1 (No Action/No Grazing) would maximize the amount of residual herbaceous cover that provides Montezuma quail habitat within the analysis area and would be expected to meet LMP standards and guidelines for the quail. 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, so the No Action alternative may not be optimum for Montezuma quail. In addition, Montezuma 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) does not improve livestock distribution and provides less growing season rest than other alternatives. While manual guidance for Montezuma quail would be implemented, the task of retaining sufficient herbaceous cover across the landscape would be complicated by poor distribution. Current management appears to be achieving LMP objectives for herbaceous cover in most areas, but livestock concentration areas would continue to result in heavier than desirable use in low, flat areas. *Alternative 3* (Proposed Action) will result in improvement in herbaceous cover. Proposed changes in management that incorporate growing season rest should increase grass plant production. New waters and fences should reduce use in flat areas and canyon bottoms, which should benefit Montezuma quail and other species found in these areas, but may also result in reduction in herbaceous vegetation in previously little-used areas adjacent to new water developments. For the most part, these increases in utilization will be in uplands, away from Montezuma quail habitats and the limits on grazing utilization should maintain occupied habitats.

Baird's sparrow. This sparrow breeds in the mixed grass prairies of the northern Great Plains and winters in the southwest grasslands including the San Rafael Valley. It is identified as a species needing herbaceous cover in the Forest MIS list. Suitable habitats occur in the east side of the project area in the Farrell allotment. The species apparently avoids overgrazed rangeland and most agricultural land. The LMP gives no data for acres of occupied habitat on the Forest; however, there is an estimated 49,379 acres of plains grassland on the Forest associated with the San Rafael Valley just east of the project area. All of this acreage is considered potential habitat. Baird's sparrow habitat is limited on the project area, consisting of an estimated 56 acres on the eastern edge of the Farrell and Harshaw allotments, less than 1 percent of the Forest total. Considering the limited suitable habitat available in the project area (less than 1 percent of the Forest total) and the limited intensity and duration of grazing in potential habitats, implementation of any of the alternatives would not result in a detectable change in Baird's sparrow populations on the Forest or a loss of occupied habitat.

Neotropical Migratory Birds and Important Bird Areas. 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 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. 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. Harshaw Creek has recently been nominated for designation as an important bird area. Fencing of the riparian portion of the creek is expected to improve riparian conditions.

Cumulative Effects – Wildlife

Activities contributing potential cumulative effects are described at the beginning of this chapter. The proposed action is designed to improve resource conditions as a result of improved distribution, lower stocking and incorporation of mitigation features. As a result, the direct and indirect effects of the proposed action and alternatives are expected to be minimal or beneficial. Past actions have contributed to current resource conditions, but these are unlikely to change significantly without the introduction of fire. Present and future actions that may affect area resources are limited to human activities such as dispersed recreation, driving on existing roads and illegal border traffic, but these activities are unlikely to increase over current levels over the life of the project. Since direct and indirect impacts will be minimal or beneficial, cumulative effects are not anticipated

Soil and Watershed Condition

Affected Environment

Landscape and Geology. The geology underlying the allotments is highly diverse. In general, a majority of the allotments are volcanic in nature with some edges composed of sedimentary rocks or alluvium. Many different volcanic sequences are represented and many have undergone varying degrees of alteration. As a consequence, the soils are highly diverse. In general, the soils in the mountainous areas are shallow cobbly fine sandy loams with numerous rock outcrops and lower valley areas are deep gravelly sandy clay loams.

Soil Condition. Soil condition is the ability of the soil to infiltrate water, resist erosion and recycle nutrients. Previously reported soil condition on the allotments (eg: the 2002 grazing biological opinion) were based on General Ecosystem Survey (GES) data published in 1991. GES data are based on a statistical analysis of soil properties such as soil type, slope and precipitation, which provide an estimate of risk, but actual soil condition was not assessed on the ground.

In order to derive accurate, site specific estimates of soil condition, field monitoring was accomplished in 2004-2005 using protocols from Forest Service Handbook 2509.18-99-1 R3 Supplement titled Soil Management Handbook. Soil condition was evaluated by using a combination of field inspections, Digital Elevation Models (DEM's), aerial photo interpretation, and topographic maps. Interpretations were based on historical livestock use patterns, GES data, and slope characteristics (Table 8). Field data collection consisted of visiting generally representative areas, key areas, Parker Three Step clusters and pace transect locations. Soil condition information was then placed into a GIS database.

Table 8. Slope Acres by Allotment

ALLOTMENT	0-5%		5-15%		15-40%		40%+		TOTAL
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	
Farrell	50	1%	820	12%	5996	84%	256	4%	7,122
Harshaw	0	0%	70	1%	5843	69%	2533	30%	8,446
Lewis	0	0%	93	4%	1336	58%	887	38%	2,316
McFarland	0	0%	22	2%	777	71%	297	27%	1,096
Weiland	0	0%	56	3%	1475	73%	500	25%	2,031
TOTAL	50	0%	1061	5%	15427	73%	4473	21%	21,011

Note: Percents are rounded and may not add up to 100%

The soil condition rating procedure evaluates soil quality based on an interpretation of factors that affect three interrelated primary soil functions: soil stability, soil hydrology and nutrient cycling. These terms are defined in Appendix 1.

Based on interpretation of these soil functions, soil condition is broken out into one of three condition classes:

- **Satisfactory.** Indicators signify that soil function is being sustained and soil is functioning properly and normally.
- **Impaired.** Indicators signify a reduction in soil function. The ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. Changes in land management practices or other preventative measures may be appropriate.
- **Unsatisfactory.** Indicators signify that a loss of soil function has occurred. Degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs or recover from impacts.

Soil condition ratings by allotment are displayed in Table 9 and Figure 6. Satisfactory soil conditions are found on 99% of the project area. These soils are functioning properly and retain their inherent productivity. The impaired soil condition class covers less than 1% of all the allotments. Impaired soil condition areas are generally from historic compaction and the lack of vegetation groundcover (VGC) that has reduced the nutrient cycling.

Table 9. Soil Condition Rating Acres by Allotment

ALLOTMENT	Satisfactory Soil Condition		Impaired Soil Condition		Unsatisfactory Soil Condition		TOTAL
	Acres	Percent	Acres	Percent	Acres	Percent	
Farrell	7,093	99.59%	29	0.41%	0	0%	7,122
Harshaw	8,445	100%	0	0%	0	0%	8,445
Lewis	2,316	100%	0	0%	0	0%	2,316
McFarland	1,095	100%	0	0%	0	0%	1,095
Weiland	2,030	100%	0	0%	0	0%	2,030
TOTAL	20,979	99.86%	29	0.14%	0	0%	21,008

Note: Percents are rounded and may not add up to 100%

Environmental Effects

Change in soil condition class is a long-term process with many influences. It is important to note that the actual soil condition class is not expected to change within the ten-year analysis period, even in the absence of grazing. The effects analysis reflects what would happen in the long term as it relates to potential recovery and provides a way to compare alternatives.

Under *Alternative 1* (No livestock grazing), there will be no direct or indirect effects from livestock grazing. The rate of soil improvements would be faster than any other alternative. In the satisfactory soil condition areas, the adequate diversity and vegetation groundcover (VGC) would contribute to maintaining a satisfactory nutrient cycling and soil structure. The hydrologic function and runoff would continue to be satisfactory. In the impaired soil condition area, the potential increase of VGC and loss of potential livestock compaction would contribute to an improved nutrient cycling and improved soil structure. The improved soil structure would contribute to the functional hydrologic condition.

Under *Alternative 2* (Continue current management), the range improvements identified in the proposed action would not occur, and livestock distribution would remain similar to current conditions. The lack of distribution would maintain areas of historical concentration. In the areas of satisfactory soil condition, the soil conditions would probably continue to be satisfactory as they are inferred to be in a static trend (ocular).

Alternative 3 (Proposed Action). Allowable use levels of 35-45% are expected to provide sufficient residual biomass to protect soils and not contribute to any decline in soil conditions. The rest-rotation system will allow the vegetation to not be impacted by grazing for a complete growing season potentially causing positive gains in plant vigor, forage plant frequency, and recruitment. Flexible stocking rates built into the proposed action should allow management to respond proactively to changing resource conditions before problems occur. The proposed range improvements including fencing and additional watering locations are designed to improve livestock distribution which will help minimize impacts in historic concentration areas. However, it will increase use in historically underused areas and therefore potentially impact the soil conditions in these areas. The use of Best Management Practices (BMPs) is expected to minimize or mitigate any potential negative effects from this alternative.

Cumulative Effects -- Soils and Watershed

Historic impacts to soils in the project area are evident. However, little direct or indirect impacts are anticipated under the alternatives. Therefore, significant cumulative effects are not anticipated.

Upland Vegetation

Affected Environment

Grazing by domestic livestock can impact vegetation by changing the mix of species in the plant community being grazed (vegetation composition), by changing the density and frequency of perennial herbaceous plants (plant frequency), and by changing the vigor of grazed plants. The combined effects of composition, density and plant vigor can be used to measure the condition and trend of rangeland plant communities.

Range condition is evaluated in terms of its ecological status, which is an evaluation of the status or health of the vegetation and soil relative to their combined potential to produce a stable biotic community. For the purposes of determining rangeland condition, permanent vegetation transects were evaluated between 2001 and 2003 in the project area. The project area falls within the Mexican oak-pine woodland and oak savannah land resource unit (41-1AZ). The reference range site used to describe the potential natural community is clayloam upland range site designation in the 16-20 inch precipitation zone (PR# 31). Range condition classifications are excellent, good, fair, poor and very poor (See Appendix 2).

Farrell Allotment. In 2003, permanent transects all showed an upward trend. Forty percent of the allotment is in fair condition, 35% is good and 25% is in excellent condition (PR#s 9, 27). The allotment currently meets plan standards for vegetation condition, but sites on heavy clay soils could be improved through management over time.

Harshaw Allotment. Recent transect data indicate fair or better condition on the allotment. However, four of six transects indicate downward or not apparent trends (PR#s 9, 24). Portions of the allotment that have historically received heavy use are dominated by annuals and low value grasses and are in need of improvement.

Lewis Allotment. Overall the allotment is in fair condition with stable trends (PR#s 9, 25). Invasive species like mesquite, catclaw and Lehmann lovegrass tend to suppress condition ratings in many areas, but these conditions are unlikely to change without fire or significant effort to treat vegetation.

McFarland Allotment. A single permanent transect indicated fair condition in 2003 (PR# 9, 26). Based on allotment inspections, most higher elevation uplands are in good or better condition, while lower, flatter sites tend to be in fair or lower condition.

Weiland Allotment. In 2003, permanent transects in upland sites indicated good condition with no apparent trend (PR# 9, 23). As with the other allotments, lower slopes and floodplains are in lower condition as a result of poor livestock distribution and limited rest or deferment.

Environmental Effects

Utilization by grazing animals affects vegetation composition and productivity. Defoliation on a repeated basis (frequency), in excessive amounts (intensity) or for extended periods without recovery (duration) can cause changes in the vigor of preferred forage plants. Vegetation condition can be improved through reductions in the frequency and intensity of utilization or by increasing the amount of rest to allow for grazed plant recovery⁶.

Under *Alternative 1* (No Grazing), there would be no direct or indirect effects as a result of livestock utilization. Some light use by wildlife may occur, but there are no large wild grazing herbivores in the project area, so use would be negligible. Over the long term, the effects of this alternative would be increases in preferred forage plant frequency, plant density and plant vigor. Mesquite, catclaw and Lehman lovegrass would continue to persist on some sites and would continue to suppress vegetation condition, even in the absence of grazing.

Under *Alternative 2* (Current Management) livestock distribution would continue to be uneven on the allotments, even with reduced stocking. Low condition areas would not be expected to improve significantly without measures to reduce the frequency and intensity of use and to increase the periods of rest.

Alternative 3 would provide additional water sources in the uplands of all allotments. Improved livestock distribution would be expected to occur as new water sources are created, thereby reducing use in lower elevation sites. On the Farrell allotment, the creation of an additional pasture would provide additional pasture rest and increase management flexibility. Over time, improved distribution and flexible stocking rates, combined with the mitigation features proposed should allow for increases in plant vigor and herbaceous production in areas that are currently in lower condition throughout the project area. Adaptive management strategies combined with monitoring should allow management to respond proactively to changing conditions before problems occur.

Cumulative Effects – Vegetation

Historic grazing and mining effects are evident in portions of the project area, especially in lower slopes and bottoms. The proposed management is designed to reduce impacts to these sites and low condition areas are predicted to improve over time. Portions of the project area may be treated to remove manzanita in the foreseeable future. This action would result in short term soil disturbance but is expected to contribute to plant

⁶Scoping comments indicated a concern that proposed 45% utilization limits exceed currently accepted guidelines for utilization (often citing summaries such as Holechek 1988, 1999, 2004 (PR#s 28, 29,30)). These guidelines are derived from numerous studies using different methodologies, but generally refer to average utilization across an entire management unit and, in some cases, across a period of years. Forest Service measurement of utilization on key forage species in key areas does not translate to utilization on all species, nor does it refer to average utilization across a pasture. For example, measured utilization on 19 key areas on the nearby Hayfield Allotment ranged from 10-55% in 2003, but the *average* utilization across the allotment was 28%. Utilization on 3 of the 19 sites exceeded 45%, which would require management adjustments to reduce utilization in the future. Utilization measurements are useful for evaluating the short-term effectiveness of management and for monitoring achievement of specific resource goals (e.g. wildlife cover), but do not provide information on ecological condition of rangeland sites.

community health over the long term by restoring a more natural fire regime and increasing herbaceous cover in treated areas. Treatments may require deferment of some pastures during project implementation.

Riparian Condition

Affected Environment

Riparian vegetation and stream channel data for the allotments within this analysis are from on-the-ground observations, aerial photo interpretation, GIS database layers, and the LMP. Direction for managing riparian areas on the Coronado National Forest is found in the Forest Service Manual 2526 (USDA 2000), and the LMP.

Riparian vegetation can be broken out into four separate types (Table 10). Harshaw Creek is the only area mapped as having deciduous riparian and it encompasses approximately 2% of the project area. Three allotments (Farrell, Harshaw and McFarland) have portions of Harshaw Creek.

Table 10. Riparian vegetation in the project area.

Allotment	Deciduous Riparian		Coniferous Riparian		Dry Desert Riparian		Evergreen Riparian		All Other Vegetation		GRAND TOTAL
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres
Farrell	154	2%	0	0%	0	0%	348	5%	6,620	93%	7,122
Harshaw	205	2%	0	0%	45	1%	217	3%	7,978	94%	8,445
Lewis	0	0%	0	0%	17	1%	0	0%	2,299	99%	2,316
McFarland	78	7%	0	0%	7	1%	0	0%	1,010	92%	1,095
Weiland	0	0%	0	0%	0	0%	25	1%	2,005	99%	2,030
GRAND TOTAL	437	2%	0	0%	69	1%	373	2%	19,912	95%	21,008

Note: Percents are rounded and may not add up to 100%

Numerous canyons or washes occur in the analysis area. Most of the drainages within the project area have surface water flowing only after rains (ephemeral) or intermittently for short durations. A portion of Harshaw Creek has year round (perennial) surface water flow. In some drainages, shallow water tables or subsurface flow (subflow) sustain small areas of riparian vegetation and support seasonal seeps and springs.

The analysis of existing streams is based primarily on information gathered at established riparian area monitoring points (PR# 28). These points were assessed using the Riparian Area Survey and Evaluation System (RASES) data collection technique (USDA, 1989). Vegetation data and basic stream morphology data were collected at each of the monitoring points. Not all mapped reaches or delineations were field validated.

Table 11 presents data collected using RASES in select streams bottoms in the project area. The use of the RASES data collection technique is a way to monitor changes to these canyon bottom vegetation communities over time. Harshaw Creek is the only drainage mapped as deciduous riparian and is generally not meeting LMP goals and objectives for deciduous riparian vegetation. Vigor appears good but recruitment and

canopy shade is low. All the other drainages appear to meeting LMRP goals and objectives. Generally, vigor is good.

TABLE 11. Existing Condition of Riparian Areas (Canyon bottom vegetation)

Allotment	Stream Name	Year Data Collected	Tree Species Recruitment*	% Tree and Shrub Canopy	Vigor
Farrell	Corral Canyon	1987	7 of 10	20	Low
		2000	5 of 6	57	Very Good
	Goldbaum Canyon	1987	9 of 9	70	Good
		2000	7 of 9	No Data	Very Good
	Harshaw Creek	1987	8 of 11	10	Good
		1999	4 of 8	30	Good
Harshaw	Alum Gulch	1987	8 of 12	20	Moderate
		2000	7 of 7	No Data	Good

* Species represented in young or seedling age class compared to total number of species found

Stream channel and stream bank information was also collected at these same locations. Table 12 summarizes the field data. Not all monitored streams are meeting Forest Plan goals and objectives for stream channels. However, the overall trend appears to be improving.

TABLE 12. Existing Condition of Stream Channels

Allotment	Stream Name	Year Data Collected	Bank Protection*	Channel Condition
Farrell	Corral Canyon	1987	No Data	Unsatisfactory
		2000	65%	Satisfactory
	Goldbaum Canyon	1987	No Data	Unsatisfactory
		2000	38%	Unsatisfactory
	Harshaw Canyon	1987	No Data	Unsatisfactory
		1999	47%	Unsatisfactory
Harshaw	Alum Gulch	1987	No Data	Unsatisfactory
		2000	92%	Satisfactory

*Percent of bank not occupied by bedrock, boulders, stones, or cobbles

Environmental Effects -Riparian

Alternative 1. No direct or indirect effects from livestock grazing on canyon bottom vegetation and stream channels. The potential increase of vegetation groundcover (VGC) on the banks, loss of livestock bank alteration and compaction and reduction in browse in the riparian areas would contribute to an improved riparian function and stream channel stability.

Alternative 2 would maintain the existing conditions of the stream channels and vegetation in the canyon bottoms and riparian areas. Improvements would be limited due

to the cattle concentrating in the canyon bottoms. Upland waters are sparse and generally not available. Riparian enclosure fencing would not be authorized or constructed in order to limit use in a sensitive area.

Alternative 3. The proposed range improvements including riparian enclosure fencing (Figure 9), pasture fencing and additional watering locations is designed to improve livestock distribution. These will help minimize impacts in historic concentration areas (canyon bottoms). Allowable use levels of 35-45% are expected to provide sufficient residual biomass in the uplands to protect soils and therefore not contribute to any stream channel degradations. The rest-rotation system will allow the vegetation to not be impacted by grazing for a complete growing season potentially causing positive gains in plant vigor, forage plant frequency, and recruitment. Flexible stocking rates built into the proposed action should allow management to respond proactively to changing resource conditions before problems occur. The use of Best Management Practices (BMPs) is expected to minimize or mitigate any potential negative effects from this alternative.

Cumulative Effects-Riparian

The features of riparian areas (shade and water) often attract humans who use these areas for recreation. Human use will continue and may retard recovery of vegetation in some areas. Overall, riparian condition is expected to improve, so the effects of recreational use should not contribute significant cumulative effects.

Other Environmental Components

Air

Affected Environment

The project area is in a Class II (rural) air quality management area. Air quality in and around the area is high due to the relative isolation from urban centers, limited access, good vegetative ground cover, and the large scale of the analysis area. Currently, the air quality in the project area is within the standards and guidelines of the Forest Plan.

Environmental Effects

Activities resulting from this grazing project will not significantly affect the factors contributing to a high quality air shed. Therefore, grazing will not have direct or indirect effects on the air resources in this Class II airshed. 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 (PR# 30).

Water Quantity and Quality

Affected Environment

Water Quantity. The project analysis area is located almost entirely within the Sonoita Creek fifth code watershed (Figure 7). Less than one percent of the area falls within the Upper Santa Cruz River watershed. All five allotments are at or near the top of their respective watersheds. Within the Sonoita Creek watershed, the north end of the Patagonia Mountains can be divided up into two sub-watersheds. The east side drains into

Harshaw Creek which eventually flows off the forest into Sonoita Creek, while the north-west side flows directly into Sonoita Creek. Table 10 shows the allotment acres by 5th code watersheds. Generally, the allotment and pasture fences follow the watershed boundaries. The two fifth-code watersheds are large in overall size totaling approximately 279,537 acres and the five allotments make up approximately only 8% of the total acres of the two watersheds (Table 11).

The closest real-time surface water flow gauging station downstream from the project area is on the Santa Cruz River at Tubac, approximately 25 miles downstream from the allotments. The data from this site indicates that surface water quantity is controlled by precipitation events and base flow derived from effluent outfall from the Nogales International Waste Water Treatment Facility. Interpreting this data is not practical to ascertain if current management on an allotment scale is impacting water quantity at a landscape scale.

TABLE 10. Allotments Acres by 5th Code Watersheds

ALLOTMENT	Sonoita Creek (HUC 15050301202)		Upper Santa Cruz River (HUC 1505030101)		TOTAL
	Acres	Percent	Acres	Percent	Acres
Farrell	7,092	100%	30	0%	7,122
Harshaw	8,445	100%	0	0%	8,445
Lewis	2,316	100%	0	0%	2,316
McFarland	1,095	100%	0	0%	1,095
Weiland	2,031	100%	0	0%	2,031
TOTAL	20,979	100%	30	0%	21,009

Note: Percents are rounded and may not add up to 100%

TABLE 11. 5th Code Watersheds Acres

5TH CODE WATERSHEDS	Five Allotments in this analysis		Area outside of the 5 Allotments		TOTAL
	Acres	Percent	Acres	Percent	Acres
Sonoita Creek	20979	13%	144,996	87%	165,975
Upper Santa Cruz River Headwaters	30	0.03%	113,532	99.97%	113,562
TOTAL	21,009	8%	258,528	92%	279,537

Note: Percents are rounded and may not add up to 100%

Water Quality. Water quality is assessed by comparing existing conditions with desired conditions that are set by the States under the authority of the Clean Water Act. The Arizona Department of Environmental Quality (ADEQ) is the regulating authority for water quality in Arizona. The general classifications used for surface water quality by ADEQ are 1) attaining, 2) impaired and 3) not assessed. According to the 2002 ADEQ report "Status of Water Quality in Arizona: The Integrated 305(b) Assessment and 303(d)

Listings Report", surface waters in Alum Gulch and Harshaw Creek are classified as impaired due to the presence of metals. Acidic water seeps from springs and abandoned mine workings carrying cadmium, copper and zinc into stream channels. These water quality issues are a result of historic mining activities and naturally occurring highly mineralized parent material. They are not related to livestock grazing.

The project area has not been designated as a Unique Water by the State of Arizona.

Environmental Consequences

Surface water quality and quantity are affected by hydrologic function, which is the ability of soil to capture, hold and release water. As soil conditions degrade, the time that water sits on the land (water residence time) decreases, resulting in a reduction of the capability to filter soluble solids and sediments. Water quantity (runoff) increases due to a compromised hydrologic function. The result is generally an increase in peak flow discharges. Turbidity is generally considered a gauge of watershed water quality; low turbidity would indicate good water quality and stable soil conditions. Cattle grazing can affect water quality by increasing the turbidity. However, turbidity is not a known problem in the project area where there is limited surface water. Best Management Practices for cattle grazing are designed to limit turbidity in the surface water.

No change in hydrologic function at a watershed scale is expected from changing livestock management, although changes in hydrologic function may occur on some localized sites.

Under *Alternative 1* (No grazing) there would be no direct or indirect effects from livestock grazing on canyon bottoms or uplands. The potential increase of vegetation groundcover (VGC) would contribute to maintaining an acceptable nutrient cycling and soil structure thereby promoting a satisfactory hydrologic function and reducing runoff potential. VGC also stabilizes the watershed promoting satisfactory water quality by minimizing soil loss and reducing turbidity.

Under *Alternative 2* (Current management) management would maintain the existing conditions of the stream channels and vegetation in the canyon bottoms, riparian areas, and uplands. Water quality appears to be satisfactory with current management, and that should continue. Improvement in water quality would be limited due to the continuation of cattle concentrating in existing concentration areas. Upland waters would not be developed, so livestock would continue to concentrate in the canyon bottoms and around existing water sources. Riparian exclosure fencing in Harshaw Creek would not be authorized or constructed in order to limit use in a sensitive area.

Under *Alternative 3* (Proposed Action), the proposed range improvements including new pasture fencing and additional upland watering locations are designed to improve livestock distribution which will help minimize impacts in historic concentration areas (canyon bottoms). Incremental improvements in water quality are expected. The new upland waters will be supplied from extracting more water from 4 existing wells. These include two wells on the Weiland Allotment (East Pasture Well and Bull Pasture Well), one well on the Harshaw Allotment (Flux Pasture Well), and one well on the Farrell Allotment (Corral Canyon Well). Three of the wells are not in true riparian areas,

however, one well is. The Bull Pasture Well is located directly upstream of the proposed riparian exclosure fencing.

Water quantities in the aquifer and subflow should not be significantly impacted from this proposal. This is based on the small number of livestock which are using the new drinkers and the overall size of the respective watersheds which contribute to the aquifers at the respective wells. There may be short-term effects on localized aquifers during the filling of new large storage tanks. This is due to the continuous draw from a well and aquifer. Mitigation for this startup operation could be filling the tanks during the wet winter months (abundant surface flow and least impact to riparian). Typically, the drinkers and troughs will be filled directly from the well or from a storage tank. The water necessary to maintain the drinkers is not expected to impact the aquifer or subflow due to the small volume of water as compared to the total volume of precipitation recharging the groundwater aquifer in the respective watersheds above each well. Water quality will increase from the proposed riparian exclosure fencing which will limit use in a sensitive area. Allowable use levels of 35-45% are expected to provide sufficient residual biomass in the uplands to protect and stabilize soils and therefore not contribute to any water quality problems. Stability contributes to satisfactory hydrologic functions and in turn good water quantity. The use of BMPs is expected to minimize or mitigate any potential negative effects from this alternative.

Cumulative Effects – Water Quantity and Quality

Since there will be no significant direct or indirect effects to water quality and quantity, no cumulative effects are anticipated.

Wild and Scenic Rivers

There are no rivers within the project area that have been determined to be potentially eligible for designation as Wild and Scenic Rivers. Therefore, the proposed action will have no effects to the eligibility or classification of Wild and Scenic Rivers.

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. 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. Historically, the EMA was within Sobaipuri territory, and was visited by Chiricahua and Western Apache.

Probably the most important historic-period uses in the project area have been mining and grazing, both of which began in Spanish Colonial times and have continued to the present. Evidence of extensive mining activities that occurred in the late 19th and early 20th centuries are still evident in the project area.

Environmental Consequences

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 minor modifications were proposed to avoid effects to heritage resources. In general, these modifications involve relocations of plastic above-ground pipelines in order to avoid concentrations of artifacts. Provided these minor modifications occur, the Forest Archeologist recommended clearance for the proposed actions. A report with a determination of "no effect" was prepared for the improvements included in Alternative 3 (PR# 41). Because direct and indirect effects will be avoided, cumulative effects are precluded.

Economics

Affected Environment

The allotments are located in Santa Cruz County. As a result of its location on the international border, tourism, international trade, manufacturing and services are the foundation of the economy, and the entire county is an Enterprise Zone. Ranching operations in the area tend to be characterized by small profit margins with the need for off-ranch supplemental income to continue operations.

Livestock grazing can affect local and regional economies, government receipts and expenses, and permittee income. 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 and benefits from goods and services purchased by ranch operators.

The economic considerations of the proposed action and alternatives can be compared in terms of the costs of implementation, the costs and revenues to the permittees and the return to the Federal and local government through grazing permit receipts.

Environmental Consequences

Costs of Improvements. Table 12 summarizes costs by allotment associated with implementation of the proposed action. Costs are based on data provided by District personnel and are for Alternative 3 only, since Alternatives 1 and 2 would not authorize new improvements.

Table 12. Costs of planned improvements for the proposed action.

Allotment	Proposed improvement	Cost
Farrell	One mile pipeline, 10,000 gallon storage tank and 2 troughs.	\$6,000 for materials
Farrell	Cross fence Best pasture (1 mile)	\$3,000 for materials
Farrell	Upland waters in Best and Corral Canyon Pastures.	\$2,000 for materials
Farrell	New well to provide water for Best Pasture	\$3,000 for drilling costs
Harshaw	Extend a pipeline from the Weiland Allotment south to the Middle pasture of the Harshaw allotment. (0.25 mile pipe and one trough).	\$700 for materials. Permittee to supply labor
Harshaw	0.6 mile of pipeline from Corral Canyon well to storage and trough in uplands of Bergier pasture.	\$4000 for materials Permittee to supply labor.
Harshaw and McFarland	Extend a pipeline from a well on the Weiland allotment to the boundary fence between the Sorrell pasture on McFarland and the Bergier pasture on the Harshaw allotment. Install 2 drinkers. (2 miles pipe)	\$2500 for materials Permittee to supply labor
McFarland	Extend an existing pipeline on the Weiland allotment into the Harshaw pasture on McFarland, install one drinker. (0.25 mile)	\$700 for materials Permittee to supply labor
McFarland	Construct and enclosure fence on Harshaw creek (0.25 mile fence).	\$500 for materials Permittee to supply labor
Weiland	Increase water storage at East well and extend a pipeline from the well into upland on the Bible pasture. (one storage tank, 1.0 miles pipeline and two drinkers)	\$4000 for materials Permittee to supply labor
Total all allotments		\$26,400 (Forest costs)

Alternative 1 would have the lowest cost as no new improvements would be authorized and only limited maintenance would occur. There would, however, still be costs associated with management of the allotments. Maintenance or removal of existing structural improvements may become necessary and costs would be borne by the Forest Service. Allotment boundary fence maintenance would be shifted from the permittees to the Forest Service or adjacent permittees. Alternative 2 would involve no new improvements, but maintenance costs would occur in order to maintain existing structural improvements. These costs would likely be more than alternative 1, but significantly less than alternative 3.

Revenue. Net ranch income represents gross returns minus operating costs. Specific operating costs and revenue estimates are not available for each ranch, and weather, market conditions and management decisions will affect net revenue on an annual basis. However, various economic studies have calculated a return of \$60-\$100 per animal unit per year for ranches in Arizona (Heitschmidt 1990, Gao 1996 reported in Ruyle, et al 2000 (PR#)). Using this range of estimates, annual income on the allotments would be well under \$10,000 under all alternatives. Estimates of ranch living expenses cited by Ruyle (PR#) vary from \$11,500 to over \$20,000 depending on the size of the ranch, so it is likely that the permittees will be dependant on outside sources on income in order to

cover living expenses. This is not uncommon; 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.

Payments to Governments. Annual grazing receipts to the Forest Service would vary from zero under no action to approximately \$6,000 under maximum allowable use on all allotments. Of this, twenty five percent (approximately \$1,500/year) would go to Santa Cruz County. The remaining 75% of fees are returned to the Forest Service, but are unlikely to cover recurring administrative costs or the costs of proposed improvements.

Under the No Action Alternative, Santa Cruz County would lose grazing fee payments and ranch revenue that could have been used to purchase goods and services. However, given the economic diversity of the county, the magnitude of this loss would be negligible on the overall county economic health.

Environmental Justice

Executive Order 12892 requires federal agencies to address the effects of their actions on low-income and minority populations by considering equity and fairness in resource decision making.

The project area is not within a concentrated area of low income, high unemployment or high poverty. Therefore, although there may be adverse impacts to individual permittees, none of the alternatives would result in disproportionate impacts to low income or minority populations.

Cumulative Effects: Economics and Environmental Justice

The analysis does not suggest that there will be significant direct or indirect economic or social impacts to local communities and counties from adoption of any of the alternatives considered. Therefore, no cumulative effects are anticipated.

4. CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

List of Key Preparers/Team Members

Stephen Gunzel, District Ranger, Sierra Vista Ranger District	Responsible Official
Rick Gerhart, Team Leader	Team Leader, Wildlife Analyses, Writer/Editor
William Edwards, Range and Watershed Staff, Sierra Vista Ranger District	Proposed Action, Vegetation Analysis
Tom Lorenz, Range and Watershed Staff, Sierra Vista Ranger District	Proposed Action, Vegetation Analysis
Sharon Beidenbender, Range Conservationist	Vegetation Analysis
Salek Shafiqullah, Hydrologist/Soil Scientist	Soils, Air, Water, Riparian Analysis
Tom Deecken, Wildlife Biologist, Sierra Vista Ranger District	Wildlife Analysis
Pete Taylor, Archeologist	Heritage Resource Analysis

FEDERAL, STATE, AND LOCAL AGENCIES:

Arizona Game and Fish Department
 Arizona Department of Agriculture
 Arizona Department of Environmental Quality
 Arizona Cooperative Extension Service
 Arizona State Land Department
 USDA Natural Resource Conservation Service
 USDI Fish and Wildlife Service

OTHERS:

National Wild Turkey Federation
 Sky Island Alliance
 Chiricahua-Dragoon Conservation Alliance
 The Center for Biological Diversity
 Forest Guardians
 Arizona People for the USA

APPENDIX 1. GLOSSARY OF TERMS

Allotment Management Plan (AMP). A document that specifies the actions to be taken on individual allotments to manage and protect resources and meet stated management objectives. It is the long-term operating plan, jointly prepared by the agency and the permittee, that implements the decision made through the NEPA process and promotes progress toward desired future conditions.

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.

Animal Unit. Considered to be one mature (1,000 lb) cow or the equivalent based upon average daily forage consumption of 26 pounds of dry matter per day.

Animal Unit Month. The amount of feed or forage required by one animal unit for one month. AUMs are allocated as follows: Adult cow=1.0 AUM; a cow/calf pair=1.32 AUM; a bull =1.25 AUM; a yearling=0.8 AUM.

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.

Capable Rangeland. Grazing lands under 40% slope, capable of producing at least 100 pounds of dried forage per acre and accessible to livestock. Capable acres are used as the basis for setting grazing capacity. Areas over 40% slope are assigned no capacity because of the erosive nature of such sites and the tendency of livestock to avoid steep slopes.

Capability. The ability of an ecosystem to support grazing use on a sustained yield basis. Grazing capability is expressed as one of three grazing capability classes.

1. Full capacity – Areas that can be used by grazing livestock under proper management without long-term damage to soil resources or the plant community.
2. Potential capacity – Areas that could be used by grazing animals under proper management but where soil stability is impaired or range improvements are not adequate to obtain necessary animal distribution. Generally, this land has impaired soils, steep terrain, poor access and/or poor water distribution.
3. No capacity – Areas which cannot be used by grazing animals without long-term damage to soils or the plant community. No capacity is assigned to these areas even though light livestock use may occur.

Grazing capacity. The average number of livestock that can be sustained on a management unit over time. It is a function of plant production, percent allowable use, overall management objectives and management intensity on the management unit.

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. The Coronado National Forest defines suitable rangelands as areas under 40% slope.

Key Area. A portion of rangeland selected because of its location, use or grazing value as a monitoring location for grazing use, range condition and trend. Key areas are usually $\frac{1}{4}$ to 1 mile from water, located on productive soils on level to intermediate slopes where prescribed use will occur first. They are 5 acres or more in size. Properly selected key areas will reflect the overall acceptability of current management.

Key Species. Plant forage species whose use serves as an indicator to the degree of use of associated species. Typically, these are native perennial grasses that are palatable to livestock.

Management Area. A land classification applied to various land units in the Coronado LMP. For each management area, the LMP describes groups of management practices and standards and guidelines that define the timing and intensity of planned activities necessary to achieve the goals and objectives of the LMP.

Nutrient Cycling. The ability of the soil to accept, hold and release nutrients. This function is assessed by evaluating vegetative community composition, litter, coarse woody material, root distribution and soil biotic crusts. These indicators are considered an important source of soil organic matter, which provides a carbon and energy source for soil microbes, stores and provides nutrients which are needed for the growth of plants and soil organisms and by providing for cation and anion exchange capacities.

Private Land Permit. A private land permit allows landowners to waive to the United States the administration of private grazing lands, which are managed in conjunction with adjacent National Forest lands.

Range Condition: a subjective expression of the health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community. Soundness and stability are evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation and the physical characteristics of the soil. Range condition is expressed as low, moderately low, moderately high, or high based on the combined ratings for plant composition, forage frequency, and vigor. The condition classes are:

Range Condition	Description of Condition	Rating
Low	very poor/poor	0-40
Moderately low	fair	41-60
Moderately high	good	61-80
High	excellent	81-100

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 hydrologic function. The ability of the soil to absorb, store, and transmit water, both vertically and horizontally. This function is assessed by evaluating or observing changes in surface structure, surface pore space, consistence, bulk density, infiltration or penetration resistance. Increases in bulk density or decreases in porosity results in reduced water infiltration, permeability and plant available moisture.

Soil Condition: An evaluation and interpretation of soil quality in terms of factors which effect soil function. Categories of soil condition are satisfactory, impaired, unsatisfactory, and unsuited.

- **Satisfactory** - Soil condition indicates that the inherent productive capacity of the soil resource is being sustained with respect to soil function. Management practices do not reduce soil function. Proper soil function results in the ability of the soil to maintain resource values and sustain outputs.
- **Impaired** - Soil condition indicates a reduction of the soil's inherent productive capacity with respect to soil function. The ability of the soil to function properly has been reduced. An impaired category should signal land managers that there is a need to evaluate existing management practices, take corrective actions where necessary and to further investigate the ecosystem to determine the degree and cause in decline in soil function.
- **Unsatisfactory** - Soil condition indicates that degradation exists. A loss of the soil's inherent productivity capacity has occurred. Soil productivity is not being sustained with respect to soil function. A reduction of soil function results in the inability of the soil to maintain resource values and sustain outputs. Soils rated in the unsatisfactory category are a high priority for land managers to evaluate and change management practices.
- **Unsuited** - Soil condition indicates that soils are inherently unproductive and/or unstable. Examples of those soils identified in the unsuited category are unstable soils occurring on very steep slopes, badlands, and other miscellaneous areas.

Soil stability. The ability of the soil to resist erosion. Soil erosion is the detachment, transport, and deposition of soil particle by water, wind or gravity. Vascular plants, soil biotic crusts, and vegetation ground cover are the greatest deterrent to surface soil erosion. Visual evidence of surface erosion includes sheets, rills, and gullies; pedestalling, soil deposition, erosion pavement, and loss of the surface "A" horizon.

Stream Condition (Proper Functioning Condition):

- a. **Functional:** riparian-wetland areas where there is adequate vegetation, landform, or large woody debris to: 1) Dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality; 2) Filter sediment, capture bedload, and aid floodplain development; 3) Improve flood-water retention and ground-water recharge; 4) Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and

temperature necessary for fish production, waterfowl breeding, and other uses; and 5) 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.

Utilization. The proportion or degree of current years forage production that is consumed or destroyed by grazing animals. It may refer to a single species, a group of species or vegetation as a whole.

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.

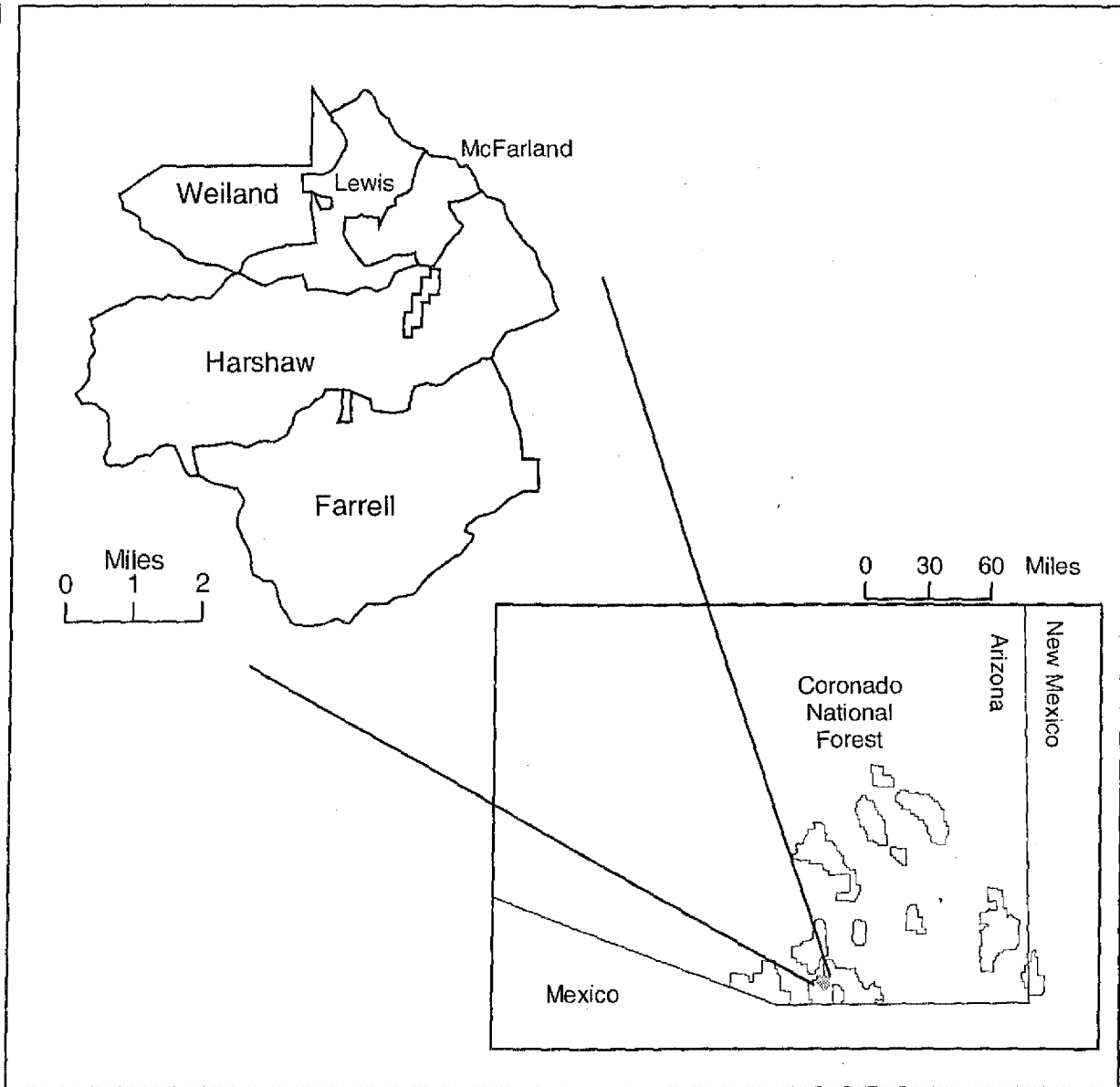
APPENDIX 2 – MAPS

- Figure 1 Project location and vicinity.**
- Figure 2 Project Area.**
- Figure 3 Project Area Vegetation Cover.**
- Figure 4 Forest Land Management Plan Areas**
- Figure 5 Allotment and Pasture Boundaries**
- Figure 6 Soil Condition**
- Figure 7 Fifth Code Watersheds**
- Figure 8 Slope Classes**
- Figure 9 Proposed Harshaw Creek Exclosure**

FIGURE 1

Vicinity Map

**Farrell, Harshaw, Lewis, McFarland, and Weiland Allotments
Sierra Vista Ranger District, Santa Cruz County, Arizona**



Legend

 Allotment Boundary

The Forest Service makes no expressed or implied warranty with respect to the character, function or capabilities of the data or their appropriateness for any users purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification.
Produced by SS, April 2005

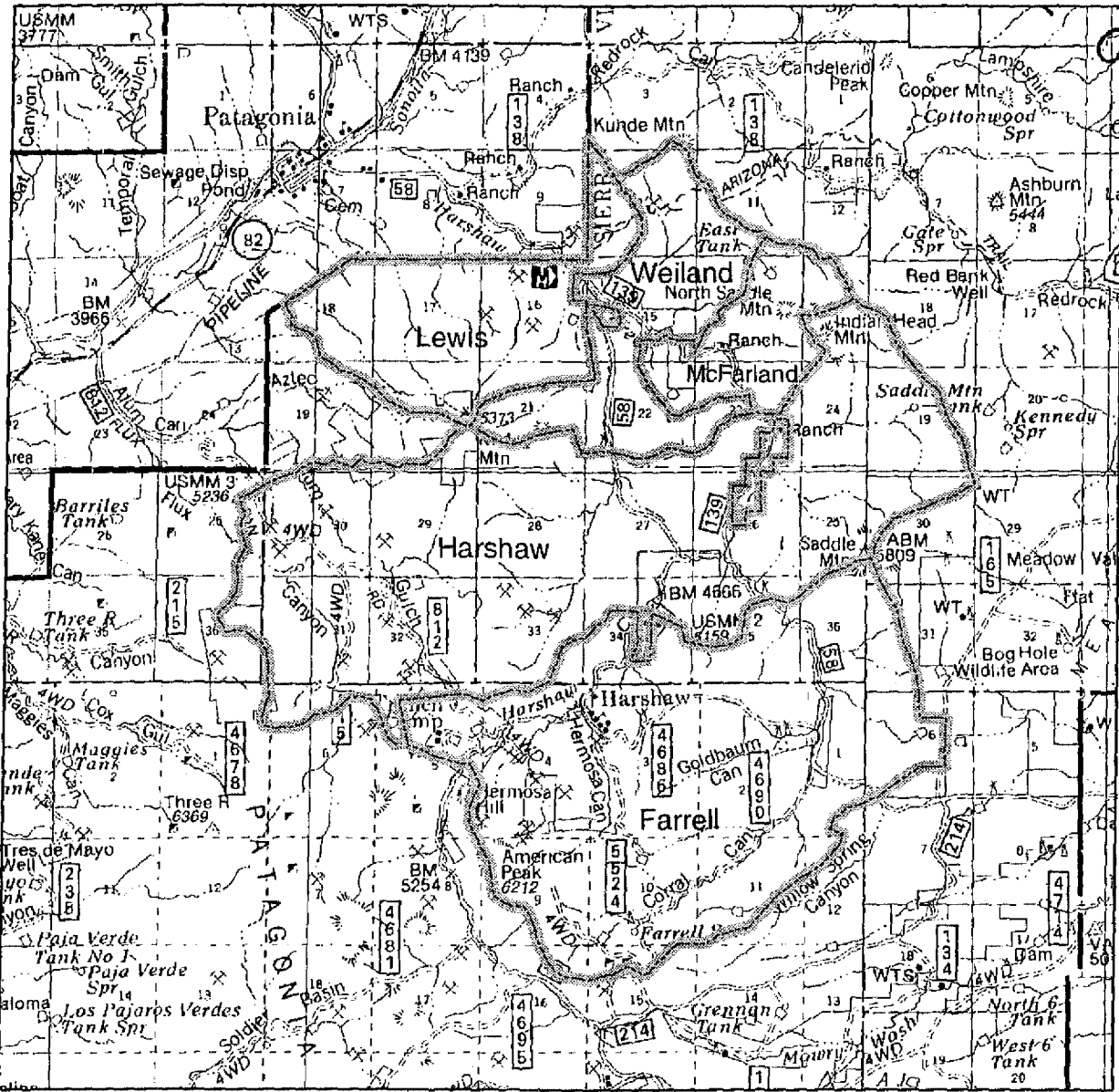
Coronado National Forest
USDA Forest Service



FIGURE 2

Visitor Use Map

Farrell, Harshaw, Lewis, McFarland, and Weiland Allotments
Sierra Vista Ranger District, Santa Cruz County, Arizona



Miles
0 1 2

Legend

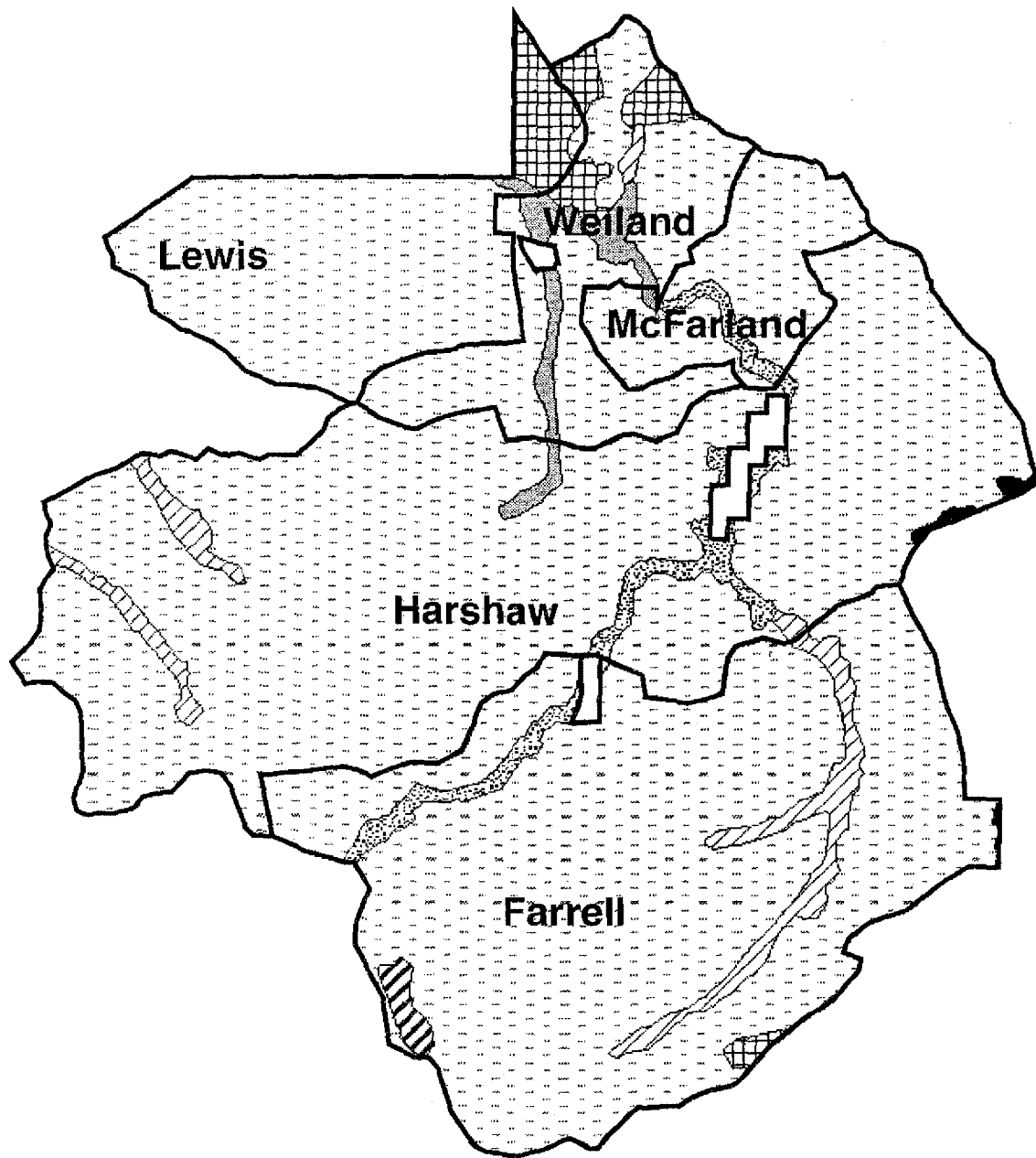
 Allotment Boundary

The Forest Service makes no expressed or implied warranty with respect to the character, function or capabilities of the data or their appropriateness for any users purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification.
Produced by SS. April 2005

Coronado National Forest
USDA Forest Service



Figure 3



1:74,551 0 1 2 Miles

The Forest Service makes no expressed or implied warranty with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification. Produced by: MB, CNF December 22, 2004

Legend

Allotment Boundary

Vegetation

Broadleaf Woodland (Evergreen)

Chaparral

Deciduous Riparian

Desert Grassland

Dry Desert Riparian

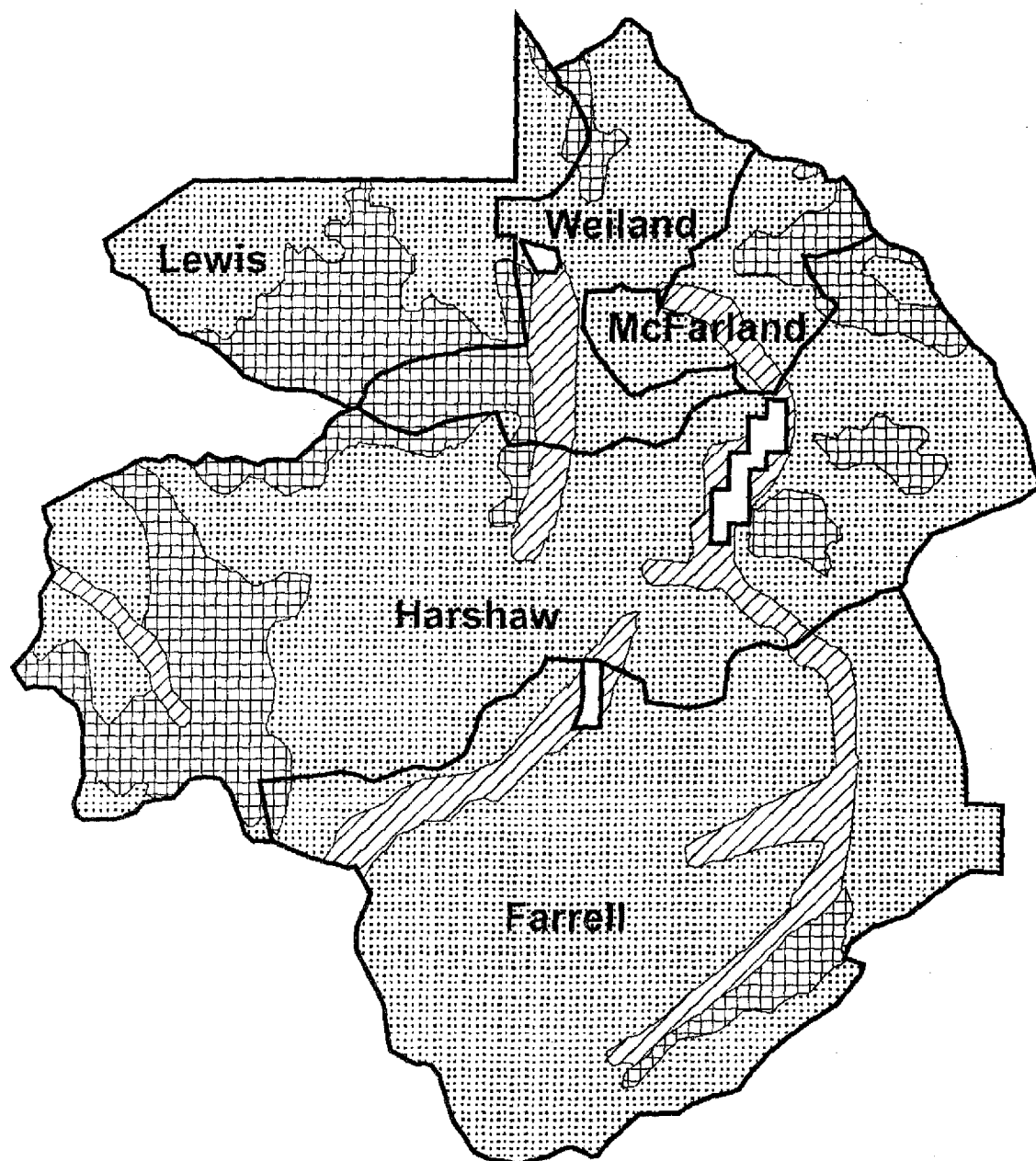
Evergreen Riparian

Plains Grassland

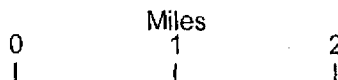


Figure 4

Harshaw, Farrell, McFarland, Lewis, and Weiland Allotment Forest Land Management Areas



1:74,447



Legend

 Allotment Boundary

Management Area

 1

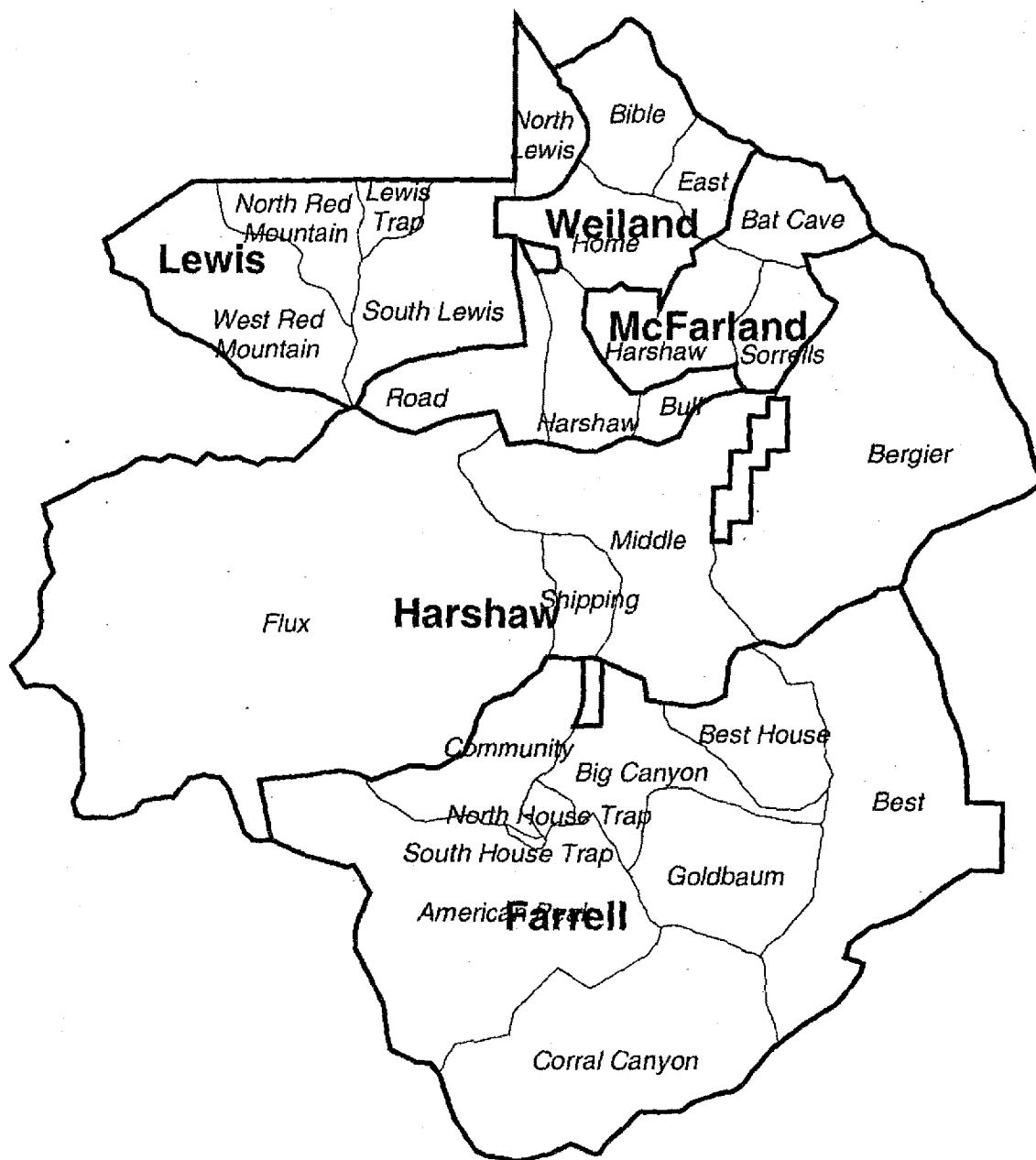
 4

 7

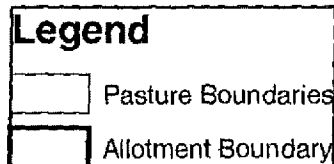
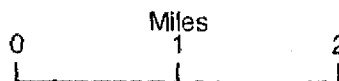
The Forest Service makes no expressed or implied warranty with respect to the character, location, or capabilities of the data or their appropriateness for any user's purposes. Represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification. Produced by MB, CNF December 22, 2004



Figure 5



1:74,447



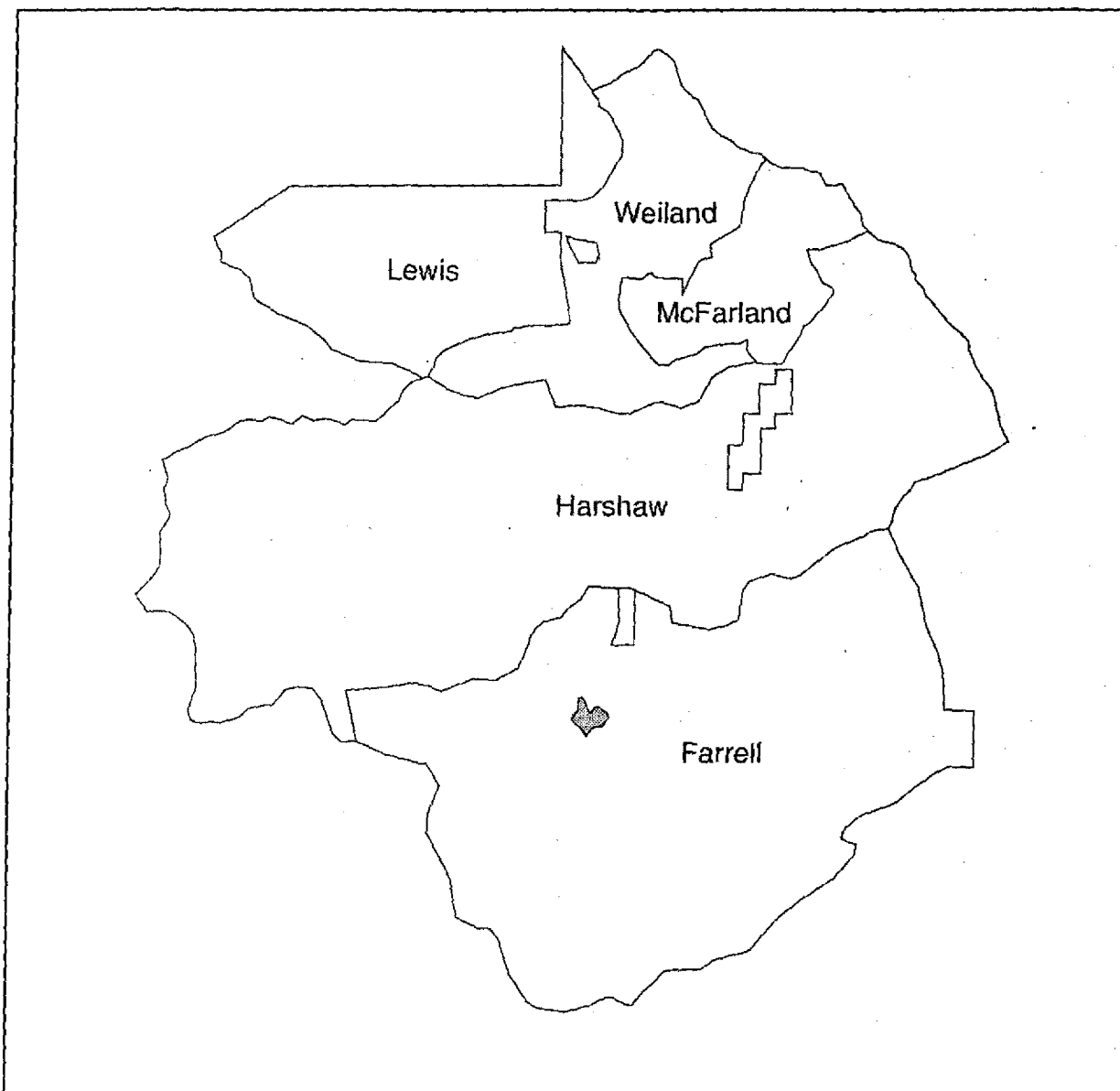
The Forest Service makes no expressed or implied warranty with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification. Produced by: MB, CNF December 11, 2004



FIGURE 6

Soil Condition

**Farrell, Harshaw, Lewis, McFarland, and Weiland Allotments
Sierra Vista Ranger District, Santa Cruz County, Arizona**



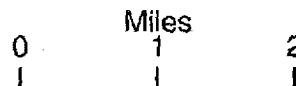
Legend

soil_condition



Impaired

Satisfactory

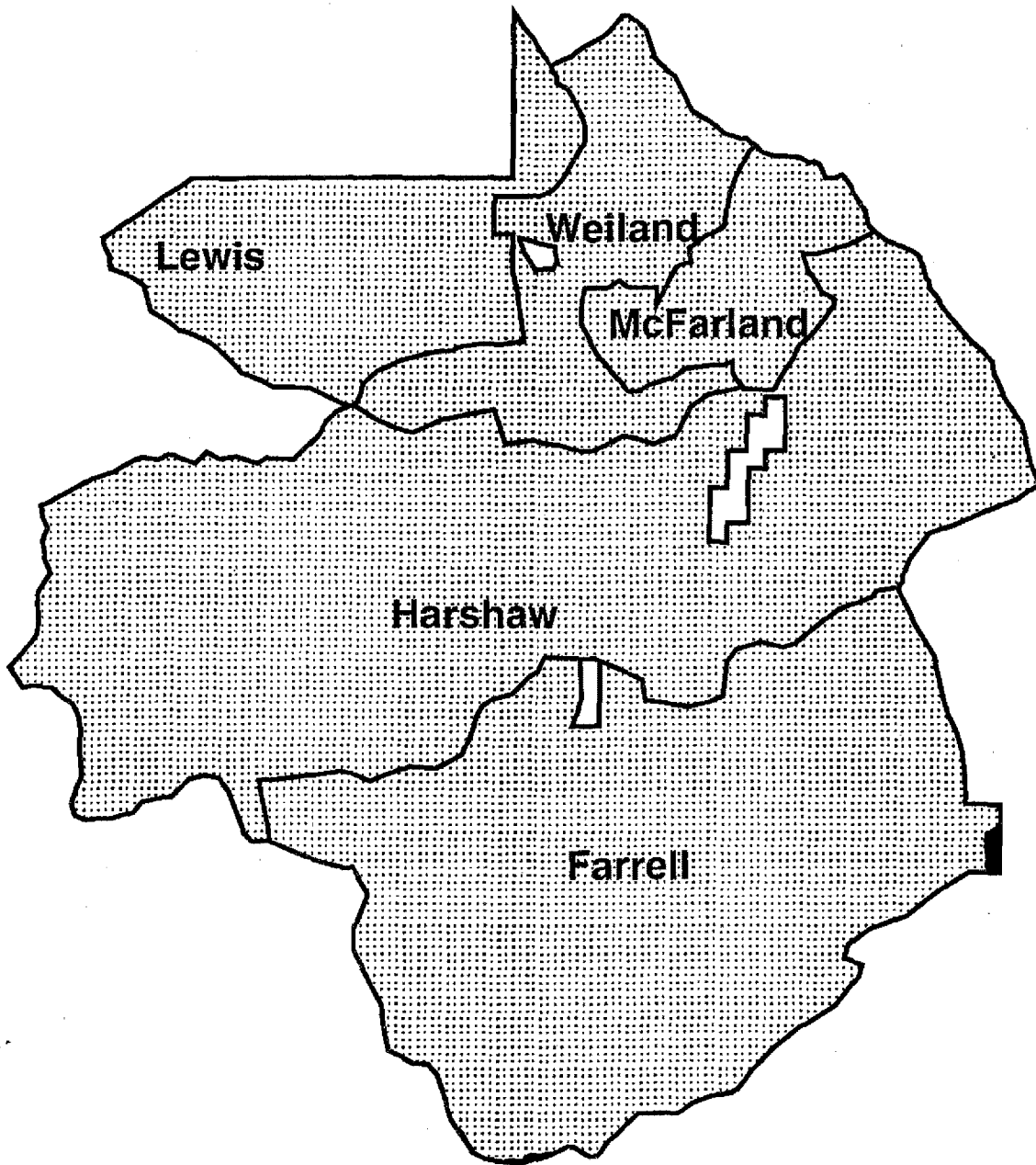


The Forest Service makes no expressed or implied warranty with respect to the character, function or capabilities of the data or their appropriateness for any users purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification.
Produced by SS. April 2005

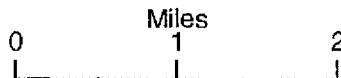
**Coronado National Forest
USDA Forest Service**



Figure 7



1:74,447



Legend

Allotment Boundary

Watershed

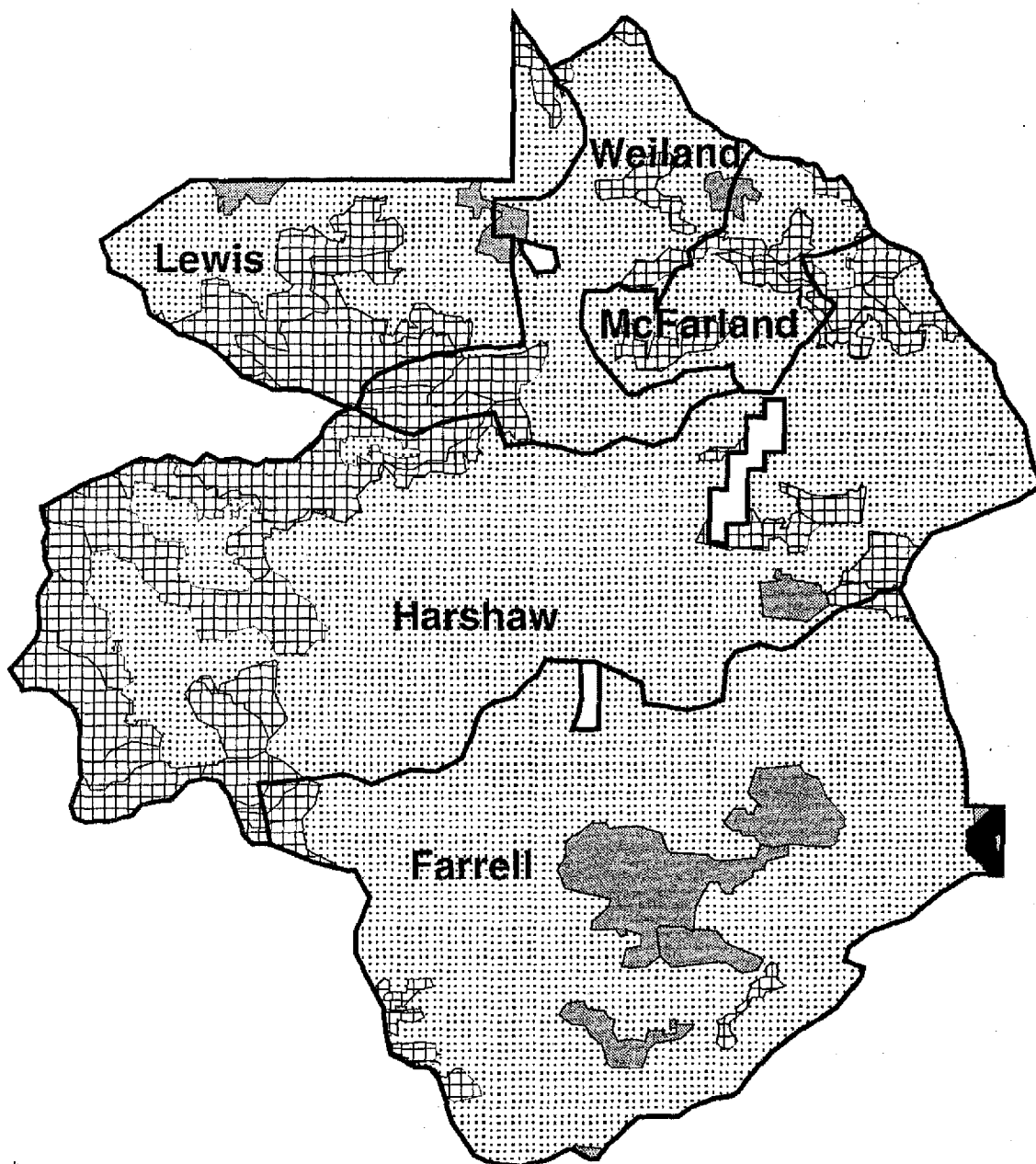
San Rafael Valley-Upper Santa Cruz River

Sonoita Creek

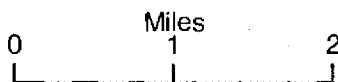
The Forest Service makes no expressed or implied warranty with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes. represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification. Produced by: MB, CNF December 23, 2004



Figure 8



1:74,447



Legend

Allotment Boundary

Slope Classes

0-5

15-40

40+

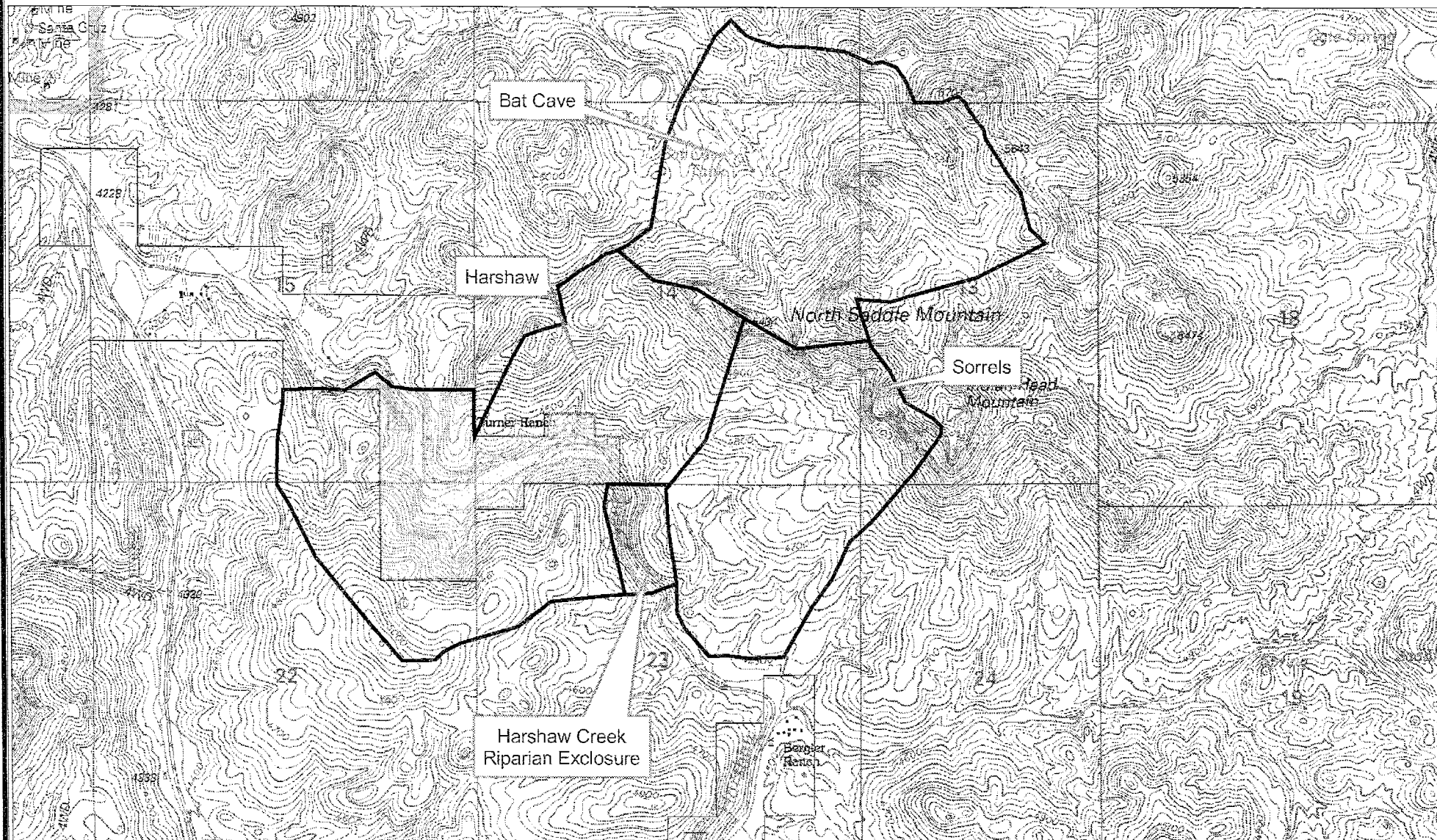
5-15

The Forest Service makes no expressed or implied warranty with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes; represented features may not be in an accurate geographic location. The Forest Service reserves the right to correct, update, modify, or replace this geo-spatial information without notification.
Produced by: MIB, CNF December 23, 2004



Figure 1

Harshaw Creek Riparian Proposed Exclosure McFarland Allotment



The Forest Service makes no expressed or implied warranty with respect to the character, function, or capabilities of the data or their appropriateness for any user's purposes. The Forest Service reserves the right to correct, update, modify, or replace the geographic information without notification. Produced by M. Babin



1:22,365

0 0.1 0.2 0.4 0.6 0.8 Miles

Coronado National Forest
USDA Forest Service

