



United States
Department of
Agriculture

Forest
Service

July 2008



Environmental Assessment

Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek Grazing Allotments Analysis

Douglas Ranger District, Coronado National Forest
Cochise County, Arizona

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1. PURPOSE AND NEED FOR ACTION

Background

This Environmental Assessment (EA) describes a Forest Service proposal to authorize grazing on the Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek grazing allotments in the Chiricahua Mountains, Douglas Ranger District, Cochise County, Arizona. The EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and one alternative.

Federal actions such as the authorization of grazing must be analyzed to determine potential environmental consequences pursuant to the *National Environmental Policy Act of 1969* (NEPA) and the *Rescission Act (P.L. 104-19, 1995)*. Supporting documentation, including more detailed analyses of project area resources and records of public participation, 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 supported by information contained in document No. 21 in the project record.

Purpose and Need for Action

Where consistent with other multiple use goals and objectives, there is congressional intent to allow grazing on suitable National Forest System lands. (*Multiple Use and Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Management and Policy Act of 1976, National Forest Management Act of 1976*). By regulation, forage-producing lands will be managed for livestock grazing where consistent with land management plans (*36 CFR 222.2(c)*). Where consistent with the goals and objectives of Land and Resource Management Plans, it is Forest Service policy to make forage from lands suitable for grazing available to qualified livestock operators (*FSM 2202.1, FSM 2203.1*).

The Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek allotments include land identified as suitable for grazing in the Coronado National Forest Land and Resource Management Plan (Forest Plan). The purpose of the proposed action is to authorize livestock grazing in a manner consistent with Forest Service policy and the Forest Plan. The purpose and need arose because:

- The allotments require environmental analysis necessary to comply with the *Rescission Act (P.L. 104, 1995)*.
- Changes in the seasons of use and permitted use have been identified as necessary to meet Forest Plan standards and to maintain or achieve desired conditions identified for the allotments.

- There is a need to incorporate additional management flexibility through an adaptive management strategy consistent with Forest Service policy (*FSH 2209.13, Chapter 90*).

Existing Condition

The grazing allotments are located on the central portion of the Chiricahua Mountains (Figures 1 and 2). The Chiricahua Mountains are well known for their scenic topography and high diversity of wildlife and plants. Some of the most biologically rich areas within the Chiricahua Mountains are found within the allotments. Vegetation communities are quite diverse (Figure 3). Lower elevations support desert grasslands which transition into broadleaf evergreen woodlands and chaparral at middle elevations. Higher elevations support a plant community dominated by coniferous forests. Major drainages in the project area include Cave Creek, Pine, Pinery and Rock creeks, East Turkey Creek, West Turkey Creek and their tributaries. Portions of these drainages contain well-developed riparian communities comprised of willows, cottonwood, sycamores, ash and Arizona cypress. Portions of all the project area fall within the Chiricahua Wilderness (Figures 2 and 4). Very little grazing occurs in the wilderness due to steep slopes and dense vegetation that characterize the wilderness. Recreation use is high in the project area. There are 10 developed campgrounds within the project area and numerous dispersed camping sites and summer homes.

Permitted use and recent actual use are displayed in Table 1. Current allotment management practices and management issues are briefly summarized below.

The **Cave Creek** allotment is permitted for 80 cow/calf pairs for seven months, from October 1 to April 30. The allotment is permitted and managed in combination with the Paradise allotment. Cattle are rotated through three pastures, and then moved onto the Paradise allotment over the course of the grazing season. A NEPA review of management on this allotment was completed in 1999 (PR 16)¹, at which time the duration of use and permitted numbers were both reduced. Monitoring records indicate that annual use is usually 25 percent or less (PR 17). Approximately 13 miles of Cave Creek from its mouth to Herb Martyr campground and South Fork Canyon are fenced to exclude grazing. The allotment was rested from 2003 to 2005 in response to drought conditions and was partially re-stocked in 2006. There are no significant resource issues identified for this allotment, but some fences are in need of repair in order to keep cattle out of riparian areas and sensitive upper elevation sites.

The **Paradise** allotment is permitted for 70 cattle for nine months, from November 1 to July 31. During the rest of the year, livestock graze off the Forest on state and private land. The allotment is used in combination with the Cave Creek allotment. There are five pastures. Current management entails pushing cattle into the highest and largest pasture for 4-5 months then rotating cattle through four smaller pastures for approximately one

¹ A Decision Notice and Finding of No Significant Impact was signed on April 23, 1999 (PR 16). However, because this allotment is managed in combination with the Paradise allotment and because the decision is scheduled to be reviewed in 2009, the Forest Service has included this allotment in the current analysis.

month each. The allotment was rested from 2003 to 2005 in response to drought conditions and was partially re-stocked in 2006. Rangeland vegetation was evaluated in 2006 and was determined overall to be in fair to good condition. Trends in soil condition appear to be upward based on observations of increasing litter and decreasing bare ground. Management issues on this allotment include the presence of a small area of impaired soils in one lower pasture and the need to reduce growing season use to allow for grazed plant recovery.

The **Pine** allotment is currently permitted for 12 cow/calf pairs yearlong, but management and stocking for the past several years has been 24 cattle for six weeks (July 15 to August 31). During the rest of the year, livestock graze off the Forest on private land. Rangeland vegetation was assessed in 2006 and was determined overall to be in fair condition. Monitoring records indicate that woody species have increased significantly since the 1960s, resulting in a loss of grazing capacity. However, the low permitted use is well within existing capacity.

The **Pinery** allotment is permitted for 130 cow/calf pairs for six months, from November 1 to April 30, but management and stocking for the past several years has been less than 40 head for the six-month period. This level of stocking reflects both the permittee's preferred management and the long term loss of grazing capacity due to woody plant encroachment. During the rest of the year, livestock graze off the Forest on private land. There are four pastures, and three are typically used each year while the fourth is rested. A different pasture is rested each year. Rangeland condition was evaluated in 2005 and 2006, and the allotment was determined to be in fair to good condition. Trends in soil condition appear to be upward, based on observations of increasing litter and decreasing bare ground. Soils are 100 percent satisfactory. Monitoring records indicate that woody species have increased significantly since the 1960s, resulting in a loss of grazing capacity.

The **Lower Rock Creek** allotment is permitted for 75 cattle for four months, from July 1 to October 31. During the rest of the year, livestock graze off the Forest on private land. There are three pastures which are used in a rest rotation, assuring no pasture is grazed during two consecutive growing seasons. Rangeland vegetation was assessed in 2006 and was determined overall to be in fair to good condition. Trends in soil condition appear to be upward, based on observations of increasing litter and decreasing bare ground. Management issues on the allotment include a small area of impaired soils in the northwest corner of the allotment and the need to introduce additional management flexibility to reduce growing season use.

The **Upper Rock Creek** allotment is permitted for 110 yearlings for five months, from November 1 to March 31. During the rest of the year, cattle graze off the Forest on private land. There are two functional pastures used in a deferred rotation. Three additional pastures are used in combination with the two main pastures depending on water availability. Systematic rangeland condition monitoring has not been completed; however visual estimates and inspections to date indicate that conditions are similar to the other allotments included in this analysis. Inspection records indicate that utilization has averaged under 20% (PR 19). The Rock Creek watershed and riparian area was

evaluated in 2007 and was determined to be stable with high bank stability and good vegetation cover (PR 14).

The **Turkey Creek** allotment is permitted for 72 cow/calf pairs yearlong. It is managed under a coordinated resource management plan² in combination with adjacent private lands. Cattle are rotated through four pastures in a deferred rotation. Cattle are off of the allotment for much of the year, and in some years the allotment is not grazed at all. The allotment was last grazed in 2005. Rangeland vegetation was assessed in 2000 and 2006 and was determined to be in fair to excellent condition overall. Trends in soil condition appear to be upward, based on observations of increasing litter and decreasing bare ground. The allotment shows upward trends in condition, and no management issues have been identified.

Table 1. Current permitted and authorized use and proposed use. Recent actual use is shown in head-months (No. of cattle X No. of months grazed) because cattle numbers vary throughout the grazing season.

	Cave Creek	Paradise	Pine	Pinery	Lower Rock Creek	Upper Rock Creek	Turkey Creek
Total Acres	26,590	9,466	8,507	12,142	7,890	6,807	13,449
Capable Acres	13,242	7,770	6,672	10,573	5,541	4,461	3,380
Permitted Use	80 cow/calf	70 cow/calf	12 cow/calf	130 cow/calf	75 cow/calf	110 yearlings	72 cow/calf
Grazing Season	10/1-4/30	11/1-7/31	yearlong	11/1-4/30	7/1-10/31	11/1-3/31	Yearlong
Permitted use Head Months	560	630	144	780	300	550	864
Animal Unit Months	739	832	190	1030	396	385	1140
Recent Actual Use (HM)							
2002-2003	475	300	25	52	138	380	233
2003-2004	non-use	non-use	47	143	227	non-use	non-use
2004-2005	non-use	non-use	47	238	127	173	296
2005-2006	non-use	non-use	47	210	118	98	non-use
2006-2007	1380	non-use	33	210	135	461	non-use
Proposed Use in AUMs (See proposed action for details)							
	635	832	190	475	396	475	1140

Management Direction

The project area falls primarily within Forest Plan Management Areas (MA) 4 and 9, but also includes smaller areas designated as MA 1, 2, 3, 7, 8A and 14 (Figure 5).

Management emphasis for these areas is described below.

Management Area 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 for livestock grazing.

² Coordinated Resource Management is the process whereby various user groups are involved in the discussion of alternate resource uses and collectively diagnose management problems, establish goals and objectives and evaluate multiple use resource management (SRM 1998). It is often used where the presence of intermingled land ownership results in the involvement of a number of stakeholders.

Range management standards and guidelines call for no assigned permitted use for livestock (Forest Plan p. 47).

Management Area 2 includes coniferous forest lands that are suitable for a wide variety of recreational and special uses. They are managed for dispersed recreation; saw-timber and fuel wood harvest will be done to enhance recreation, visual quality and wildlife values. Range management standards and guidelines call for exclusion of livestock grazing (Forest Plan p. 50). These are high elevation non-wilderness areas found primarily on the Pine and Paradise allotments.

Management Area 3 includes undeveloped lands that have a high attraction for recreation. They are managed for a variety of dispersed recreational opportunities while protecting or maintaining the unique physical, biological or cultural resources. These areas include much of the Cave Creek basin outside of the Chiricahua Wilderness and a small area in upper Turkey Creek. Standards and guidelines specify that riparian areas in Cave Creek are to be grazed only between November 1 and June 30 (Forest Plan p. 55). In practice, cattle are excluded from Cave Creek year-round.

Management Area 4 includes 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” (Forest Plan p. 62). Lower elevation uplands outside of the Chiricahua Wilderness fall within this management area.

Management Area 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 (Forest Plan p. 67). All or portions of Pinery Canyon, Pine Canyon, Rock Creek, and upper West Turkey Creek fall within MA 7. Additional unmapped riparian areas are known from the project area and are managed under this emphasis.

Management Area 8A includes lands that have been determined to be suitable for both wilderness designation and designation as a research natural area. The Pole Bridge Research Natural Area is located in the upper Turkey Creek watershed in Pole Bridge Canyon. Standards and guidelines specify that livestock grazing be excluded to protect other value or eliminate conflicts with other users (Forest Plan p. 77).

Management Area (MA) 9 includes vegetative and landform types that have been determined to be suitable for wilderness designation. Management emphasizes wilderness values while providing livestock grazing and recreational opportunities that are compatible with maintaining wilderness values and protecting resources (Forest Plan p. 79). Forest Plan standards and guidelines limit utilization to 35% (Forest Plan p. 116).

Management Area 14 includes lands within the South Fork of Cave Creek that have been designated as a Zoological/Botanical Area. Management emphasis is to perpetuate unique wildlife or vegetative species. Forest Plan standards specify conservative (“extensive”) range management with annual forage utilization established at 30% (Forest Plan, p. 85); however, current management excludes grazing year round.

Desired Condition

The Coronado National Forest Plan identifies the following goals for the range, wildlife, soil, water and lands, wilderness and recreation programs on the Forest (Forest Plan pp. 9-11).

- To restore rangeland to at least moderately high ecological condition (70% to 75% of potential production, fair range condition) with stable soil and a static to upward trend.
- Produce livestock products consistent with other resources and uses.
- Eliminate grazing from areas not capable of supporting livestock without significant detriment to range or other resources.
- Balance permitted grazing use with grazing capacity.
- 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.
- 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.
- Allow the use of available National Forest lands for appropriate public or private interests consistent with National Forest Policies.
- Protect significant cultural resources from damage by project activities or vandalism.
- Manage existing wildernesses to preserve and protect the wilderness character in accordance with the various wilderness acts.

Based on Forest Plan goals and site-specific knowledge of the allotments, the following objectives constitute the desired condition for the analysis area. Monitoring methods to be used to determine achievement of each objective are also identified:

- Livestock stocking is consistent with annual forage production and use is monitored annually. Management controls livestock use and distribution so that sufficient herbaceous vegetation is retained to protect soils and provide herbaceous wildlife cover; zones of heavy use are minimized. Achievement will be monitored through implementation monitoring described under the proposed action on pages 19 and 20.
- Ecological sites within the allotments have stable soils, functional hydrology and support functional biotic communities. All areas are at or moving toward their

ecological potential. Achievement will be monitored through effectiveness monitoring described under the proposed action on pages 19 and 20.

- Native vegetation in riparian bottoms is a diverse mix of perennial grasses, forbs, shrubs and trees. Recruitment of young trees is occurring and trees and shrubs show no evidence of high-lining or hedging. Riparian bottoms throughout the allotments provide suitable year-round habitat for species dependent on herbaceous cover. Achievement will be monitored through implementation and effectiveness monitoring described under the proposed action and monitoring at established riparian monitoring transects.
- Areas of historic heavy livestock use have increasing ground cover and litter and stable soils. Achievement will be monitored through implementation and effectiveness monitoring described under the proposed action.
- Occupied habitats for threatened, endangered, sensitive and management indicator species are maintained or improved, and recovery objectives are being met. Achievement will be monitored through surveys and occurrence records, implementation and effectiveness monitoring.
- All grazing improvements necessary for management on all allotments are in proper working order and are contributing toward improved livestock distribution and pasture reliability. Achievement will be monitored through implementation monitoring and facility inspections.

Proposed Action

The Forest's proposed action is to authorize continued livestock grazing on the Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek grazing allotments. The proposed action consists of four components - **authorization, improvements, management practices and monitoring** – implemented using an adaptive management strategy. Light to moderate grazing intensities and regular growing season rest or deferment will be used to provide for grazed plant recovery, increased plant vigor and retention of sufficient herbaceous vegetation to protect soils and to provide herbaceous cover for wildlife. Existing structural range improvements would be maintained. The proposed action is described in detail as Alternative 2 in the Alternatives section, below.

Decision Framework

The Douglas District Ranger is the official responsible for decisions regarding management of the Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek grazing allotments. Based on the results of the NEPA analysis, the Ranger will issue a decision document or documents that include(s) a determination of the significance of the environmental effects and whether an environmental impact statement will be prepared. The decision(s) will also include a determination of consistency with the Forest Plan, National Forest Management Act, National Environmental Policy Act and applicable laws, regulations and executive orders.

If the District Ranger determines it is not necessary to prepare an environmental impact statement, the Ranger will decide whether or not livestock grazing will continue to be authorized. If grazing continues to be authorized, the District Ranger would determine which management actions, mitigation measures and monitoring requirements would be prescribed in the Allotment Management Plans. These would include permitted use, season of use, allowable utilization standards and the term of the permits. Decisions may be made separately for each allotment. That is, the District Ranger may decide to authorize grazing on one or more allotments, and not on others, or may select different alternatives for different allotments.

Public Involvement

Prior to developing proposed actions, the Forest met with the permittees on the allotments to identify management objectives and strategies. The proposal was listed in the Schedule of Proposed Actions in June 2007, and was provided to the public and other agencies for comment during scoping on September 26, 2007 (PR 28). Two comment letters were received in response to the scoping notice (PRs 29, 30). Using the comments from the public and other agencies, the interdisciplinary team developed a list of issues to address (see below).

In May and June, 2008, a draft of the EA (PR 56) was provided to parties who had expressed interest in the project. The public was also notified of the opportunity to comment through a legal notice published in the *Douglas Daily Dispatch* on May 14, 2008 (PR 57). Four comment letters were received in response to this solicitation (PRs 60-63). A summary of these comments and a Forest Service response is contained in the project record at PR 64.

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 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.³ An analysis of the issues and scoping responses is included in the Record as PR 31.

³ The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..."

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 effects to wildlife, including listed and sensitive species and their habitats. Effects could be either positive or negative depending on the timing, intensity, frequency and duration of grazing and other management activities.

Riparian condition – Grazing in riparian areas could affect riparian conditions, especially where perennial water occurs.

Soil and watershed condition – Continued grazing on the allotments could affect soil condition. Effects could be either positive or negative depending on the timing, intensity, frequency and duration of grazing and other management activities.

Upland vegetation – Continued grazing on the allotments could lead to changes in the composition, structure and vigor of upland vegetation and could affect the condition and trend of rangeland resources. Effects could be either positive or negative depending on the timing, intensity, frequency and duration of grazing and other management activities.

Heritage Resources – Concentrations of livestock and construction of range improvements may affect historic and prehistoric sites located within the project area.

Additional considerations in this EA include potential effects to **air quality, water quality and quantity, special management areas and social resources** including **economics**. Effects on these resources are evaluated through specialist's reports and consultation with tribes and regulatory agencies.

2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the management of the Pine, Pinery, Paradise, Cave Creek, Lower Rock Creek, Upper Rock Creek and Turkey Creek grazing 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 _____

Continue Current Management. Under this alternative, there would be no change in allotment management. As permits expire, new permits would be issued for the classes and numbers of livestock currently permitted. Annual authorized use would continue to be controlled through annual operating instructions. Existing improvements would be maintained. This alternative assumes management intensity, utilization and distribution patterns similar to the past five years. Although this alternative would achieve many of the resource objectives identified in the purpose and need, this alternative was not carried forward because it would not increase management flexibility through formal implementation of adaptive management.

Alternatives Considered in Detail _____

Alternative 1

No Action

Under this alternative, grazing would not be authorized and use of the allotments by domestic livestock would be discontinued. Permittees would be given up to one year from the date of the NEPA-based decision to remove livestock from the allotments. 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

The Proposed Action

The Forest's proposed action is to authorize continued livestock grazing on the Cave Creek, Pine, Pinery, Paradise, Upper Rock Creek, Lower Rock Creek and Turkey Creek allotments. The proposed action consists of four components - **authorization, improvements, management practices and monitoring** – and would be implemented using an adaptive management strategy.

1. Authorization

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

- **Duration and timing of grazing.** Grazing would be authorized on each allotment using rotational or seasonal grazing in order to incorporate growing season rest or deferment to allow for grazed plant recovery. On all allotments, the sequence and timing of pasture moves and the timing of entry and exit from the allotments would be based on monitoring of range readiness, ecological condition, water availability and utilization. Use will occur primarily in the non-growing season. Where growing season use occurs, pastures used in one year will be rested or deferred the following growing season to provide for plant regrowth and recovery.
- **Intensity of grazing.** Forage utilization would be managed at a level corresponding to light to moderate intensity (30-45%)⁴ in order to provide for grazed plant recovery, increased plant vigor, and retention of herbaceous litter to protect soils and provide forage and herbaceous cover for wildlife. Consistent patterns of utilization in excess of 45 percent of key species in key areas would be used as a basis to modify management practices or take administrative actions necessary to reduce utilization in subsequent grazing seasons. Within the Chiricahua Wilderness, annual utilization would not exceed 35 percent, in accordance with Forest Plan direction.

The following administrative actions would be necessary to implement the decision to authorize grazing.

- **Permit issuance.** New 10-year term grazing permits would be issued for each allotment for the numbers and terms identified below and in Table 1 by allotment. The term grazing permit will identify the number, kind and class of livestock authorized and the season of use as required by Forest Service policy (FSM 2231.11). Permits will also identify the total animal unit months (AUMs⁵) authorized for each

⁴ Based on review of numerous grazing intensity studies, Holechek (2004) identifies light to moderate grazing as 32-43 percent average use of primary forage species. These averages are based on pasture-wide utilization averaged over time. 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. For the purposes of monitoring, an annual use guideline of 30-45 percent of key species in key areas will be used to monitor use in all pastures, which, combined with growing season rest or deferment, should insure pasture-wide *average* use of less than 45 percent.

⁵ An animal unit month (AUM) is a measure of the amount of *forage* required by a 1000 lb cow or its

permit. The number and class of livestock and season of use would be allowed to vary depending on resource conditions and management objectives, provided that annual use does not exceed the total AUMs authorized or the season of use identified for the allotment. Such changes will be documented and authorized in annual operating instructions. Grazing permits would be issued within 90 days of final agency action following the NEPA decision to authorize grazing [FSH 2209.13(94) and R3 Supplement 2209.13-2007-1]. Note: Proposed authorized use displayed below for the Paradise, Pine and Upper Rock Creek allotments reflects modifications made subsequent to and in response to public and permittee review of the proposed action. The rationales for changes in proposed authorizations are described after the following list.

- **Cave Creek.** 80 cow/calf pairs, October 1 to March 31 (up to 635 AUMs). The allotment would continue to be managed in combination with the Paradise allotment.
- **Paradise.** 105 cow/calf pairs, October 1 to March 31 (up to 832 AUMs). The allotment would continue to be managed in combination with the Cave Creek allotment.
- **Pine.** 16 cow/calf pairs October 1 to June 30 (up to 190 AUMs).
- **Pinery.** 60 cow/calf pairs November 1 to April 30 (up to 475 AUMs).
- **Lower Rock Creek.** 75 cow/calf pairs yearlong (up to 396 AUMs).
- **Upper Rock Creek.** 40 cow/calf pairs yearlong (up to 475 AUMs). The Forest would be grazed in combination with the permittee's private land using a deferred rotation. For the first three years, stocking would not exceed 356 AUMs in order to assure that pastures and waters can support this management.
- **Turkey Creek.** 72 cow/calf pairs yearlong (up to 1140 AUMs). Although authorized year-long, it is anticipated that current conservative management would continue, resulting in limited seasonal use or non-use in future years.

equivalent for one month based on a daily allowance of 26 lbs. of dry forage per day (Society for Range Management 1998, USFS 1997). It is not synonymous with animal month (or head-month), which is an expression of one month's *occupancy* of the range by an animal. The amount of forage consumed varies based on the size and class of livestock consuming the forage. In general, forage consumption increases with increasing size of the animal using the forage. A cow/calf pair will typically consume more forage than a cow without a calf; a yearling will consume less. Thus an area of rangeland with the capacity to support a certain number of mature cows will likely support relatively fewer cow/calf pairs (or bulls or other larger animals) or relatively more yearlings (or other smaller animals) over the same period of time. The concept of animal unit conversion factors is incorporated into production and utilization studies accomplished by the Forest and is useful for comparing initial capacities on allotments for different classes of livestock. With the forage requirement of a mature cow as the base (1 AUM), the Forest Service Handbook defines a cow/calf pair as 1.32 AUM and a yearling as 0.7 AUM (FSH 2209.15(28)). Ultimately, however, range capacity can be variable and stocking is determined on an annual basis in response to actual use monitoring and current forage conditions.

Change from current management. Changes in management are summarized below by allotment. Changes are largely intended to promote growing season rest or allow additional opportunities for pasture deferments to avoid use during the same period in consecutive years.

- **Cave Creek.** The grazing season would be reduced by one month in the spring to provide additional time for rest and regrowth of grazed plants. Thus, AUMs authorized would be reduced but permitted numbers would not change.
 - **Paradise.** The season of use would be reduced from nine months to six in order to reduce spring growing season use and to provide time for rest and regrowth of grazed plants. The AUMs authorized (832) would remain the same as currently permitted.
 - **Pine.** The grazing authorization would change from yearlong, primarily summer use to nine months primarily dormant season use in order to provide growing season rest and the opportunity for plants to regrow and recover each year. The AUMs authorized would remain the same as currently permitted (190), but growing season use would no longer occur.
 - **Pinery.** Permitted numbers and AUMs of available forage would be reduced to reflect the loss of capacity due to tree and shrub encroachment, and to reflect the permittee's preferred management. Dormant season use would continue in order to provide for grazed plant regrowth each year.
 - **Lower Rock Creek.** Permitted numbers and total AUMs of available forage would not change; however, the season of use would initially be changed from the summer growing season to the winter dormant season to provide growing season rest. The authorization would remain year-long in order to provide the flexibility to rotate and defer pastures in some years.
 - **Upper Rock Creek.** The season of use would change from winter seasonal to yearlong. Use on the Forest would not exceed 9 months in any year, but may occur during any season. This is intended to avoid using both Forest and private pastures during the same time in consecutive years. The numbers and class of livestock will be reduced from 110 yearlings to 40 cow/calf pairs; however, total AUMs authorized (475) would increase as a result of increased duration of use. (Note: the public review draft incorrectly identified 475 AUMs as 30 cow/calf pairs rather than 40. This has been corrected in this final.)
 - **Turkey Creek.** Current permitted use and authorized AUMs of forage would continue.
- **Allotment Management Plans.** Consistent with Forest Service manual guidance (FSH 2209.13, 94) new allotment management plans (AMPs) would be developed for each allotment and would be incorporated into any term grazing permits issued. The AMPs will specify the goals and objectives of management, management strategies, range improvements and monitoring requirements and will incorporate an adaptive management strategy described below. The use of coordinated resource management plans (CRMPs) will continue where in place and such management will be

encouraged where the presence of intermingled ownership is conducive to more flexible management.

- **Annual Operating Plans.** On an annual basis, the Forest and permittees would jointly prepare annual plans, referred to as Annual Operating Instructions (AOI), prior to each grazing year. The AOI will set forth:
 - The maximum permissible grazing use authorized on the allotment for the current grazing season and the number, class and kind of livestock, and the timing and duration of use.
 - The planned sequence of grazing in pastures on the allotment, or the management prescriptions and monitoring that will be used to make changes.
 - Structural and non-structural improvements to be constructed, reconstructed, or maintained and who is responsible for these activities.
 - Allowable use or other standards to be applied and followed by the permittee to properly manage livestock.
 - Monitoring for the current season that may include, among other things, documentation demonstrating compliance with the terms and conditions in the grazing permit, AMP and AOI.

Using adaptive management, actual numbers of livestock may vary based on the class of livestock, the duration of use and climatic conditions. Grazing systems may also be modified as needed to meet stated management objectives.

2. Improvements

No structural improvements (waters and fences) are currently proposed for any of the allotments considered in this analysis. Future monitoring may identify the need for additional improvements. In this case, the need for, and site-specific effects of, each additional improvement will be evaluated as described under *Adaptive Management*, below.

The responsibility for maintenance of range improvements is assigned to the permittee(s) in the terms and conditions of each grazing permit (FSM 2244.03). Maintenance activities include the repair of fences and water facilities, cleaning of stock ponds and other actions necessary to maintain the improvement in serviceable condition necessary to serve the purpose intended. On an annual basis, responsibilities for repair and maintenance of existing improvements will be identified in the AOI(s).

3. Management Practices.

To mitigate resource impacts, the following measures will be implemented. These practices have been demonstrated to be successful when used on similar projects and are considered effective at reducing environmental impacts. They are consistent with applicable Forest Plan standards and guidelines, Best Management Practices and the terms and conditions and conservation measures of applicable U.S. Fish and Wildlife Service Biological Opinions. Implementation of the mitigation measures and design

criteria is intended to preclude the occurrence of potentially significant environmental impacts.

Soil, Water and Vegetation – the objective is to mitigate effects of livestock grazing and facility construction through the use of Best Management Practices (FSH 2509.22, PR 49) and adaptive management. Practices include, but are not limited to the following.

- Utilization of key upland herbaceous forage species in key areas will be managed to achieve the goal of light to moderate grazing as a pasture average. The objective is to protect plant vigor, increase herbaceous residue needed for soil protection and to increase herbage producing ability of forage plants. A utilization guideline of 30-45% use of key species in key areas will be used to achieve this objective.
- Management practices 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. Placement of liquid or bulk supplements will require prior approval of the District Ranger.
- No hay will be placed on Forest lands in order to minimize the introduction of weed seeds.

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

- All water developments will include wildlife access and escape ramps. Waters will be kept available to wildlife year round.
- All new and reconstructed fencing will be built to Forest Plan standards (Forest Plan, 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.
- In the event that the need for new range improvements is identified, projects will be designed to avoid the destruction of agaves. 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. The objective is to avoid impacts to lesser long-nosed bat food resources.
- In the event that the need for new range improvements is identified, all proposed range improvements will be evaluated by a qualified wildlife biologist for effects to 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.

- Within areas meeting the definition of high quality Montezuma 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 (PR 40). The objective is to provide herbaceous vegetation as cover for quail and other wildlife.
- The Forest will implement the Forest's Stockpond and Aquatic Habitat Management and Maintenance Guidelines for the Chiricahua leopard frog (*Rana chiricahuensis*) (PR 51). The objectives are 1) to minimize short-term impacts to frogs while allowing maintenance activities that maintain occupied habitats, and 2) to protect shoreline and emergent vegetation and to improve water quality.

Heritage Resources – The objective is to protect heritage resources (historic and prehistoric sites) from direct or indirect impacts caused by ground-disturbing activities associated with the construction of range facilities and to monitor the effects of cattle grazing on sites to ensure that adverse effects are not occurring. In general, these measures include the following:

- If new range facilities are proposed, the locations will be surveyed by qualified personnel for heritage resources prior to any ground-disturbing activities. Facilities will be built or modified to avoid impacts to heritage sites. If unrecorded sites are discovered during the course of project implementation, activities will cease and the Forest or District 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.
- If impacts from grazing (e.g. excessive trampling, cattle rubbing against and knocking down standing features) are occurring to heritage sites, measures will be taken (e.g. fencing) to protect them.

4. Monitoring

The objective of monitoring is to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Monitoring is necessary under the adaptive management strategy proposed in order to implement timely and effective management changes.

Effectiveness monitoring includes measurements to track the long term condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring will be done following procedures described in the Interagency Technical Reference (1996)⁶ and the Region 3 Rangeland Analysis and Training Guide (USDA-FS 1997). These data are interpreted to determine whether management is achieving desired resource conditions, whether changes in resource condition are related to management, and to determine

⁶ Sampling Vegetation Attributes, Interagency Technical Reference. 1996. Cooperative Extension Service, USDA Forest Service and Natural Resources Conservation Service, and USDI Bureau of Land Management.

whether modifications in management are necessary. Effectiveness monitoring will occur at five to ten year intervals, or more frequently if deemed necessary. Examples of effectiveness monitoring include, but are not limited to dry weight rank, pace transects, pace quadrat frequency, Parker 3-step, riparian evaluations (RASES or proper functioning condition), soil and watershed condition assessments and repeat photography. Monitoring will occur at established permanent monitoring points.

Implementation monitoring will occur on an ongoing basis and will include such things as inspection reports, seasonal and annual forage utilization measurements, livestock counts and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference⁷ and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands (Smith, et al 2007, PR 50).

Utilization will be monitored on key forage species, which are perennial grasses that are palatable to livestock. At a minimum monitoring will include use in key areas⁸, but may include monitoring outside of key areas. Utilization on non-grass species (forbs, shrubs and trees) may also be measured if appropriate for the site. The Douglas District Range Staff Officer and the permittees will be responsible for monitoring livestock grazing utilization. Over time, changes in resource conditions or management may 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 in cooperation with the permittees.

Adaptive Management

Adaptive management uses the documented results of management actions (monitoring) to continually modify management in order to achieve specific objectives, which are identified under *Desired Condition* in Chapter 1. Adaptive management provides the flexibility to adjust livestock numbers and the timing of grazing so that use is consistent with current productivity and is meeting management objectives. Under the adaptive management strategy proposed, the specific number of livestock authorized annually, specific dates for grazing, class of animal and modifications in pasture rotations may be administratively modified as determined to be necessary and appropriate, based on implementation and effectiveness monitoring. However, such changes will not exceed the limits for timing, intensity, duration and frequency authorized in the NEPA-based analysis and decision. Administrative changes will be documented and implemented in the AOI, AMP and/or the term grazing permit.

⁷ Utilization Studies and Residual Measurements. Interagency Technical Reference. 1996. Cooperative Extension Service, USDA Forest Service and Natural Resources Conservation Service, and USDI Bureau of Land Management. Revised 1999.

⁸ A key area is 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 ¼ 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.

Adaptive management also includes monitoring and analysis to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions 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), or whether further analysis under NEPA is required.

Future Review of the Decision

In accordance with Forest Service Handbook direction [FSH 1909.15(18) and 2209.13(96)], an interdisciplinary review of the decision will occur within 10 years, or sooner if conditions warrant. If this review indicates that management is meeting standards and achieving desired condition, the initial management activities would be allowed to continue. If monitoring demonstrates that objectives are not being met and management options beyond the scope of the analysis are warranted, or if new information demonstrates significant effects not previously considered, a new proposed action would be developed and further analysis under NEPA will occur.

Comparison of Alternatives

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

Table 2. Comparison of the Alternatives.

Attribute	Alternative 1	Alternative 2
National Forest Policy and Forest Plan Consistency	Consistent with Forest Plan and policy.	Consistent with Forest Plan and policy.
Meets purpose and need	Yes.	Yes. Balances use with capacity. Provides management flexibility.
Effect on Wildlife and Plants	No Effects from grazing.	Effects mitigated. Light to moderate utilization and emphasis on winter use reduces localized effects to habitats.
Effects on soil and watershed condition	No effects from grazing. Improvement in soil and watershed cover over time.	Moderate use contributes to watershed stability. Concentrations of cattle may contribute to localized soil impairment.
Effects on upland vegetation	No effects from grazing. Increasing plant cover and litter over time.	Moderate use levels and emphasis on winter use maintain satisfactory conditions.

3. ENVIRONMENTAL CONSEQUENCES

This chapter summarizes the physical, biological, social and economic environments of the affected project area and the potential effects to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives. The chapter is organized by resource. Within each section, the affected environment is briefly described, followed by the environmental consequences (effects) if implementing each alternative.

Wildlife

The Chiricahua Mountains are the most southeastern of several mountain ranges within the Basin and Range Geographic Province of southern Arizona and are part of an archipelago of “sky islands” connecting the Rocky Mountains to the Sierra Madre Occidental of Mexico (McLaughlin 1995). The mountains are located in an intersection zone where Rocky Mountain forests, Sierra Madrean woodlands, Chihuahuan and Sonoran deserts and plains grasslands converge. As a result, the Chiricahua Mountains are one of the most biologically diverse areas in the continental United States. More than 1400 species of plants, 500 vertebrate species and thousands of invertebrates are known from the area. More than 300 species of birds nest in or migrate through the mountain range. The entire Chiricahua Mountain range is identified by the National Audubon Society as an Important Bird Area.

Affected Environment – Threatened and Endangered Species

Effects of the ongoing grazing activities on the allotments have been evaluated in Biological Assessments (BA) of Ongoing and Long-term Grazing on the Coronado National Forest in 1998 and again in 2002 (USFS 1998, 2002, USDI-FWS 2002, PR 25). The effects of continued implementation of the Forest Plan, including livestock grazing, were evaluated in 2005 (USDA-FS 2004, USDI-FWS 2005). The effects of ongoing grazing on Mexican Spotted Owl critical habitat were assessed in 2004 (PR 52). Livestock grazing is currently managed to comply with the 2002 and 2005 Biological Opinions from the U.S. Fish and Wildlife Service. Based on minor changes in proposed management, updated information on resource conditions and the need to extend the term of the consultation to coincide with the term of the proposed grazing permits, project level consultation was reinitiated for the proposal in 2007 (PR 33). Species potentially affected by the proposed action or alternatives are disclosed below. More extensive discussions, including “no effect” determinations, can be found in the project BA (PR 33).

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). The lesser long-nosed bat (LLNB) was listed as endangered without critical habitat on September 30, 1988 (53 FR 38456). The species feeds on the nectar and pollen of paniculate agaves (*Agave palmeri*, *A. parry*, and *A. deserti*) and the nectar, pollen and fruit of columnar cactus. Paniculate agaves are found on all of the allotments and the LLNB is known to roost and forage

throughout the Chiricahua Mountains between July and September each year. Five roosts are located within the project area or within foraging distance of the project area.

Jaguar (*Panthera onca*). The Jaguar is listed as endangered without critical habitat (62 FR 39147, 1997). Jaguars are found in habitats ranging from Sonoran desert scrub to subalpine coniferous forest. Since 1996, jaguars have been photographed twice in the Peloncillo Mountains, approximately 20 miles southeast of the project area. Documented occurrences within the Chiricahua Mountain complex include a confirmed kill in 1986 in the Dos Cabezas Mountains and reports dating back to the early 20th century. No jaguars are currently known to inhabit the Chiricahua Mountains; however, given the relative orientation to historic and recent jaguar observations, the rugged characteristics of the project area and the wide-ranging habits of jaguars, all seven allotments are considered to have some potential as travel corridors or hunting areas. Based on recent occurrences and the presence of suitable habitats, a jaguar or jaguars may be reasonably expected to occur in the project area in the next ten years.

Mexican spotted owl (*Strix occidentalis lucida*) and critical habitat. Nine Mexican spotted owl (MSO) protected activity centers (PACs) are found in the project area (Figure 9). The PACs have not been monitored recently, but are presumed to be occupied for the purposes of this analysis. All nine PACs and nearly all suitable nesting and foraging habitat are located in high elevation sites or steep canyons outside of suitable and capable rangelands. Topographic features and dense vegetation restrict access to these locations. All allotments fall partially or entirely within designated critical habitat for the MSO (Figure 9). Not all mapped critical habitat is suitable for MSO. Primary constituent elements⁹ are located in steep, inaccessible sites where livestock grazing is limited by topography.

Chiricahua leopard frog (*Rana chiricahuensis*). The Chiricahua leopard frog (CLF) requires permanent or nearly permanent pools or ponds for breeding. There are numerous historic observations of the CLF from within the project area (Sredl, et al, 1999). The species was last recorded in the project area in 2003 in Horsefall Canyon and in Cave Creek near Portal (USFS file records). Surveys in 2007 did not detect the species at historic locations within the Chiricahua Mountains (AGFD 2007, unpub., PR 34) and the Horsefall Canyon site was dry. The CLF appears to be extirpated from the Chiricahua Mountains or reduced to such low abundance that populations are extremely difficult to detect. The apparent extirpation of CLF from the mountain range is consistent with the extensively documented range-wide decline of the species (Clarkson and Rorabaugh 1989, Sredl and Howland 1994, Rosen *et al.* 1994, Sredl *et al.* 1997). Fungal disease and invasion of habitats by bullfrogs have been identified as primary causes for this decline. Extended drought leading to the drying of several historic sites has also affected the species.

Yaqui chub (*Gila purpurea*). Yaqui chub populations occur in West Turkey Creek, largely on private land held by the El Coronado Ranch, which holds the Turkey Creek

⁹ Primary constituent elements are the physical and biological features of the habitat that support nesting, roosting and foraging. Primary constituent elements for the MSO are identified in the final rule listing critical habitat for the species (USDI 2004).

grazing permit. Since 1998, these private lands have been managed under a Habitat Conservation Plan (PR 21) that provides for a balanced water supply in West Turkey Creek and in private ponds to maintain habitats and enhance the survival of the species. Critical habitat is designated in the San Bernardino National Wildlife Refuge, but not on the Forest.

Environmental Consequences – Threatened and Endangered Species

Lesser long-nosed bat. In 2002 the Forest determined that grazing as practiced on the five allotments *may adversely affect* the LLNB (PR 25). Take was not assessed and no terms and conditions were issued. This determination was based on the following rationale: The LLNB feeds on flowering agaves on the Forest between July and September. Agave stalks, as they begin to bolt are particularly palatable to domestic livestock. If pastures are grazed during April and May when agave stalks are accessible, livestock may feed on young agave stalks, precluding the plant from flowering and potentially reducing forage resources for LLNB. However; it has not been established that grazing by livestock significantly increases herbivory on agaves compared to ungrazed areas. Because deer and other wildlife also feed on the plants, levels of herbivory on agaves have been found to be similar in both grazed and ungrazed pastures. (Widmer 2002, Bowers and McLaughlin 2001). In addition, livestock herbivory on agaves diminishes significantly at distances greater than 0.75 mile (1.21 km) from water (Widmer 2002).

Under *Alternative 1*, no effects are anticipated as livestock will be removed from the allotments and agaves will not be exposed to grazing. Herbivory on bolting agaves by native wildlife would continue. Under *Alternative 2*, grazing on the Cave Creek, Paradise, Pine and Pinery allotments would be limited by the permit to the winter season. Cattle would not be on these allotments during the agave bolting season. The other allotments will be permitted year-long, but in practice are grazed seasonally, most often during the winter period. The duration of exposure would be short and grazing intensity would be light to moderate. Moreover, grazing is often deferred during the May-June period because water is often limited during this driest part of the year. If grazing occurs during the bolting period, the effects of livestock herbivory on agaves are likely to be discernable only within .75 mile of the few available waters. The proposed action does not include modification of any bat roost on Forest Service land or other activities that would result in disturbance at roosts. Based on this, the Forest has determined that the proposed action *may affect, but is not likely to adversely affect* the lesser long-nosed bat on all seven allotments.

Jaguar. In 2002, the Forest determined that ongoing grazing is *not likely to adversely affect* the jaguar based on the conclusion that grazing does not affect movement corridors for the species (PR 25). The decline of the jaguar in Arizona was concurrent with predator control activities associated with land settlement and the development of the livestock industry in the early 20th century. Predator control activities aimed at jaguar no longer occur. Activities that potentially affect jaguars are those that result in fragmentation of habitats or disruption of movement corridors that allow dispersal into unoccupied habitat. Excessive removal of woody or herbaceous vegetation, particularly

within riparian corridors, could affect cover for jaguars and/or their prey; however, jaguars are not dependent solely on dense vegetation for escape or protective cover. Habitat remoteness and steep topographic relief appear to provide the majority of cover available to this species in the southwest.

Under *Alternative 1*, livestock would be removed. There would be no effects on woody cover, although herbaceous cover may increase in areas that were historically grazed. Assuming that jaguars opportunistically prey on cattle, some reduction in prey availability may occur. However, native deer are abundant in the project area, so this effect would not be significant. Under *Alternative 2*, livestock grazing may result in short term disturbance, but would not disrupt connectivity corridors within the U.S. and between the U.S. and Mexico. Livestock grazing within the project area is not predicted to reduce woody cover in bottoms or uplands. Removal of herbaceous cover by grazing livestock would continue, but this would not significantly affect cover for jaguars. Jaguars may prey on livestock, but such predation has not been documented in the project area. Based on this, the Forest concluded that the proposed action will *may affect, but is not likely to adversely affect* the Jaguar on all five allotments.

Mexican spotted owl (*Strix occidentalis lucida*) and critical habitat. In 2002 the Forest determined that ongoing livestock grazing is *not likely to adversely affect* the MSO on all seven allotments (PR 25). In 2004, the Forest determined that ongoing livestock grazing is *not likely to adversely affect* MSO critical habitat on all seven allotments (PR 52).

Under *Alternative 1*, herbaceous cover would not be influenced by livestock grazing. Under *Alternative 2*, grazing on the Cave Creek, Paradise, Pine and Pinery allotments (the allotments with PACs) would be limited by the permit to the winter season, outside of the MSO nesting season. The Turkey Creek allotment will be permitted year-long, but in practice is grazed seasonally if at all, and most often during the winter period. In addition, all PACs in the analysis area are outside of capable and suitable range and are unlikely to be grazed when cattle are on the allotments.

Outside of PACs, proposed utilization limits of 30-45% (35% within the Chiricahua Wilderness) are expected to provide sufficient residual herbaceous cover for prey species. Owls foraging outside of PACs but within suitable habitat may be subject to disturbance, but this disturbance would be limited to the presence of grazing livestock or human activities associated with herding cattle or with the day-to-day running of ranching activities. No construction activities are proposed within PACs. Based on this the proposed action *may affect, but is not likely to adversely affect* the Mexican Spotted Owl and its designated critical habitat on all seven allotments.

Chiricahua leopard frog (*Rana chiricahuensis*). Consultation in 2002 determined that ongoing grazing *may adversely affect* the CLF on all seven allotments based on the assumption that grazing would occur in suitable or potential habitats on the allotments. At present, there are no known occupied habitats in the project area; therefore no livestock use will occur where the species is present. Non-occupied suitable habitats occur in the project area and seasonal livestock use may occur in some of these habitats. The proposed action would continue exclusion of livestock from much of Cave Creek and West Turkey Creek where likely to be occupied habitats occur. Upland vegetation, soil

and riparian conditions have been assessed throughout the project area and are judged to be contributing to satisfactory watershed and riparian conditions (PRs 9-15, 22, 43-47). Upland and riparian vegetation is meeting forest plan standards. Trends in soil and watershed conditions appear to be upward, based on observations of increasing litter and decreasing bare ground. Best management practices and light to moderate utilization proposed should maintain these trends (PR 43). The Forest's Chiricahua Leopard Frog Management Guidelines (PR 51) will be implemented as part of the proposed action in order to minimize the potential introduction of predators and/or disease and to maintain cover in suitable habitats. Based on the current condition and trend of resources and mitigation measures in place or proposed, the proposed action *may affect, but is not likely to adversely affect* the Chiricahua leopard frog on all seven allotments.

Yaqui chub (*Gila purpurea*). Consultation in 2002 determined that ongoing grazing is *likely to adversely affect* the Yaqui chub because there is a possibility that livestock may come in contact with occupied habitat in West Turkey Creek during high water flows. Incidental take was issued as a result of this consultation. The Turkey Creek allotment has not been grazed since 2005. When the allotment is grazed, livestock grazing occurs irregularly in uplands during the fall and winter. Grazing is not allowed along West Turkey Creek during the spring and summer. Although management effectively prevents livestock access to the creek, occupied habitats in upper West Turkey Creek are not physically excluded. Vegetation monitoring indicates that uplands are in fair to excellent condition with stable soils and upward trends. Watershed condition does not appear to be affected by current light levels of grazing. The proposed action largely continues the management already in place on the allotment and is not expected to result in effects in a manner or to an extent not considered previously. However in keeping with previous determinations, these effects cannot be considered insignificant or discountable. The proposed action *may affect, likely to adversely affect* the Yaqui chub on the Turkey Creek allotment.

Affected Environment - Forest Service Sensitive Species

Sensitive species are those species that have been identified by the Regional Forester as of concern for reduction in population viability as evidenced by 1) significant current or predicted downward trends in population numbers or density, or 2) significant current or predicted downward trends in habitat capability that would reduce a species' distribution. (Forest Service Manual 2670.5). The Regional Forester's list of sensitive plant and animal species was revised and updated in September 2007, and was the basis for the analysis. Due to the high ecological diversity found in the Chiricahua Mountains, numerous sensitive species potentially occur in the project area. Effects to sensitive species have been analyzed in a biological evaluation prepared for this project (PR 39) and are summarized below.

Environmental Consequences – Forest Service Sensitive Species

Mammals

Chiricahua (Mexican) fox squirrel (*Sciurus nayaritensis*). Suitable habitats are found in upper elevations of the project area in pine-oak forests and evergreen and coniferous riparian plant communities. Fox squirrels are highly arboreal and are probably not

affected by moderate levels of grazing. Light to moderate livestock grazing as proposed should provide for tree recruitment. In addition, very little grazing is anticipated in upper elevation canyons that provide the best squirrel habitat. The proposed action is expected to have *no impact* on Chiricahua fox squirrel.

Arizona shrew (*Sorex arizonae*). Dense leaf litter and forest debris, such as downed logs are important as cover for foraging shrews. The species has been documented in the project area in East Turkey Creek, and suitable habitats may occur in the Cave Creek drainage. Effects from livestock grazing would only occur if livestock were allowed to concentrate in narrow wet canyons preferred by the shrew, and if this use resulted in the degradation of leaf litter and herbaceous cover that provide habitat. The proposed winter grazing (Nov-April) should reduce the potential impact in narrow canyons. Based on this, the proposed action *may impact individual Arizona shrews, but is not likely to result in a trend toward federal listing or a loss of viability.*

White-nosed coati (*Nasua narica*). This species is common in oak woodlands and riparian habitats throughout the Forest. Identified threats include indiscriminate killing and predator control. The Arizona Game and Fish Department restricts the take of this species through an annual bag limit. No predator control is proposed as part of the proposed action. Managed grazing does not affect woodland habitats for this species. *No Impact.*

Bats: Mexican long-tongued bat (*Choeronycteris mexicana*), Allen's lappet-browed bat (*Idionycteris phyllotis*), Townsend's big-eared bat, (*Corynorhinus townsendii pallescens*), Western red bat (*Lasiurus blossevillii*), Western yellow bat (*Lasiurus xanthinus*). Populations of the five species of bats potentially occurring in the project area are affected primarily by disturbance or destruction of roost sites, which are primarily caves, crevices, abandoned mines or, in the case of the western red bat and western yellow bat, riparian trees. Bat roosts are found in the project area, but these are not affected by grazing. The proposed action includes mitigation that would avoid disturbance of bat roosts. Therefore, the proposed action would not affect caves or mines. Grazing in riparian areas would not be of sufficient intensity or duration to alter the composition or recruitment of mature riparian trees. *No Impact* for all species.

Birds

American Peregrine Falcon (*Falco peregrinus anatum*). Active peregrine falcon eyries are known from Cave Creek and Portal Peak within the analysis area. The entire project area is likely used as a foraging area for birds nesting nearby. The primary threat to the species is disturbance at nest sites, primarily by recreational rock climbers, but also through other noise producing activities that take place during the nesting season (March 1 to July 15). No activities that would disturb eyries are planned or anticipated, so direct impacts would be precluded. Light to moderate grazing intensity under the proposed action should maintain vegetative diversity and corresponding prey species habitat quality. Based on the foregoing, the proposed action should have *no impact* on peregrine falcon.

Apache Goshawk (*Accipiter gentilis apache*). There are ten goshawk post-fledging family areas (PFAs) within the analysis area. Nesting habitat includes closed-canopied

Madrean oak woodland and Mexican pine-oak woodlands. Forest plan standards and guidelines for goshawk call for management that results in uneven age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes and species composition well distributed across the landscape. Under the proposed action the combination of winter grazing and moderate (<45%) utilization proposed should maintain vegetative diversity and would not be expected to affect prey species abundance. Effects would be limited to minor disturbance related to grazing, maintenance of existing improvements and movement of livestock. For the most part, grazing will occur outside of the nesting season for this species (March-September). The proposed action *may impact individuals, but is not likely to result in a trend toward federal listing or a loss of viability.*

Gould's Wild Turkey (*Meleagris gallopavo mexicana*). The indigenous population of this subspecies is thought to have been extirpated on the Forest during the late 1800s and early 1900s. The existing population is the result of re-establishment efforts over the past five years. Within the analysis area, suitable habitats are coniferous woodland, riparian corridors in oak woodlands, and grassland savannas. The species appears to be able to coexist with well-managed livestock grazing. Limiting factors appear to be the presence of roost trees of sufficient size and the availability of free water. Mature grass seed heads are a source of forage for turkeys as well as green herbaceous leafage, insects, and mast (acorns and juniper/manzanita berries). The proposed action is expected to retain sufficient herbaceous forage for turkeys across the landscape, although areas of livestock concentration may impact forage resources on a local scale during the late winter and spring. Livestock waters likely benefit turkeys, and mitigation measures would assure that all waters are accessible. Neither alternative will affect roost trees. Effects are expected to be limited to disturbance as a result of minor construction or livestock management activities and localized removal of grass cover and forage. The proposed action *may impact individual turkeys, but is not likely to result in a trend toward federal listing or a loss of viability.*

Broad-billed Hummingbird (*Cynanthus latirostris*). This is a summer resident in riparian areas of southern Arizona. The species would be affected by activities that degrade riparian areas. Light to moderate dormant season grazing is not expected to affect riparian vegetation to a significant degree. Much of the best habitat for this species is located in Cave Creek, which is not grazed. *No impact.*

White-eared Hummingbird (*Hylocharis leucotis*). Most observations of this species are from Cave Creek or higher elevations. Suitable habitats in Cave Creek and higher elevations are fenced, inaccessible, and/or not grazed during the summer when the hummingbird is present on the Forest. *No impact.*

Violet-crowned Hummingbird (*Amazilia violiceps*). This is a primarily Mexican species that reaches the northern extent of its range in southern Arizona. The species nests most often high in Arizona sycamores. Suitable habitats are found in Cave Creek, but these habitats are not subject to livestock grazing. *No impact.*

Lucifer Hummingbird (*Calothorax lucifer*). This hummingbird prefers open arid landscapes with agave, ocotillo, yucca and penstemon. These types of landscapes are

widespread in southern Arizona. Heavy grazing in preferred habitats could potentially affect the species, but light to moderate dormant season grazing proposed is not expected to affect the species. *No impact.*

Eared Quetzal (*Euptilotis neoxenus*). This is a forest bird of Mexico that rarely ranges north into Arizona. It is observed infrequently in the Chiricahua Mountains. Threats are associated with the loss of nesting trees due to logging. No tree removal is proposed. *No impact.*

Northern Buff-breasted Flycatcher (*Empidonax fulvifrons pygmaeus*). The buff-breasted flycatcher occurs quite widely in open pine forests in Mexico and Central America. The U.S. breeding population is restricted to a few higher elevation canyons in the Huachuca and Chiricahua Mountains from March to September each year. Populations of buff-breasted flycatcher appear to be influenced by events such as fire that create or maintain an open grass understory in the bird's pine-oak woodland habitat. Occupied habitats are found in Pine, Pinery, Horsefall, Saulsbury, Pole Bridge and Cave Creek canyons in the project area, but they are almost entirely at higher elevations where livestock do not graze. The exception is Lower Pinery Canyon, but this allotment is grazed only during the winter when flycatchers are not present. Winter use should optimize herbaceous understory by allowing for complete grass re-growth each summer and light to moderate utilization should retain sufficient residual herbaceous biomass to provide suitable year round habitats. The proposed action *may impact individual buff-breasted flycatchers, but is not likely to result in a trend toward federal listing or a loss of viability.*

Abert's Towhee (*Pipilo aberti*). This species is widely distributed throughout lower elevations in southern Arizona, nesting in dense vegetation ranging from riparian thickets to suburban back yards (Corman 2006). The Chiricahua Mountains are largely above the elevation range preferred by the species. Suitable habitats are limited in the project area and there are no breeding records. *No impact.*

Reptiles

Twin-spotted Rattlesnake (*Crotalus pricei*). This small rattlesnake is locally common on talus slopes and other rocky sites in ponderosa pine, aspen, and mixed conifer, generally above 8,000 feet in elevation. Preferred rocky habitats are typically avoided by cattle and are found at elevations above which grazing occurs. In addition, most grazing will occur during the winter when the snake is not active. *No impact.*

Slevin's Bunchgrass Lizard (*Sceloporous slevini*). This lizard is found mainly above 6,000 feet elevation in sunny patches of bunchgrass in open coniferous forests. Grazing as proposed would result in minor modification of bunchgrass communities, but most grazing would occur during the winter and grasses would be allowed to regrow each year. The proposed action *may impact individuals of this species, but is not likely to result in a trend toward federal listing or a loss of viability.*

Green Ratsnake (*Senticolis triapsis*). The subtropical species is rarely seen, although its Madrean evergreen woodland habitats are quite abundant. There are no known threats, other than collecting for the pet trade. The effects of grazing on this species are not well

documented, but rocky woodland sites preferred by this species would normally be avoided by cattle. *No impact.*

Reticulate Gila Monster (*Heloderma suspectum suspectum*). The species is threatened by overcollection and loss of habitat near urban areas, but populations and habitats in remote locations like the Chiricahua Mountains are secure. Livestock grazing is not known to be a threat. *No impact.*

Invertebrates

Chiricahua water scavenger beetle (*Cymbiodyta arizonica*). Adults and larvae are aquatic. There is limited perennial water habitat in the project. The best habitats are found in Cave Creek, which is not grazed. There could be trampling effects to wet/damp areas elsewhere. The emphasis on winter use should help keep cattle up out of canyon bottoms. The proposed action *may impact individual water scavenger beetles, but is not likely to result in a trend toward federal listing or a loss of viability.*

Four Spotted Skipperling (*Piruna polingii*). Habitat is moist woodland openings with lush vegetation, meadows, ravines, and streamsides in the mountains. Caterpillars likely feed on native grasses as do livestock. The proposed grazing intensity and emphasis on winter use would retain more than half of the vegetative biomass. The proposed action *may impact individual spotted skipperling, but is not likely to result in a trend toward federal listing or a loss of viability.*

Plants

Chiricahua Rockcress (*Arabis tricornuta*). All known occurrences of this plant are on steep rocky sites at elevations above which livestock grazing would occur. *No impact.*

Lemmon Milkweed (*Asclepias lemmonii*). This plant occurs in the project area in Cave Creek and Turkey Creek. This plant grows during the monsoon season and is unlikely to be significantly affected by the proposed winter grazing. Most milkweeds contain resinoids and glycosides and are seldom eaten because of low palatability. Effects would primarily be related to ground disturbance by grazing cattle. The proposed action *may impact individuals, but is not likely to result in a trend toward federal listing or a loss of viability.*

Copper Mine Milk-Vetch (*Astragalus cobrensis* var *maguirei*). This plant is found in canyon bottoms and drainages in Pinery Canyon and West Turkey Creek, as well as Chiricahua National Monument. Populations were surveyed in 2001 (Malusa 2001) and do not appear to be threatened by current levels of human use. Individual plants could be grazed or trampled, but the species appears to be fairly tolerant of disturbance. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Chihuahuan Sedge (*Carex chihuahuensis*). This grass-like semi-aquatic perennial has been documented from Cave Creek. The Cave Creek allotment would be grazed during the winter (October-April) and suitable habitats in Cave Creek itself are fenced to exclude cattle. The other allotments in the group generally lack suitable habitats. Isolated populations occurring outside of Cave Creek could be grazed late in the grazing season as

the plants start to green up. Summer growing season rest would allow for re-growth and plant vigor to be restored. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Trans-Pecos Indian Paint Brush (*Castilleja nervata*). This plant is known from private land near Turkey Creek. If present on the Forest, this plant could be grazed because it typically occurs on south facing grassy slopes where cattle would graze during winter. Heavy grazing is considered a potential threat, but light to moderate levels proposed and emphasis on winter use would allow the species to persist. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Arid Throne Fleabane (*Erigeron arisolius*). This plant grows in moist rocky soils within grasslands, grassy openings in woodlands or roadsides. One population is known from upper Pinery Canyon. Baker (1999) surveyed numerous locations on the Forest and considered it common and abundant over a large range. This annual plant appears tolerant of disturbance and is unlikely to be seriously affected by dormant season grazing with a light to moderate use level. Livestock are not present when plant is actively growing. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Chiricahua Fleabane (*Erigeron kuschei*). This plant is known only from the Chiricahua Mountains at elevations above 6,900 feet on shaded, north-facing cliffs and ledges carpeted with moss. Known populations are not accessible to livestock. *No impact.*

Wislizeni Gentian (*Gentianella wislizeni*). High-elevation clearings 6,900 feet and above, usually with open sunlight appear to be the best habitat. Plants survived the 1994 Rattlesnake Fire and increased in number at some locations that experienced low intensity fire. This plant is found only at highest elevations within the Chiricahua Wilderness along the crest trail where no grazing is planned. *No impact.*

Bartram Stonecrop (*Graptopetalum bartramii*). This small succulent grows in cracks in rocky outcrops in shrub live oak-grassland on sides of rugged canyons which are usually avoided by livestock. Nevertheless it sometimes grows in situations where trampling or limited grazing may occur. The species has not been found in the project area, but is known from one location north of the project area. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Arizona Mountain Alumroot (*Heuchera glomerulata*). This plant occurs in wet or moist sites from 4,000 to 9,000 feet in Pinery Canyon and near Rustler Park. These locations are generally above capable rangelands. Given the wide elevational range and the plant's affinity for wet sites, undetected populations could be exposed to grazing. The emphasis on dormant season use should preclude effects while the plant is actively growing. The proposed action *may impact individuals, but is not likely to result in a trend toward federal listing or a loss of viability.*

Purple-spike coralroot/Texas Purple-spike (*Hexalectris warnockii*). This orchid is known to occur in the Chiricahua National Monument, but is not known from the project

area. Spikes of this plant are not above ground during season when livestock are grazed. *No impact.*

Lemmon Lily (*Lilium parryi*). A single population was discovered in 1992 in East Turkey Creek growing on the edge of an inaccessible waterfall. This population was washed out in 1994 after the Rattlesnake Fire. *No impact.*

Lemmon's lupine (*Lupinus lemmonii*). There are no known records from the analysis area. One location occurs on private land west of the Chiricahua Mountains. Not likely to occur in analysis area. *No impact.*

Toumey groundsel (*Packera neomexicana* var *toumeyi*). Two populations are known from the project area, but both are in locations that are not grazed (South Fork of Cave Creek and Fly's Peak). Populations may occur undetected elsewhere. Impacts would be limited to grazing of individual plants, but these are expected to be minimal due to the emphasis on low elevation winter grazing. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Chiricahua Rock Daisy (*Perityle cochisensis*). This plant grows in crevices and ledges of rhyolitic cliff faces. This habitat is not accessible by livestock. *No impact.*

Davis Mountain Jacob's Ladder (*Polemonium pauciflorum* ssp. *hinckleyi*). Occurs in Ponderosa pine and oak forests up to alpine fir above 6,800 feet on a variety of substrates. The elevational range of the species is generally above where livestock would graze. Undetected populations growing in canyon bottoms may occasionally be grazed or trampled during the plant's dormant season. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Blumer's Dock (*Rumex orthoneurus*). This herbaceous perennial grows in mid-to-high elevation wetlands in canyon and meadow situations. Populations in the Chiricahua Mountains grow at elevations that are not exposed to grazing. Malusa (1993) reported that plants in Long Park were grazed heavily by cattle in 1991, but cattle are no longer allowed to graze at this elevation. Under the proposed action, no grazing would occur in the vicinity of populations, but there is a slight chance that cattle may get through fences on rare occasions. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Chiricahua Mountain brookweed (*Samolus vegans*). This perennial herb is confined to areas with permanent water. One population is known from Cave Creek. Cave Creek is fenced to exclude cattle. *No impact.*

Huachuca groundsel (*Senecio multidentatus*). This herbaceous perennial grows in montane conifer forests above 7,000 feet. A single population is known from the vicinity of Chiricahua Peak. This population is found inside the Chiricahua Wilderness well above where grazing would occur. *No impact.*

Nodding blue-eyed grass (*Sisyrinchium ceruum*). This small plant could be impacted through trampling in seeps, springs, and wet areas when livestock concentrate around dwindling water. This plant is known from one high elevation site in the analysis area, but could occur undetected at lower elevations. Riparian exclosures and emphasis on

dormant season use would help maintain this plant. The proposed action *may impact individual plants, but is not likely to result in a trend toward federal listing or a loss of viability.*

Porsild's Starwort (*Stellaria porsildii*). Known locations are in high elevation meadows that are not grazed. *No impact.*

Shade Violet (*Viola umbraticola*). This plant occurs in shady areas in canyon bottoms, usually within riparian ponderosa pine forest in Arizona, and pine-oak in Mexico. A population is known from the South Fork of Cave Creek in an area that is excluded from grazing. Undetected populations growing elsewhere may be affected by grazing or trampling. The proposed action *may impact individuals, but is not likely to result in a trend toward federal listing or a loss of viability.*

Affected Environment - Management Indicator Species

Forest Plan direction for Management Indicator Species (MIS) is to maintain or improve occupied habitat (PR 1). Forest-wide trends of all MIS have been assessed and are reported in the Forest-wide Status Report for Management Indicator Species (USDA-FS 2006, PR 36). The background information and conclusions of this report are incorporated by reference. Eight species and the group of cavity nesters are known to occur or potentially occur within the project area. A description of the selection criteria and in-depth evaluations of project-level impacts are contained in a separate report (PR 37).

Environmental Consequences – Management Indicator Species

Primary and Secondary Cavity Nesters. Primary cavity nesters are those species that excavate and nest in cavities, whereas secondary cavity nesters use cavities excavated by primary cavity nesters. Primary and secondary cavity nesters potentially occur in all plant communities in the project area, an estimated total of 84,000 acres of Madrean evergreen woodlands, coniferous or riparian forest. Habitat requirements for cavity nesters differ by species. In general, they require large, older age class trees and snags to provide a suitable substrate for cavities. Between 1982 and 2003, human-caused and natural fires burned in excess of 38,000 acres of woodland and riparian areas in the Chiricahua Mountains. Trees killed in these fires remain standing in many areas and continue to provide suitable substrate for cavity nesters. Riparian areas are considered stable and recruitment of younger age class trees is occurring in both grazed and ungrazed sites. The most well-developed riparian forests are found in Cave Creek and nearly all of this is fenced to exclude grazing. Therefore, the trends in the quantity and quality of cavity nester habitat are considered stable.

Grazing-related activities would affect cavity nesters only if they are of sufficient scale and intensity to change the rate of regeneration of cavity bearing trees. No activities are proposed that would change the amount or distribution of cavity bearing trees in upland sites. In riparian areas, grazing potentially reduces the recruitment of trees through trampling or browsing on small trees by livestock. Approximately 13 miles of Cave Creek and South Fork are fenced to exclude cattle. Dormant season use proposed for most allotments should allow for riparian tree growth and recruitment during the growing

season. Where use is authorized year-long or during the growing season, pasture rest and deferment or short duration use will limit the amount of time livestock are in any pasture, allowing for recruitment of riparian vegetation where the potential exists. Therefore, grazing as proposed is unlikely to cause a detectable change in cavity-nester populations or a loss of occupied habitat.

Elegant Trogon (*Trogon elegans*). Elegant trogons are included in the Cavity Nesters, Riparian Species, Species Needing Diversity, Special Interest, and Threatened and Endangered Species indicator groups. It was selected as an indicator because it needs cavities for nesting and is considered sensitive to concentrated recreation. Elegant trogons are found in mixed-deciduous riparian bottoms and pine-oak woodlands between 4,500 to 6,500 feet. Elegant trogons nest in secondary cavities, often in sycamores or oaks, between the months of April and August. Trogon surveys are accomplished annually in the Chiricahua Mountains. The number of pairs observed averaged 6.1 between 1991 and 2000. More recent data are not available. These data combined with surveys elsewhere on the Forest indicate that populations persist in suitable habitats on the Forest, but population levels are too low to detect statistically significant trends.

Occupied habitats are found in Cave Creek and its tributaries in the Cave Creek allotment. Additional suitable habitats occur in Pine Canyon (Pine allotment) and possibly Turkey Creek (Turkey Creek allotment). Cave Creek drainages are largely excluded from livestock grazing, or where not fenced, are grazed only during the winter in accordance with Forest Plan standards and guidelines. Based on the results of riparian area inventories conducted in 1998, grazing under current management is not limiting the development of riparian areas on the four allotments (PR 45). Implementation of *Alternative 1* should result in no impacts to riparian vegetation from grazing. Site-specific disturbances related to livestock management activities would not occur. The proposed action (*Alternative 2*) would restrict grazing to the winter on the Cave Creek allotment and allow for rest or deferment in other allotments where potential habitats are found. The proposed intensity of use in riparian areas should be sufficient to allow for recruitment of new riparian trees. No activities are proposed that would affect the distribution of existing nest trees. Neither alternative is expected to contribute to a change in forest-wide populations of the species, but should maintain suitable and occupied habitat for the species.

Sulphur-bellied flycatcher (*Myiodynastes luteiventris*). The Sulphur-bellied Flycatcher is included in the Cavity Nesters, Riparian Species, Species Needing Diversity, Special Interest Species indicator groups. The species nests in mid-elevation (5,000-7,000 ft) mixed deciduous riparian canyons composed of Arizona Sycamore (*Platanus wrightii*) and Walnut (*Juglans major*). Sulphur-bellied Flycatchers typically arrive late in the spring, often not appearing until early June, and depart at the end of the monsoon in early September, immediately after nesting. They feed on insects and berries. No information on trend for this species is available in the NABBS database; however, the species has been regularly detected during breeding bird surveys in suitable habitats in the Chiricahua Mountains since 1981 (Sauer et al, 2004). The Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2007) describes the species as fairly common in suitable habitats and suggested that some range expansion is occurring.

Suitable habitats are found in Cave Creek and its tributaries in the Cave Creek allotment. These drainages are largely excluded from livestock grazing, or where not fenced, are grazed only during the winter in accordance with Forest Plan standards and guidelines. Implementation of *Alternative 1* should result in no impacts to riparian vegetation from grazing. Site-specific disturbances related to livestock management activities would not occur. The proposed action (*Alternative 2*) will restrict grazing to winter use only on three of the seven allotments and allow for rest or deferment in other allotments. The proposed season and intensity of use in riparian areas should be sufficient to allow for recruitment of new riparian trees. No activities are proposed that would affect the distribution of existing nest sites. Neither alternative is expected to contribute to a change in forest-wide populations of the species, but should maintain suitable habitat.

Montezuma (Mearns') Quail (*Cyrtonyx montezumae mearnsi*). This species is identified as a Species Needing Herbaceous Cover. It is also a priority bird species in the Arizona Partners in Flight Bird Conservation Plan (Latta, et. al. 1999). Montezuma quail habitat is common throughout the Forest, encompassing approximately 225,000 acres. The amount of potential habitat has not changed significantly since 1986, but Forest-wide habitat suitability has likely improved as a result of improved livestock management over the past two decades. As with many small game species, harvest data provide an index to population levels from year to year. Harvests have fluctuated widely, but are currently near the same levels they were at in the early 1980's (PR 36, 37). The maintenance of grass height over 6" is necessary to provide sufficient cover for the birds to hide from predators. Forest Service Manual guidance (Forest Service Manual Supplement 2631.1, PR 64) restricts grazing in mapped high density Montezuma quail habitat to 45% by weight to meet this objective. Much of the project area is considered high density habitat and is mapped as primary range by the Arizona Game and Fish Department (AGFD 2005, PR 65).

Alternative 1 would maximize the amount of residual herbaceous cover that provides Montezuma quail habitat within the analysis area and would be expected to meet Forest Plan 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 (Brown 1982, Bristow and Ockenfels 2000). Therefore, 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. In the absence of sufficient precipitation, the effects of management changes alone on long-term trends for quail populations may not be discernable.

Alternative 2 should maintain sufficient levels of herbaceous cover as a result of grazing intensities under 45% and an emphasis on non-growing season use. Monitoring records indicate that mixed perennial grasslands in the project area are in fair to excellent condition and riparian conditions are satisfactory. Utilization monitoring indicates that use on all of the allotments has been 30% or less in recent years. These trends are expected to continue under the proposed action. Forest manual guidance (PR 40) will be implemented across the landscape through a utilization guideline of 30-45%. Grazing as

proposed under either of the alternatives is unlikely to cause a detectable change in Montezuma quail populations or a loss of occupied habitat.

Baird's sparrow (*Ammodramus bairdii*). This sparrow breeds in the mixed grass prairies of the northern Great Plains and winters in the southwest. The species has not been documented on the Forest. Grasslands east of the Chiricahua Mountains on state and private land have been identified as potential wintering habitats (Whetstone 1995), but suitable habitats are limited on the Forest. The Forest boundary roughly follows the edge of the woodland.

Alternative 1 would result in the greatest development of herbaceous cover over the life of the project. *Alternative 2* would manage for light to moderate use levels, resulting in the maintenance of the limited suitable habitat on the allotments. Considering the limited suitable habitat available in the project area and the limited intensity and duration of grazing in potential habitats, implementation of either of the alternatives would not result in a detectable change in Baird's sparrow populations on the Forest or a loss of occupied habitat.

Blue-throated hummingbird (*Lampornis clemenciae*). The blue-throated hummingbird is found in Cave Creek Canyon during the spring and summer. The project area is at the very northern extreme of the species' range. This bird is highly tolerant of human activity and readily habituates to sugar water feeders. Low numbers of birds are usually observed during NABBS routes in Rucker and Portal but data are insufficient to detect trends. The species appears to be highly correlated to the presence of running water, which is limited to Cave Creek and South Fork. In addition, the species is found on the Forest primarily during the spring and summer when livestock are not on the allotments. Therefore, implementation of either of the alternatives would have no effect on occupied habitats and would not contribute significantly to changes in Forest-wide populations.

Buff-breasted Flycatcher (*Empidonax fulvifrons*). Effects to this species are discussed under "Sensitive Species", above. Neither alternative would affect occupied habitats for buff-breasted flycatcher or contribute to changes in Forest-wide populations for the species.

Coues White-tailed Deer (*Odocoileus virginianus couesi*). Coues white-tailed deer is included in the Species Needing Diversity, Species Needing Herbaceous Cover, and Game Species indicator groups. The Coronado National Forest Plan identifies 1,430,071 acres of occupied habitat for the species in all vegetation types on the Forest. The amount of occupied habitat has not changed significantly since 1986. Several large fires have likely improved deer habitats by creating a variety of seral stages that benefit deer. The entire project area (approximately 84,000 acres) is considered suitable habitat, and represents less than six percent of the total occupied habitat on the Forest.

Survey data are collected by the Arizona Game and Fish Department (AGFD) on the basis of Game Management Units. The project area is included in Game Management Unit 29. AGFD does not typically estimate populations, but monitors trends based on fawn survival and recruitment. Fawn survival over the past five years (1999-2005) in Unit 29 has averaged 35%, indicating a stable population. Deer harvest trends have remained stable over the past 5 years (2002-2006), averaging 200 animals per year.

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 would not be of sufficient intensity or duration to affect large scale reductions in cover or result in competition. Grazing as proposed continues management practices that have been in place for several years and that have allowed white-tailed deer to persist. Neither alternative is likely to cause a detectable change in white-tailed deer populations or a loss of occupied habitat.

Black Bear (*Ursus americanus*). 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. Because of their secretive and solitary nature, bears are difficult to census, and there have been no attempts to census bear on the Forest. Populations are estimated by AGFD based on qualitative analyses of habitat carrying capacity. Bear numbers are also influenced by hunting, which is regulated by the AGFD. Black bears potentially occur throughout all of the project area.

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). Manzanita, oak and other mast-producing plants are abundant throughout the project area. The proposed action does not include features that would affect mast production. Grass can be seasonally important in black bear diets, especially in the spring. Given the moderate use grazing levels and rest and deferment proposed, competition for forage would not be expected under any of the action alternatives. There may be a slight potential for bear depredation on livestock during years of poor forage production, but this potential is considered small in light of the lack of records of past problems. Moreover, grazing on four of the seven allotments would be limited to winter use, so cattle would not be present on the allotments when bears are active during the summer. Neither alternative is expected to cause a detectable change in black bear populations 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.” Advice from the Forest Service Southwestern Regional Office is to analyze effects in the following manner: (1) effects to Species of Concern listed in the Arizona Partners in Flight Bird Conservation Plan; (2) effects to Important Bird Areas (IBAs) identified by the National Audubon Society; and (3) effects to important overwintering areas.

Species of Concern. The Arizona State Partners in Flight Bird Conservation Plan (Latta 1999) lists priority species of concern by vegetation type. Species that potentially occur in the project area are shown in Table 3. Proposed light to moderate grazing intensities

and regular growing season rest are predicted to maintain habitat quality for all species listed in Table 3.

Table 3. Summary of effects of the proposed action on migratory bird species of concern and habitat types in the project area.

Species	Habitat Type	Habitat Description	Effects
Northern Goshawk	Mixed Conifer Madrean Pine-Oak Woodland	Mature forests with a mosaic of dense stands and openings	Suitable habitats largely ungrazed. No effects on tree canopy or structural diversity. (See Biological Evaluation)
Mexican Spotted Owl	Mixed Conifer	Mature forests with dense canopy and midstory. Woody debris in understory. Cool, steep sided canyons.	Suitable habitats largely ungrazed. (See Biological Assessment)
Buff-breasted Flycatcher	Madrean Pine-Oak Woodland	Apache and Chihuahuan pines with herbaceous understory	Light seasonal grazing should maintain herbaceous understory. (See MIS analysis)
Eastern (Azure) Bluebird	Madrean Pine-Oak Woodland	Mixed oak and pines with open canopy and herbaceous understory. Cavity nester.	Light seasonal grazing should maintain herbaceous understory. Proposed action will not change the distribution of mature cavity-producing trees.
Montezuma (Mearns') Quail	Madrean Pine-Oak Woodland	Oak canopy of greater than 20% with understory of perennial grass greater than 6".	Light seasonal grazing will retain herbaceous understory. (See MIS analysis).
Band-tailed Pigeon	Madrean Pine-Oak Woodland	Mixture of acorn-producing trees and a shrubby component.	No actions are proposed that would change the abundance or distribution of oaks.
Thick-billed Parrot	Madrean Pine-Oak Woodland	Tall pines with snags for nesting	No actions are proposed that would change the abundance or distribution of pines. Preferred habitats largely ungrazed.
Elegant Trogon	High Elevation Riparian	Canyons with sycamores and oaks, often with perennial waterflow.	Habitats largely excluded from grazing. (See MIS analysis).
Red-faced Warbler	High Elevation Riparian	High elevation canyons containing maple, oak and sycamore with dense midstory. Ground-nester.	Primary threat is logging; suitable habitats largely ungrazed. Project will not affect woody species needed by the bird.

Important Bird Areas

The Chiricahua Mountains are identified as an Important Bird Area by the National Audubon Society (<http://www.tucsonaudubon.org/azibaprogram/ibalist.htm>). The proposed action is limited to the authorization of low intensity, seasonal livestock grazing and continues practices that have been in place for many years. The authorization is not expected to affect the designation of the IBA or to affect the characteristics that led to the designation of the IBA.

Important Overwintering Areas

The Chiricahua Mountains are located in an intersection zone where Rocky Mountain forests, Sierra Madrean woodlands, Chihuahuan and Sonoran deserts and plains grasslands converge. The mountains are located in an important migratory corridor for numerous avian species. More than 300 species of birds nest in or migrate through the mountain range. Over 130 species of birds are regularly identified during the Portal Christmas Bird Counts in the vicinity of Cave Creek.

The proposed action is limited to the authorization of low intensity, seasonal livestock grazing and continues practices that have been in place for many years. The proposal is not expected to affect the overall diversity of the area that provides habitat for wintering birds.

Vegetation Condition

Affected Environment

Grazing by domestic livestock may impact vegetation by changing the mix of species in the plant community being grazed (vegetation composition), by changing the density and frequency of perennial forage plants, and by changing the vigor of the grazed plants. Rangeland condition is an expression of the degree to which the composition, frequency and vigor of plants in a community resemble the climax plant community for that site. Measurements of these three vegetation parameters are used to place range sites into vegetation condition classes that reflect the relative effects of grazing on vegetation.

The project area falls within the Mexican Oak-Pine Woodland and Oak Savannah Land Resource Unit (41-1 AZ) and Range Woodlands Land Resource Unit (41-3 AZ) as defined by the Natural Resource Conservation Service. The reference range sites used to describe the potential natural community for the purpose of determining rangeland condition include Sandyloam Uplands, Clayloam Uplands, Loamy Uplands, Limy Slopes, Shallow Hills and Volcanic Hills in the 16-20 inch and 20-23 inch precipitation zones. Rangeland vegetation was assessed in 2006 by the Forest Service using the dry weight rank methodology (PRs 9-13). Monitoring results are summarized below.

Pine. Data collected at permanent monitoring locations indicate that the allotment is generally in fair condition. One site rated as poor due to a significant increase in the overstory of oaks, pine and other woody species and a corresponding decrease in perennial grasses that have been shaded out by the tree canopy. Indicators of soil

condition such as the amount of bare ground and litter show positive trends, but vegetation composition is unlikely to change in the absence of fire.

Pinery. Data collected at monitoring locations indicate the allotment is in fair to good condition (PR 12). Groundcover is high, indicating very good soil stability.

Paradise. Overall rangeland condition was determined to be fair to good based on data collected at four monitoring locations (PR 13). Monitoring records indicate that juniper and other woody species are also increasing in some locations on this allotment. The percentage of bare soil has decreased substantially over conditions measured in the 1960's, indicating positive trends in soil stability.

Lower Rock Creek. Overall rangeland condition was determined to be fair to good based on data collected in 2006 and 2007. As elsewhere in the project area, tree and shrub cover has increased since monitoring began in the 1960s. Watershed condition is considered good based on the presence of adequate soil cover.

Upper Rock Creek. Permanent transects on this allotment have not been read. However the allotment has been lightly used and is grazed only during the dormant season. Inspection records (PR 19) indicate that use has been generally less than 20%. Watershed health and hydrologic stability were assessed for use in this analysis and were determined to be high based on high vegetative cover and channel stability (PR 14).

Cave Creek. Permanent transects on this allotment have not been read. However the allotment is grazed only during the dormant season and receives growing season rest each year. In addition, the allotment was placed in non-use for between 2003 and 2006.

Turkey Creek. Overall rangeland condition was determined to be fair to good based on data collected in 2006 and 2007 (PR 10). Additional monitoring was accomplished in 2000 by a consultant using Natural Resource Conservation Service methodology (PR 22). These data indicated good ecological conditions at 15 monitoring locations.

Environmental Consequences

Monitoring indicates that most sites within the project area are at or near their ecological potential or that conditions are affected by high tree densities and canopy closure. Under *Alternative 1* woody species would likely continue to suppress condition, because a shift in species composition is needed for some areas to reach high condition. Thus many areas will probably remain in fair condition in the absence of more intensive management such as burning or mechanical treatment that would open up the canopy. On open loamy upland sites, residual plant material, both standing and in the form of litter, would be expected to increase in the absence of grazing. Additional organic material is expected to provide soil protection, increase soil water holding capacity and decrease evaporation. In terms of indirect effects, additional herbaceous material in the understory will provide fine fuels that will allow fire to play a more natural role in the area. The re-establishment of a more natural fire regime may reduce the density of woody species such as juniper, pinyon pine and oak that currently suppress herbaceous production.

Alternative 2 (Proposed Action) will provide flexibility to adjust to changing forage conditions. Proposed utilization objectives of 30-45% in uplands should maintain plant

density and vigor over the term of the analysis, especially if use occurs primarily during the dormant season. Moderate use proposed is expected to leave sufficient residual biomass to protect soils and provide herbaceous fuels to carry fire. Annual growing season rest on all of the allotments and regular rest or deferment should allow for growth and reproduction of perennial grasses each summer. Management alone may not be sufficient to result in significant changes, since a shift in species composition would be necessary.

Riparian Condition

Affected Environment

Numerous named drainages are found in the analysis area and all allotments support stands of riparian vegetation in some locations (Table 4). Cave Creek and Turkey Creek support perennial or semi-perennial flows, although in dry years permanent water is restricted to isolated pools during the summer. Riparian vegetation in most drainages is sustained throughout much of the year by sub-surface flow. Nearly all larger drainages have roads located in or adjacent to the channel and are subject to high recreational activity. These uses also affect hydrology and vegetation in riparian areas.

The analysis of riparian area condition is based primarily on information gathered at established riparian area monitoring points using the Riparian Area Survey and Evaluation System (RASES, USDA-FS 1989). These areas were assessed in 1998 for condition and to verify the accuracy of the vegetation classification (PR 45). Additional RASES monitoring has not occurred since 1998, but many riparian areas are fenced to exclude livestock (Cave Creek, North Fork of Cave Creek, Turkey Creek) and are therefore not affected by grazing. Inspection records in the allotment files do not indicate that there have been significant changes in riparian condition. Stream channels and canyon bottom vegetation are generally meeting the standards of the Forest Plan. Nearly all riparian areas have been affected by wildfire in the watersheds within the past 15 years, resulting in changes in channel development. Several channels (North Fork Cave Creek, Cave Creek, Pinery Canyon, Pine Canyon, the lower part of East Turkey Creek, and Turkey Pen Canyon) have bank protection of less than 60%, which is the Forest Plan standard. However, vigor and recruitment of riparian vegetation is good, indicating that conditions are moving toward Plan standards.

Table 4. Existing Riparian Condition, Central Chiricahua Mountain Allotments.

Allotment	Stream Name	Year Data Collected	Tree Species Recruitment (species in young age classes compared to total number of species found)	Tree and Shrub Canopy (Percent Shade)	Vigor
Cave Creek	North Fork of Cave Creek	1998	5 of 6 (none riparian)		
	South Fork Cave Creek	1998	3 of 6 (1 riparian species)	70%	Excellent
	Cave Creek	1998	7 of 8 (3 riparian species)	55%	Excellent
	Cima Creek	1998	4 of 4 (1 riparian species)	80%	Excellent
Lower Rock Creek	Rock Creek	1998	4 of 5 (1 riparian species)	22%	Good

Allotment	Stream Name	Year Data Collected	Tree Species Recruitment (species in young age classes compared to total number of species found)	Tree and Shrub Canopy (Percent Shade)	Vigor
Pine	Pine Canyon	1998	6 of 6 (2 riparian species)	60%	Good
	Pinery Canyon	1998	5 of 5 (2 riparian species)	35%	Good
Pinery	Pine Canyon	1998	6 of 7 (2 riparian species)	80%	Good
	Pinery Canyon	1998	7 of 7 (1 riparian species)	55%	Good
Paradise	East Turkey Creek (lower)	1998	6 of 7 (2 riparian species)	35%	Good
	East Turkey Creek (upper)	1998	4 of 5 (1 riparian species)	35%	Excellent
	Silver Creek	1998	5 of 6 (1 riparian species)	15%	Good
Turkey Creek	Turkey Pen Canyon	1998	6 of 6 (2 riparian species)	20%	Good
	Turkey Creek (lower)	1998	6 of 6 (only 1 riparian species)	50%	Good
	Turkey Creek (middle)	1998	6 of 7 (2 riparian species)	50%	Good
	Turkey Creek (upper)	1998	6 of 7 (only 1 riparian species)	35%	Good
Upper Rock Creek	Rock Creek (lower)	1998	6 of 6 (3 riparian species)	45%	Good
	Rock Creek (upper)	1998	5 of 5 (2 riparian species)	20%	Good

Environmental Consequences

Livestock grazing may impact riparian area condition by compacting or altering the soil surface or by removing plant material, thereby affecting bank stability; or by grazing on individual plants, thereby changing the vegetation composition and affecting the vigor of the grazed plants.

Under *Alternative 1* some increases in herbaceous cover would be anticipated as cattle would no longer graze in canyon bottoms. Bulk density and soil structure would trend toward natural levels. A reduction in streambank alteration caused by cattle and increases in vegetative groundcover would contribute to bank stability. Elimination of browsing on riparian vegetation would be expected to increase riparian plant vigor and recruitment of young trees. Where trails, roads and campgrounds occur in drainage bottoms, traffic would continue to affect soils.

Under *Alternative 2*, livestock exclosures on the Cave Creek allotment would be maintained and effects related to grazing would be avoided. Elsewhere, livestock use would occur largely during the dormant season when plants are not actively growing. Stream channels and canyon bottom vegetation would continue to be impacted at current levels, but significant effects are not known to be occurring under current management. Unfenced isolated springs may be impacted through grazing or trampling at the sites. Most springs in the project area are located at higher elevations where livestock do not normally graze. Based on the emphasis on winter use and light to moderate use levels proposed, riparian areas would continue to meet or move toward forest plan standards.

Soil Condition

Affected Environment

The geology underlying the project area is rhyolite, limestone, and andesite with minor areas of alluvium along the gentle terrain in the largest canyons. In general, the soils are shallow to deep very cobbly to extremely cobbly sandy loams with numerous rock outcrops.

Soil condition field monitoring has been ongoing for years and the latest information was collected in 2006 (Table 5). All allotments were evaluated using protocols from Forest Service Soil Management (FSH 2509.18-99-1 R3 Supplement). Interpretations of soil condition are based on site visits, historical livestock use patterns, soil properties, and slope characteristics. Small areas of impaired soils are identified on two allotments (Figure 6). On Lower Rock Creek, soil compaction and low vegetative ground cover were identified in the northwest corner of the allotment. On the Paradise allotment, a portion of the Cemetery pasture has compacted soils and a preponderance of woody plants. Soil structure, texture and depth have not been significantly modified, indicating that soil function has not been permanently affected. Both sites are flat areas where livestock historically concentrated. Vegetation monitoring at these sites indicates that soil cover is increasing as a result of recent management. Elsewhere, soils are 100% satisfactory.

Table 5. Soil Condition, Central Chiricahua Mountains Allotments.

Allotment	Acres in Satisfactory Soil Condition	Acres in Impaired Soil Condition	Total	% Impaired
Lower Rock Creek	8,057	105	8,162	1.3%
Paradise	9,530	176	9,706	1.8%
Pine	9,518	0	9,518	0%
Pinery	11,495	0	11,495	0%
Turkey Creek	13,383	0	13,383	0%
Upper Rock Creek	8,533	0	8,533	0%
Cave Creek	25,730	0	25,730	0%

Environmental Consequences

Livestock grazing may impact soil function by compacting the soil surface, removing plant material or changing the plant community composition. Where soils are impaired, *Alternative 1* will lead to improved soil quality in areas such as cattle bed grounds and around water sources where cattle tend to concentrate. Over time soil bulk density and structure would return to natural levels, but changes would be slow. Areas of impaired soils on the Paradise and Lower Rock Creek allotments would persist for several years. Under *Alternative 2*, growing season rest and light to moderate utilization should maintain adequate vegetation cover and contribute to satisfactory nutrient cycling and soil structure. Areas with satisfactory soils should remain satisfactory. On impaired soils, bulk density and soil structure will continue to be altered by grazing livestock to some degree, but current positive trends are expected to continue. Change in soil quality is a

long-term process and no significant improvements would occur over the short term (5-10 years) under either alternative. Changes in the vegetation community observed on the Paradise allotment will be difficult to reverse in the absence of fire or more intensive vegetation treatments. Nutrient cycling and soil structure may continue to be impaired even under light grazing. Monitoring actions identified under the proposed action and adaptive management strategies will allow more flexibility in herd management.

Water Quantity and Quality

Affected Environment

The allotments lie almost entirely within the upper headwaters of two fifth code watersheds: Cave Creek-San Simon (Hydrology Unit Code [HUC] 1504000602) and Willcox Playa (HUC 1505020100) (Figure 7). Average precipitation at Portal is 20.95 inches, and 19.17 inches on the Chiricahua National Monument (PR 46), but can be quite variable.

Vegetation and soil monitoring data collected for this analysis indicate that watersheds in the project area are functioning properly (PRs 9-15, 22, 43, 46, 47). For several years the El Coronado Ranch (Turkey Creek allotment) has been involved in an extensive and quite notable watershed rehabilitation project initiated and accomplished by the permittee. Thousands of small rock structures have been installed in drainages throughout the ranch. Over time, soil builds up behind each structure, providing a substrate for plants to colonize and allowing water to infiltrate the soil.

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. Water quality has been assessed in several locations within the area (Table 6). Cave Creek is designated as a Unique Water by ADEQ. High levels of selenium have been identified in a portion of Cave Creek, which is thought to be related to naturally high levels of this element in the watershed. Tests for other pollutants including bacteria (*E. coli*) indicate that the stream segments are attaining all uses (PR 47). There is no evidence that non-point source or point source pollution related to grazing in these allotments is impacting water quality.

Table 6. Current water quality within the project area as determined by ADEQ.

Allotment	Stream	Assessment Category	Water Quality Standard Exceedances	Cause
Paradise	East Turkey Creek	Category 3 (Inconclusive)	No exceedances	Not enough samples
Turkey Creek	Turkey Creek	Category 2 (Attaining Some Uses)	Dissolved Oxygen	Natural low flow conditions
Turkey Creek	Ward Canyon	Category 2 (Attaining Some Uses)	Dissolved Oxygen	Natural low flow conditions

Allotment	Stream	Assessment Category	Water Quality Standard Exceedances	Cause
Cave Creek	Cave Creek upstream of South Fork Confluence	Category 5 (Impaired)	Selenium	Probably natural
Cave Creek	Cave Creek downstream from South Fork Confluence	Category 1 (Attaining all uses)	No exceedances	Improved from Category 2 in 2004 because sufficient sampling has now been completed
Cave Creek	South Fork Cave Creek	Category 1 (Attaining all uses)	No exceedances	Improved from Category 2 in 2004 because sufficient sampling has now been completed
Cave Creek	North Fork Cave Creek	Category 3 (Inconclusive)	Dissolved Oxygen, Core Parameters missing	Natural low flow conditions

Water quantity (surface water yield) is controlled by annual precipitation and hydrologic conditions on the watershed. Hydrologic conditions are in turn influenced by vegetation type and density on the watershed and soil condition. Adequate cover in the form of standing vegetation and litter is necessary to intercept raindrops and arrest the overland flow of water. Soils that have been degraded through compaction or erosion cannot effectively capture, hold and release water. On compromised watersheds, water quantity in the form of runoff increases due to a compromised hydrologic function. The result is generally an increase in peak flow discharges (flooding).

Environmental Consequences

Water Quality. Surface water quality is affected by erosion of the soil surface. Adequate vegetation groundcover is necessary to slow the movement of water and trap and filter sediments. Under *Alternative 1*, adequate diversity and vegetation groundcover (VGC) would contribute to maintaining a satisfactory hydrological function and runoff would continue to be satisfactory. In areas with impaired soils, the potential increase of VGC and elimination of livestock-caused soil compaction would contribute to an incremental improvement in hydrological function resulting in less runoff, better infiltration and an improvement in water quality due to less sediment and lower turbidity. Under *Alternative 2*, areas of impaired soils would continue to contribute small amounts of sediment downstream and surface runoff would be expected to be slightly greater, relative to no grazing, due to poor VGC in some areas. Under the proposed action, the potential increase of VGC and slight reduction in compaction would contribute to an incremental improvement in hydrological function resulting in less peak runoff. However, the changes are unlikely to be measurable. Allowable use levels of 30-45% are expected to provide sufficient residual biomass to protect upland areas and drainage systems over time.

Water Quantity. Under *Alternative 1*, adequate vegetation groundcover would contribute to satisfactory hydrological function and runoff would continue to be satisfactory. Water currently consumed by or diverted and stored for livestock would be returned to the system, but this accounts for less than 1% of the total water yield on the analysis area and is unlikely to be significant. Under *Alternative 2*, light to moderate use should provide sufficient residual plant material to protect uplands and drainages and contribute to soil stability over time. Existing water developments would divert and store water that would otherwise percolate back into the ground and support sub-surface flow. Livestock would consume some of the stored water. However, this amount is unlikely to significantly affect total water yield.

Air Quality

Affected Environment

The project area is located entirely within a Class II (generally rural) airshed. 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. None of the project area is within a non-attainment area. Currently, the air quality in the project area is within the standards and guidelines of the Forest Plan.

Environmental Consequences

Activities resulting from this project will not significantly affect the factors contributing to a high quality air shed. Selection of the No Action Alternative or the Proposed Action would not negatively affect air quality. No direct or indirect effects would occur to air quality from this project. Because there will be no direct or indirect effects, no cumulative effects are anticipated.

Special Management Areas

Affected Environment

Wilderness. Portions of all of the allotments, except Paradise, fall within the Chiricahua Wilderness. Areas within the wilderness are almost entirely outside of capable and suitable rangelands and are not grazed to a significant degree. These areas are heavily wooded, steep and often rocky. Forest Plan direction limits livestock utilization to 35% of current year's growth. Estimated use in wilderness pastures on the Upper Rock Creek allotment was 0-5% in 2007.

Research Natural Areas. The 406 acre Pole Bridge Research Natural Area (RNA) was established in 1931 to represent the Mexican pine-oak woodland and to protect a distinctive plant community that includes Apache pine (*Pinus englemanni*), Arizona pine (*Pinus ponderosa* var *arizonica*), Southwestern white pine (*Pinus strobiformis*), Chihuahuan Pine (*Pinus leiophylla*) and border pinyon (*Pinus discolor*). The RNA is not fenced, but steep terrain and thick vegetation preclude grazing use.

Zoological/Botanical Areas. South Fork of Cave Creek is identified as a Zoological/Botanical Area (ZBA). It is located entirely within the fenced enclosure associated with Cave Creek and is not grazed.

Wild and Scenic Rivers. The Cave Creek allotment contains four stream segments that have been identified as potentially eligible for designation as wild, scenic or recreational rivers (USDA Forest Service, 1993). Two segments (7.6 miles of stream, 2,432 acres total) are located in South Fork Cave Creek from the headwaters to the confluence with Cave Creek. Two segments (approximately 9.5 miles, 3,040 acres total) are located in Cima (Winn Falls) Creek and Lower Cave Creek from the headwaters to the Forest boundary. The outstandingly remarkable values associated with these segments include scenery, recreation, wildlife and fish, geology, history and riparian. South Fork of Cave Creek and lower Cave Creek are fenced to exclude livestock grazing. The upper segment of the Cima Creek is within a lightly grazed portion of the Cave Creek Allotment. Forest Service policy (FSM 1924.2) requires the Forest Service to assure that site-specific projects do not impact the free-flowing character or outstandingly remarkable values associated with eligible river segments.

Environmental Consequences

Grazing livestock are not affecting RNA or ZBA resource values under current management because livestock grazing does not occur in these areas. Very limited grazing occurs on the margins of the Chiricahua Wilderness but does not affect wilderness values at current levels. Under the proposed action, no management changes are recommended that would result in new or different effects.

Relative to Wild and Scenic River values, cattle are excluded from South Fork and most of the Cave Creek stream channel. Non-excluded areas are lightly grazed during the non-growing season. No impoundments, diversions or other modifications of the waterway are proposed, so no effects to the free-flowing character of the segment would occur. An analysis of the effects of the proposed action (PR 53) concludes that the proposed action will have no effects on the free-flowing character of Cima Creek, Cave Creek or South Fork of Cave Creek and the identified ORVs will be protected. Therefore, the proposal will have *no effect on the eligibility status* for these four segments. The proposal is consistent with existing standards for classification as wild, recreational and scenic, and the proposed management will have *no effect on these classifications*.

Heritage Resources

Affected Environment

Heritage resources (also called “cultural resources”) include archaeological and historical sites and other properties important to maintaining the traditional beliefs and lifeways of local social groups (“traditional cultural properties”). Although only approximately 1% of the allotments have been surveyed for heritage resources, 10 heritage resource sites have been documented, and many more indubitably occur throughout the area. These sites reflect the depth and diversity of human presence throughout the Chiricahua Ecosystem

Management Area (EMA) and surrounding regions. To date, no specific Traditional Cultural Properties have been identified in the area.

Native American sites that pre-date European contact include artifact scatters that represent temporary campsites or resource processing locations, small villages consisting of the remains of buried pit structures, more expansive habitation sites with vestiges of adobe architecture, and rock shelters. Although site density within the allotments is less than has been documented within the surrounding valleys and private inholdings, especially in terms of larger habitation sites, it appears that the areas currently included within the grazing allotments were occupied at least sporadically throughout the last several thousand years.

At the time of European contact, various bands of Apaches, especially the Chiricahua, were the primary groups of Native Americans occupying the northern Chiricahua Mountains. They appear to have gained an increased presence in the area at some point near the end of the Precontact Period and remained a dominant force from the Spanish Colonial Period through the 1860s. Encounters with non-Native groups were often violent. Between 1872 and 1876, the northern Chiricahua Mountains were within the Chiricahua Indian Reservation. After termination of the Reservation in 1876, intermittent hostilities took place, until the ongoing military campaigns culminated in the surrender of Geronimo in 1886. Although, none of the previously documented heritage resources within the allotments appear to be directly associated with the protohistoric and/or historic Apache presence within the Chiricahua EMA, additional undocumented sites must be present.

The most important Historic period uses of the area have been, mining and grazing, which began in Spanish Colonial times. However, compared to most of southern Arizona, these developments were delayed by the presence of the Chiricahua Apaches. Mining (especially of lead and silver) became increasingly important following the end of the Apache Wars. Mining activity and associated settlement generally peaked during the first decade of the 20th century, although some settlements persisted until the 1950s. Grazing, on the other hand, has been ongoing and continues to be the predominant land use activity. The remains of some historic structures, range installations, and mining operations have been designated as heritage resources within the allotments.

Few of the heritage resources documented within the allotments have been formally evaluated for National Register eligibility, but all will be treated as eligible for management purposes.

Environmental Consequences

Construction of range improvements can directly damage artifacts or structures and alter their spatial relationships, while also encouraging concentration of livestock in the vicinity of the improvements. Concentration of livestock on archaeological and historical sites can also result in damage to artifacts and structures, and alteration of their spatial relationships. These impacts can compromise various aspects of the integrity of historic properties and diminish their research and interpretive potential.

Adoption of *Alternative 1* would result in no direct or indirect effects from livestock grazing on heritage resources. The proposed action would require implementation of the mitigation measures identified as part of the proposed action in order to insure that there would be no adverse effects to heritage resources as the result of new range improvements.

Economics

The economic effects of the proposal were not identified as a key issue during scoping, and specific operating costs and revenue estimates are not available for each ranch. Therefore a detailed economic analysis was not conducted. However, the generalized effects of the alternatives can be compared in the context of the local economy. The allotments are located primarily in Cochise County, Arizona. Tourism and financial services are a growing segment of the economy of Cochise County. Farm and ranch employment is considered an important segment of the economy, but total agricultural employment (farming and ranching) accounted for 3.3% of the economy in 2000 (USDA Forest Service 2005, Headwaters Economics 2007, PR 33). Ranching operations in the area tend to be characterized by small profit margins with the need for off-ranch supplemental income to continue operations.

Environmental Consequences

Decisions relative to livestock grazing on individual allotments primarily affect 1) the permittees, who pay grazing fees and receive economic returns on their investments in livestock grazing and who contribute funds for the construction of range improvements, and 2) the Forest Service, which collects grazing fees and expends grazing receipts and appropriated tax dollars to construct improvements and to administer the allotments. Local communities may also benefit from the sale of goods and services associated with ranch operations, but given the size and economic diversity of Pima and Cochise counties, these effects are considered insignificant in this case.

Termination of the grazing authorizations (*Alternative 1*) would likely result in negative economic effects on the individual permittees. Although they would no longer pay grazing fees or expend money to maintain the allotments, the permittees would be dependant on adjacent private or state land to maintain ranching operations. Annual grazing receipts to the Forest Service would vary from zero under *Alternative 1* to approximately \$5,180 under maximum allowable use on all allotments under *Alternative 2*¹⁰. Typically, 25% of these receipts are returned to the Forest in the form of Range Betterment Funds used to construct range improvements. These funds (approximately \$1,300/year under full stocking) would not be available to the Forest Service under *Alternative 1*.

There would be no costs associated with new range facilities as none are proposed. There would, however, still be costs associated with management of the allotments and maintenance of facilities. Maintenance of improvements is typically the responsibility of

¹⁰ Estimate based on the 2008 grazing fee of \$1.35 per AUM

the permittee. In the absence of a permittee, maintenance or removal of existing structural improvements may become necessary and costs would be borne by the Forest Service.

Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Executive Order 12898 (February 11, 1994) directed all Federal agencies to evaluate their proposed actions to determine the potential for disproportionate adverse impacts to minority and low-income populations. The memorandum from the President to heads of departments and agencies that accompanied the Executive Order states that “each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA].”

The project area is located in rural Cochise County. The area is sparsely populated, primarily by ranchers and a few owners of private parcels adjacent to Forest Service lands. Selection of any of the alternatives would not result in adverse or disproportionate effects on low income or minority populations. The alternatives, including no grazing, are consistent with activities that have been implemented throughout the Coronado National Forest over many years. As such, the effects are predictable. There would be no displacement of minorities or increases in taxes or fees that would constitute an economic hardship to minorities under any of the alternatives. There would be no effects to public health. Therefore, disproportionate direct, indirect or cumulative adverse impacts on low income or minority populations would not occur.

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.

Historic Grazing. Livestock grazing has occurred within the analysis area for over 100 years. In the late 1800s, widespread unregulated grazing resulted in erosion, heavy surface runoff, flooding and down-cutting of streams throughout the southwest. Livestock consumption of herbaceous fine fuels, combined with active fire suppression beginning in the early 1900’s has likely contributed to a decreased fire frequency and subsequent invasion of many grasslands by woody plants. The effects of these activities and events are still evident in the project area. The proposed action is designed to correct the effects of historic management, but these effects will likely continue to influence resource conditions, especially soil condition, for the foreseeable future.

Human Activities. Authorized activities in the project area include camping, hiking, hunting, wildlife watching and vehicle use on surfaced and unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas and minor wildlife disturbance in popular bird watching spots. There are several developed recreational facilities (campgrounds) in the project area. Several summer homes in the Cave Creek area and an organizational camp in Pine Canyon are in place under special use permits. Private land inholdings are located in Cave Creek/Portal, Pinery Canyon and Turkey Creek, which include numerous residences and the American Museum of Natural History Southwest Research Station.

Portions of the area show substantial evidence of trailing by undocumented aliens and/or drug traffickers. The effects of these activities include accumulations of trash, creation of wildcat foot and vehicle trails and vandalism of range improvements, especially fences. In addition, the area has seen a substantial but unquantified increase in vehicle traffic related to interdiction efforts on the part of the U.S. Border Patrol and other enforcement agencies. The effects of border crossing activities are largely outside of the control of the Forest Service and the permittees, but they are likely to require additional efforts to maintain improvements and keep to a rotation schedule.

These facilities and activities will continue to result in short term and relatively minor effects to soils and hydrology and wildlife, especially where activities are concentrated in drainage bottoms. However, because no significant direct or indirect effects of the proposed action and alternative are anticipated, neither of the alternatives is expected to contribute significant cumulative effects.

4. CONSULTATION AND COORDINATION

ID TEAM MEMBERS:

William Edwards, District Ranger, Douglas Ranger District	Responsible Official
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Marcello Martinez, Range and Watershed Staff, Douglas Ranger District	Proposed Action, Vegetation Analysis
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James Heitholt and Joseph Harris, Range Conservationists, Douglas Ranger District	Vegetation Analysis
Robert LeFevre, Hydrologist/Forester	Soils, Air, Water, Riparian Analysis
Chris LeBlanc and Bill Gillespie, Archeologists, Supervisor's Office	Heritage Resource Analysis

The Forest Service consulted the following Federal, State, and local agencies, tribes and organizations during the development of this environmental assessment. Several individuals not identified specifically below also participated in this process.

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

TRIBES:

Fort Sill Apache Tribe	Hopi Tribe
Mescalero Apache Tribe	Pueblo of Zuni
San Carlos Apache Tribe	Tohono O'odham Nation
White Mountain Apache Tribe	Yavapai Apache Nation

OTHERS:

National Wild Turkey Federation	Sky Island Alliance
Western Watersheds Project	The Center for Biological Diversity
Forest Guardians	Arizona People for the USA

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