United States Department of Agriculture

Forest Service

Southwestern Region

Environmental Assessment

Duquesne, Lochiel and Hayfield Grazing Allotments

Grazing Authorization and Allotment Management Plans

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

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Chapter 1 – Purpose and Need

Background

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

Federal actions such as the authorization of grazing and approval of allotment management plans must be analyzed to determine potential environmental consequences (*National Environmental Policy Act of 1969 (NEPA); Rescission Act of 1995 (P.L.104-19)*). The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act and other relevant federal and state laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Coronado National Forest Supervisor's Office in Tucson, Arizona. Throughout this EA, references to supporting documentation in the planning record are shown in parentheses. For example, a reference "(Doc. 23)" would mean that a specific passage in the EA is linked to information contained in Document 23 of the planning record.

Purpose and Need for Action

The purpose and need of the proposed action is to authorize grazing on the Duquesne, Lochiel and Hayfield Allotments in a manner consistent with Forest Service policy and the Coronado National Forest LRMP, and to provide long-term management direction on grazing through allotment management plans (AMPs).

The action is needed here and now because:

- All three allotments lack current AMPs. Recent management has been implemented through annual operating instructions.
- Cattle distribution on all three allotments could be improved by additional infrastructure, such as water supply and fences.
- Recent sustainable use on the Duquesne and Lochiel allotments has been significantly less than permitted, indicating that permitted use should be adjusted. Production and utilization data for the three allotments are available for consideration in establishing new permit numbers.
- The allotments currently lack sufficient environmental analysis to comply with the Rescission Act (P.L. 104-19, 1995).

This action responds to the goals and objectives outlined in the Coronado Forest Plan, and helps move the project area towards desired conditions described in that plan.

Existing Condition

Detailed maps of the project area are displayed in Appendix 3. The project area is located in the Patagonia Mountains in portions of Townships 23 and 24 South, Ranges 16 and 17 East. The analysis area contains a total of 21,700 acres in Management Areas 1, 4, and 7 as identified in the Coronado National Forest LRMP. Basic descriptive information for the three allotments is presented in Table 1. Total acreage shown for the Hayfield and Duquesne allotments is somewhat less than that reported in the scoping report as a result of more refined GIS analysis at the project level. Elevations range from 7,221 feet above mean sea level at Mt. Washington (Duquesne Allotment), to about 4,800 feet in the lowest portion of the Lochiel Allotment. Rangeland vegetation and soil condition are generally good throughout the project area. Areas of less than satisfactory soil condition and fair range condition are areas where livestock have historically concentrated at lower elevations. Woody species, especially juniper, are encroaching into some grassland areas on the allotments. As is the case in most of southern Arizona, the primary growing season is July to September during the summer monsoon.

The geology underlying the allotments is highly diverse. All the major geologic time periods (Eras) are represented from Precambrian intrusive granites to Paleozoic sedimentary rocks of the Naco Group to Mesozoic volcanics to Cenozoic alluvium. In general, the mountainous areas to the west are the intrusive granodiorite rocks while the eastern portions of the allotments are alluvial fans and piedmonts. As a consequence, the soils are highly diverse. In general, the soils in the mountainous areas to the west are shallow cobbly fine sandy loams with numerous rock outcrops and the eastern portions are deep gravelly sandy clay loams. The project area is within the Patagonia Mining District and many historic mines are located in or adjacent to the allotments. Mining was predominantly for metals including lead, silver, gold and copper. Many of the mine workings were during the late 1800's and the turn of the century. Active commercial work faded in the 1940's and 1950's. Within the forest system lands, many private property in-holdings and patented mining claims are present.

Table 1. Existing conditions on the allotments in the project area.

	Duquesne	Lochiel	Hayfield
Total Acres (Forest)	12,536	2,257	6,907
Capable Acres	9,554	1,933	6,907
Current Permitted Use: cows yearlong (CYL)	210 Forest, 10 private	79 Forest, 2 private	203 forest, 47 private
Recent Use CYL/private/non-use	2000: 94/10/116 2001: 113/10/77 2002: 165/10/45 2003: 145/10/65	2000: 70/2/9 2001: 60/2/19 2002: 55/2/24 2003: 53/2/26	2000: 100/71/186 2001: 86/71/200 2002: not stocked 2003: 203/47
Maximum Authorized Utilization	45%	45%	45%
Current Management	2-herd, 13 pasture	3-pasture deferred	3-herd, 14 pasture

	Duquesne	Lochiel	Hayfield
	deferred rotation. Cow-calf	rotation with private land. Cow-calf	deferred rotation. Cow-calf.
Dominant Cover Types	Broadleaf woodland Evergreen riparian Deciduous riparian Plains grassland Desert grassland Chaparral	Broadleaf woodland	Broadleaf woodland Plains grassland Evergreen riparian
Range Condition	90% good 10% fair	50% good 50% fair	85% good 15% fair
Soil Condition	91% satisfactory 9% impaired	89% satisfactory 11% impaired	93% satisfactory 7% impaired

Broadleaf Evergreen Woodlands are the dominant plant community in the project area. The main woody species in this plant community are Emory oak (*Quercus emoryi*), silverleaf oak (*Q. hypoleucoides*), Arizona white oak (*Q. arizonica*) and alligator juniper (*Juniperus deppeana*). Understory species include skunkbush (*Rhus trilobata*), Mearns' sumac (*R.. choriophylla*) and several native grasses including sideoats grama (*Bouteloua curtipendula*), blue grama (*B. gracilis*), bull grass (*Muhlenbergia emersleyi*) and others. Oak woodlands occur in higher elevations in steep terrain and in dry canyon bottoms. At mid elevations, the woodlands give way to oak/manzanita (*Arctostaphylos pungens*) chaparral, especially on long broad ridges in the Lower Mowry and Apache pastures in the Duquesne allotment.

At lower elevation on the east side of the project area adjacent to the San Rafael Valley, woody vegetation gives way to plains grassland. This plant community is most common on the Hayfield allotment. Grass species include blue grama, hairy grama (*B. hirsuta*), wolftail (*Lycurus phleoides*) and curly mesquite (*Hilaria belangeri*) and mid-grasses such as cane beardgrass (*Bothriochloa barbiculmis*), sideoats grama and plains lovegrass (*Erigrostis intermedia*).

Major drainages in the project area include Duquesne, Finley and Adams San Antonio and Mowry Canyons and Chino Draw. Drainages flow seasonally, but do not support perennial flows or deciduous riparian plant species.

Management

Duquesne Allotment: Prior to 1965, allotment records indicate that actual use on the allotment averaged 266 cattle year long (CYL). In 1965, the permit was reduced to 210 CYL where it remained until 1995 when the allotment changed hands. Available records indicate that the allotment was stocked at or near 210 CYL each year until the early 1990's. Inspection records indicate that overuse in canyon bottoms was an ongoing problem during this period. In 1995 the allotment changed hands and a new permit was issued for 210 CYL and 10 CYL on a private land permit (3485 AUM total). At this time, the Forest entered into an MOU with the permittee allowing partial non-use to allow for

recovery of the rangeland resource. Stocking on the allotment from 1995 to present has averaged approximately 50% of the permitted use (Table 2).

Approximately 1300 acres of alienated (non-federal) land consisting of patented mining claims are found in the interior of the allotment, primarily in the vicinity of Washington Camp and Duquesne. Most of these acres are unfenced and are grazed by Duquesne allotment cattle. These lands have limited grazing capacity and are not included in capacity estimates for the allotment. In addition, the permittee owns 62 deeded acres and leases 970 acres in the vicinity of Washington Camp, which are the basis for the private land permit.

The allotment has been grazed for the past several years as a two-herd deferred rotation, consisting of a northern herd and a southern herd. Allowable use has been set at 45% of key species in key areas. The lack of reliable waters in several pastures on the allotment contributes to uneven livestock distribution. During dry periods, dirt stock tanks go dry and livestock concentrate around the few reliable troughs and wells.

Lochiel Allotment: The ranch has been in the same ownership for over 70 years. It is currently permitted for 79 CYL with an additional 2 CYL private land permit for 205 acres of private land (1283 total AUM). It is operated under a cow-calf, two-pasture deferred rotation. With only 2 pastures, management flexibility has been limited. The permittee has attempted to mitigate this by splitting growing season use between the two pastures and removing livestock during dry periods. Allowable use has been set at 45% of key species in key areas.

Hayfield Allotment: Grazing records in the allotment file date back to 1919. Over the years the allotment changed hands and incorporated neighboring ranches until the mid 1960s when it reached its current size. An additional 1600 acres (20% of the ranch) is private land managed under a private land permit. Beginning in 1966, a preference for 286 cattle yearlong was assigned, along with a private land permit for 71 head (5,654 total AUM). Actual use over the ten years between 1992 and 2001 averaged 136 CYL. The ranch was purchased by the Nature Conservancy in 2001. At this time the Forest and private land permits were reduced to 203 and 47 CYL, respectively, for a total of 250 CYL (3,238 AUM). Production and utilization studies completed in 2000 (PR Doc. 6) were used as a basis for setting permit numbers. In 2002 the ranch was re-sold with a conservation easement restricting development of the private property. The new permittee began partially restocking the allotment in 2003.

Table 2. Stocking levels (Cows year-long) on the Duquesne, Lochiel and Hayfield Allotments, 1995-2003.

Allotment	1995	1996	1997	1998	1999	2000	2001	2002	2003
Duquesne	84	unk	31	110	107	94	113	165	145
Lochiel	79	60	77	67	65	70	60	55	53
Hayfield	189	80	55/25	69	64/13	100	86	No use	203

Grazing Capacity

The project area contains some of the most productive rangelands on the Forest, especially in lower elevation plains grasslands. Production and utilization studies were

completed for the allotments between 2001 and 2003 (Docs. 5, 6 and 19). These data were used to calculate grazing capacity on the allotments prior to development of the proposed actions (Table 3).

Table 3. Capacity estimates for allotments in the project area.

Allotment	Capable Acres	Estimated Capacity	
		AUM	Acres/AUM
Duquesne	9,554	2176	4.4
Lochiel	2,557	728	3.5
Hayfield	6,907	3238	2.1

Desired Condition

The Coronado LRMP (page 10) contains the following goals for the range program on the Forest:

- To restore rangeland to at least moderately high ecological condition (70% to 75% of potential production, fair range condition) with stable soil and a static-to-upward trend.
- Produce livestock products consistent with other resources and uses.
- Eliminate grazing from areas not capable of supporting livestock without significant detriment to range or other resources.
- Balance permitted grazing use with grazing capacity.
- 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 desirable nonnative wildlife, fish and plant species through improved habitat management.
- Improve the habitat of and the protection for local populations of Threatened and Endangered species to meet the goals of the Endangered Species Act of 1973.

Grazing permits and allotment management plans would support these goals by providing for the following specific objectives, which constitute the desired condition in the analysis area:

- Grazing activities contributing to impaired soil quality are corrected through improved distribution.
- Ecological condition as expressed by the number of acres in fair or better condition is maintained or improved.
- Range production and movement toward site potential for each soil/vegetation site is increased.
- All grazing improvements on all allotments are in proper working order.

Proposed Action

The Sierra Vista Ranger District proposes to authorize grazing on and develop allotment management plans for the Duquesne, Lochiel and Hayfield allotments. Grazing on the Duquesne, Lochiel and Hayfield allotments will be authorized under the following terms and conditions:

- Forage utilization on all three allotments will be limited to 45% of current year's growth of key species in key areas. Forest plan standards for protection of Mearns' quail habitat will be in effect.
- Management on each allotment will be designed to insure that pastures receive growing season rest at least every other year.
- Range improvements would be constructed to the degree necessary to achieve management objectives and move the project area toward desired condition.
- Provisions for the protection and recovery of threatened and endangered species will be incorporated in accordance with the LRMP and recovery objectives.

A detailed description of the proposed action for each of the allotments is found in Chapter 2 (Alternatives).

Decision Framework

The Sierra Vista District Ranger is the official responsible for the decision. Given the purpose and need, the District Ranger will review the environmental analysis of the proposed action and the other alternatives in order to make the following decisions:

- Whether to authorize grazing on the Duquesne, Lochiel and Hayfield allotments.
- If grazing is authorized, which management practices and mitigation measures will be prescribed in each AMP, including permitted classes and numbers of livestock, seasons of use, range facilities to be constructed, allowable utilization levels, the term of the permit and monitoring actions to be conducted.

Decisions may be made separately for each allotment or collectively for all allotments combined.

Public Involvement

The proposal has been listed continuously in the Forest's Schedule of Proposed Actions since September 2003. The proposal was provided to the public and other agencies for comment during scoping on December 10, 2003 (Doc. 12) and was posted on the Forest's web site. Five comment letters were received in response to scoping. Using the comments from the public, other agencies, and tribes, the interdisciplinary team developed a list of issues to address in the analysis. On June 28, 2004 a draft of this assessment was provided to parties who had expressed interest through scoping (Doc. 34). The public was notified of the opportunity to comment through legal notice in the newspaper, and a copy of the draft was posted on the Forest's internet site from June to September, 2004. Comments provided during this second comment period have been considered by the responsible official and incorporated into the analysis as appropriate (Doc. 42).

Issues

Copies of the comments received in response to scoping and an analysis of the issues raised can be found in the project record (Docs. 13-18). Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence.

Several comments identified issues previously raised by the IDT. No new issues were developed as a result of scoping. As for significant issues, the Forest Service identified 5 topics raised during scoping. The following issues and measures were used in the analysis of impacts of the proposed action. Impacts will be quantified to the extent practicable. When measures cannot be quantified, a qualitative narrative based on the expertise of an appropriate resource specialist will be presented.

1. **Grazing effects on wildlife:** The timing and intensity of grazing in the project area could result in adverse effects on wildlife, including threatened, endangered, proposed, sensitive (TEPS) species, management-indicator species, and their respective habitats. Utilization in canyon bottoms could impair the achievement of Forest Plan standards for Mearns' quail cover. Issues will be evaluated through narratives and tables describing effects, by alternative, as identified through a Wildlife Specialist's Reports, Biological Assessment and Evaluation and consultation with appropriate wildlife resource agencies.
2. **Soil and watershed condition:** Topographic and vegetative features on the allotments encourage cattle to concentrate in areas with impaired soils and moderately low range condition. Effects will be evaluated through narrative and tabular descriptions, by alternative, as identified through a range and soil condition and trend analysis.
3. **Upland vegetation condition.** Proposed stocking and utilization levels may not be sufficient for achievement of Forest Plan standards for restoring rangelands. Narrative and tabular descriptions, by alternative, as identified by a range condition and trend analysis.
4. **Economics:** Permit reductions may have economic consequences for the permittee. Narrative and tables describing relative costs and returns of the alternatives

Additional environmental components include effect to air quality, water quality, riparian and heritage (cultural) resources. Effects on these resources are evaluated through specialist's reports and consultation with appropriate tribes and regulatory agencies. Effects are disclosed in narrative and tabular form

Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the project in order to define the differences between alternatives and provide a clear basis for choice among options by the decision maker and the public.

Alternatives

Alternative 1: No Action (No Grazing)

Under this alternative, grazing would not be authorized and use of the allotments by domestic livestock would be discontinued[1]. Existing structural improvements would remain in place but would not be maintained. Improvements contributing to resource protection or enhancement, such as water developments important for wildlife, would be maintained where feasible using other program funds. Periodic inspection of structural improvements would be used to determine whether maintenance or removal is needed. Removal or maintenance of improvements would be authorized by a separate decision. Where necessary, maintenance of allotment boundary fences would be reassigned to adjacent permittees with the understanding that livestock are to be kept off of the allotments.

Alternative 2: Continue Current Management

Under this alternative, grazing would continue as currently permitted and as described above under Existing Conditions (pp. 2-4). Existing improvements would be maintained, but no new improvements would be authorized.

Alternative 3: Light to Moderate Grazing

This alternative was identified by the ID Team as a means of comparing impacts to upland vegetation, soils and watershed and effects to wildlife species such as Mearns' quail that require herbaceous cover. It is intended to assist with defining the issues and to provide a more complete range of alternatives. Under this alternative, allowable use would be reduced to 25-35% of annual forage production of key species in key areas. Allowable stocking was estimated by using production and utilization study data and recalculating for a maximum of 35% allowable use, rather than 45%. Proposed improvements and management strategies on all allotments would be similar to those described under the proposed action.

Alternative 4: The Proposed Action

The proposed action would authorize grazing within defined limits for the duration, intensity, frequency and timing of grazing. Within these management limits, annual or

[1] In order to provide consistency in analysis across the Forest Service, the Forest Service Handbook (FSH 2209.13) requires the agency to identify "no grazing" as the no action alternative.

seasonal adjustments may be made in response to variations in forage or other resource conditions. Initial stocking rates would be set based on existing resource and infrastructure conditions and are supported by production and utilization data collected over the past 4 years. Where a range of stocking is identified, changes in stocking would be based on successful infrastructure development and documented improvement in resource conditions. Specific numbers of livestock permitted will be identified each year in Annual Operating Instructions. Management limits common to all three allotments follow below.

Duration of grazing. The proposed action would authorize grazing year-round on the Duquesne and Hayfield Allotments. On the Lochiel Allotment, grazing would be limited to 9 months (October-June).

Intensity of grazing. Forage utilization would not exceed 45% of key species in key areas. Forest Plan standards for Mearns' quail will be in effect (see below). Resource conditions and management objectives will dictate stocking levels within the range of numbers identified in the EA.

Frequency and timing of grazing. Management systems will be designed to incorporate growing season rest on pastures at least every other year in order to provide for plant recovery. The timing of pasture moves will be dictated by utilization monitoring and resource objectives.

Duquesne Allotment. As currently designed, a single herd would be rotated through the allotment. The herd would spend the winter months in the southern pastures (Callihan, Duquesne and Santo Nino) from October through March. The Callihan pasture will be used for fall shipping each year with the balance of cool season use alternating between the Duquesne and Santo Nino pastures. The order in which the Duquesne and Santo Nino pastures are used will alternate in order to provide for cool season plant species growth. The southern pastures would be rested each growing season.

The seven northern pastures would be divided into four units of approximately equal capacity: 1) Apache, 2) Upper and Lower Mowry, 3) Sepprel and South Mowry, and 4) L&J and Harristeen. Cattle would be rotated through three of the northern units during each year from April through September. The fourth unit would be rested. Growing season (July-September) use will occur in two of the four pastures each year, followed by growing season rest the next two years. The Finley and Adams pasture will be used as a travel trap for moving cattle between northern and southern pastures approximately two weeks in the spring and two weeks in the fall each year.

Proposed improvements include installation of pipelines from existing wells to provide reliable water to upland portions of the allotment, which would improve livestock distribution and reduce use in lower elevations. The Santo Nino pasture would be cross-fenced in order to prevent cattle from drifting down out of higher portions of the pasture and reduce livestock impact. Encroaching small junipers would be hand-grubbed in the Harristeen, L&J and Upper Mowry pastures.

The proposed action would authorize a range of 2,176-2,932 AUM, equivalent to 137-185 cow-calf pairs. The stocking level would be set at 120-180 cow-calf pairs for 12 months. A range of numbers is proposed to reflect the variability in forage conditions

regularly experienced on the allotment. Stocking levels would initially be set at the low end of the range. As improvements are completed and are effective at improving distribution and if monitoring demonstrates achievement of desired conditions, stocking would be allowed to increase within the range defined above.

Lochiel Allotment. The proposed action would authorize grazing for a range of 594-728 AUM, equivalent to 50-61 cow-calf pairs for 9 months. The two-head private land permit would be discontinued. Livestock would be rotated between the two existing pastures during the October-June grazing period. The order in which the two pastures will be used will alternate each year in order to provide for cool season plant species growth. Livestock would be removed from the allotment and placed on private land every growing season (July 1-September 30) in order to provide annual growing season rest on the entire allotment. No new fences would be required, but a new water supply would be developed in the uplands where East and West pasture meet.

Initial stocking will be 50 cow-calf pairs for 9 months, October-June (594 AUM) and would remain at this level until resource conditions improve and proposed range improvements are implemented. As improvements are completed and are effective at improving distribution, and if monitoring demonstrates achievement of desired conditions, stocking would be allowed to increase within the range defined above.

Hayfield Allotment. Permitted numbers on the allotment were reduced from 286 CYL (3,432 AM) to 203 CYL (2,436 AM) in 2001. The proposed action would authorize up to 3,238 AUM, equivalent to 204 cow-calf pairs yearlong. A deferred rest-rotation management system is proposed with herd movements being dictated by utilization levels in key areas and forage and water conditions. A single herd would be rotated through 16 pastures, 1-3 pastures at a time (determined by pasture size). Management goals are to limit the use in bottoms, improve distribution in uplands and provide adequate growing season rest. No set pasture rotation would be established. The number of pastures provides sufficient flexibility that pasture rotations can be determined by management objectives and pasture condition. The grazing capacity derived from the 2000 production and utilization study (3,238 AUM) reflects allowable use based on current management and resource conditions. Within pastures, livestock distribution will be accomplished through controlling access to waters by fencing select waters. No new water developments are identified. However, should monitoring indicate the need for additional upland water sources, the following actions may be proposed.

- Construct a pipeline from an existing well on the Duquesne allotment to provide upland water to pastures 1-9 on the Hayfield allotment.
- Construct a pipeline from an existing well on the Lochiel allotment to provide upland water to pasture 14 on the Hayfield allotment.

Monitoring Activities Common to All Action Alternatives

Monitoring will be used to determine whether management is being properly implemented and whether the actions are effective at achieving or moving toward desired conditions. Seasonal utilization will be measured on key species in key areas (see Appendix 2 for definition of terms). Key areas have been established (PR Doc. 35) and will be identified the Allotment Management Plans for each allotment, consistent with the

management guidelines in the Coronado LRMP on page 22. Key species will be native perennial grasses that are palatable to livestock. These may include, but are not limited to, plains lovegrass (*Eragrostis intermedia*), sideoats grama (*Bouteloua curtipendula*), hairy grama (*B. hirsuta*), blue grama (*B. gracilis*), Texas bluestem (*Andropogon cirratus*), wolftail (*Lycurus phleoides*), cane beardgrass (*Bothriochloa barbinoides*), green sprangletop (*Leptichloa dubia*) and three awn (*Aristida sp*). The Sierra Vista District Range Staff Officer and the permittees will be responsible for monitoring livestock use to assure that use levels stay below 45%. When any single key area reaches the stated use objective, the livestock will be moved to next pasture or off the Forest.

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

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

If monitoring indicates that desired conditions are not being achieved, changes in management may be proposed. Changes may include administrative decisions such as the specific number of livestock, specific dates for grazing, class of animal or modifications in pasture rotations, but will not exceed the limits for timing, intensity, duration and frequency defined for the proposed action and analyzed herein.

Additional monitoring to insure compliance with the Endangered Species Act is identified under Mitigation Measures, below.

Mitigation Measures Common All Action Alternatives

In response to public and agency comments on the proposal and consistent with commitments made as a result of previous Biological Opinions (BO), species recovery plans and Forest Plan standards and guidelines, mitigation measures have been developed to reduce or eliminate potential wildlife impacts under the various alternatives. Many of these measures are already being implemented in the project area. The mitigation measures will be applied to any of the action alternatives, as appropriate.

Mearns' quail. Forest Plan standards and guidelines (page 34) and the Forest Service Manual (Chapter 2361, Supplement 2600-94-1; Doc. 24) provide direction for livestock use of high density Mearns' quail habitat. These mitigation measures supplement standard forage utilization limits in areas of high quality Mearns' quail habitat. Mearns' quail key areas within identified high quality habitat will be identified by the District Biologist in cooperation with Arizona Game and Fish Department (AGFD) and other interested parties. Allowable use within key areas will be 45% maximum with a desirable level of 35-40%. The objective of these use levels will be the maintenance of

an average minimum standard of six inches of herbaceous stubble height as quail cover. This standard will be met within the normal cycle of wet and dry years.

Lesser long-nosed bat. All range construction projects will be designed to avoid the destruction of agaves and the disturbance of bat roosts. If impacts to agaves are unavoidable, the Forest will ensure that no more than 1% of agaves within 800 meters of the project are impacted.

Sonora tiger salamander. The Forest has adopted stockpond management and maintenance guidelines that are in effect on three allotments and will continue to implement the conservation measures identified on pages 9-11 of the 2002 BO (Doc. 3). These measures will assure compliance with terms and conditions 2.a through 2.h in the BO.

The Forest will continue to inventory stock ponds within the range of the salamander with the objective of identifying sites where bankline vegetation or submerged aquatic cover can be enhanced to benefit salamander habitat. Potential improvements include fencing of tanks or portions of tanks, creating double tanks, placing logs or other underwater structures into tanks or modifying livestock management in ways that protect bankline cover. These actions will insure compliance with terms and conditions 3.a and 3.b of the BO.

Livestock permittees on the three allotments have been notified of the terms and conditions of the biological opinion for Sonora tiger salamander.

Chiricahua leopard frog. The 2002 biological opinion on ongoing grazing (Doc. 3) specifies terms and conditions for livestock management activities on the three allotments that are necessary to minimize the take of Chiricahua leopard frog. These measures include requirements to survey for and salvage frogs during stock pond cleaning activities; measures designed to minimize the introduction of non-native species or chytrid contamination into occupied sites; measures to reduce direct mortality and damage to aquatic cover as a result of livestock impacts and the requirement to monitor and report incidental take. Permittees have been notified of these terms and conditions through annual operating instructions.

The Forest will continue to inventory stock ponds within the range of the Chiricahua leopard frog with the objective of identifying sites where bankline vegetation can be enhanced to benefit frog habitat. Potential improvements include fencing of tanks or portions of tanks, creating double tanks, or modifying livestock management in ways that protect bankline cover. These actions will insure compliance with reasonable and prudent measure 3 in the BO.

The Forest will continue to monitor incidental take of listed species and report any mortality along with implementation of terms and conditions in an annual report to the Fish and Wildlife Service.

General Measures.

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

All new fencing will be built to LRMP standards (LRMP, page 35) to provide for wildlife passage through the fence. At a minimum, this will be a 4-strand fence with a smooth bottom wire 16 inches off the ground and a total fence height of 42 inches or less.

Best Management Practices for soil and watershed protection (FSH 2509.22) will apply to all action alternatives and will be incorporated into the allotment management plans. Practices include but are not limited to 1) Annual preparation of an operating plan with the permittee to allow for current allotment conditions; 2) periodic field checks to identify needed adjustments in season of use and livestock numbers, including stock counts, forage utilization, assessment of rangeland to verify soil and vegetative condition and trend; and 3) necessary techniques to achieve proper distribution or lessen the impact on areas which are sensitive or would naturally be overused.

Future Review of the Decision

In accordance with Forest Service Handbook direction (FSH 1909.15 (18)) 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 will be allowed to continue. If monitoring demonstrates that management options beyond the scope of this analysis are warranted, or if significant new information demonstrates effects not previously considered, further analysis under NEPA would be conducted. Additional improvements not disclosed and analyzed herein would require site-specific analysis and decisions.

Comparison of Alternatives

Table 4. Alternative Effects Summary

Attribute Compared	Alternative 1 No grazing	Alternative 2 Current Management	Alternative 3 Light Grazing	Alternative 4 Proposed Action
Number of livestock Authorized (CYL)	0	210 Duquesne 79 Lochiel 203 Hayfield	127 Duquesne 39 Lochiel 178 Hayfield	150 Duquesne 50 Lochiel 203 Hayfield
Season of Use	No Use	Yearlong	Duquesne and Hayfield: Yearlong Lochiel: 11/1-6/30	Duquesne and Hayfield: Yearlong Lochiel: 11/1-6/30
Cost of New Range Improvements	None	None	Duquesne: $93,000 Lochiel: $13,000	Duquesne: $93,000 Lochiel: $13,000

Attribute Compared	Alternative 1 No grazing	Alternative 2 Current Management	Alternative 3 Light Grazing	Alternative 4 Proposed Action
			Hayfield: 0	Hayfield: 0
Average livestock grazing utilization	None	45%	35%	45%
Economics of the Proposal	No permittee income; permit revenue would be lost. Administrative costs slightly reduced, but FS maintenance costs increased.	Highest permittee income at maximum stocking, but full stocking is unlikely in most years. Administrative costs static.	Light stocking reduces annual income, but long term income may increase due to improved conditions and less need to de-stock in bad years. Administrative costs static.	Light stocking reduces annual income, but long term income may increase due to improved conditions and less need to de-stock in bad years. Administrative costs static.
TEPS Effects Determinations	No effect	Adverse Effects for Sonora tiger salamander, Chiricahua leopard frog and lesser long-nosed bat under all three alternatives. May affect, not likely to adversely affect Mexican spotted owl, Gila topminnow and jaguar. Effects will be less under alternatives 3 and 4.		
Effects to Management Indicator Species	Increased herbaceous cover	Least herbaceous cover. Would not meet Mearns' quail standards in some years	Increase in herbaceous cover in most areas	Increase in herbaceous cover in most areas, but not as much as 1 or 3
Range Vegetation condition	Greatest Improvement	Stable or decline	Improve	Improve
Soil and Watershed Condition	Improved hydrologic function and soil structure. Reduced runnoff.	Areas of impaired/compacted soils remain. Decline in condition.	Moderate increase in soil condition and hydrologic function. Some areas of impaired soils in livestock concentration areas.	Moderate increase in soil condition and hydrologic function. Some areas of impaired soils in livestock concentration areas.
Riparian Condition	Increase in herbaceous vegetation. Limited potential for riparian tree growth.	Continued heavy use of herbaceous vegetation in some bottoms.	Increase in herbaceous vegetation. Limited potential for riparian tree growth.	Increase in herbaceous vegetation, but less than 1 or 3. Limited potential for riparian tree growth.
Water quality	Less sediment. Improved water quality	Static. Continued loss of sediment.	Improved water quality. Less runnoff.	Improved water quality. Less runnoff.

Attribute Compared	Alternative 1 No grazing	Alternative 2 Current Management	Alternative 3 Light Grazing	Alternative 4 Proposed Action
Heritage Resources	No effect	No projects:No effects	Effects avoided or mitigated	Effects avoided or mitigated
Air Quality Effects	None	None	None	None

Chapter 3 - Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for the comparison of alternatives presented in the chart above.

Effects on Wildlife (Issue 1)

Affected Environment

The three allotments are located within Game Management Units 35A and 35B. Typical huntable fauna include Mearns' quail, Gambel's quail, mourning dove, band-tailed pigeon, cottontail rabbit, white-tailed deer, mule deer, javelina, mountain lion and black bear. Of these, Mearns' quail, white-tailed deer and black bear are management indicator species for the Coronado Forest Plan. All three allotments are mapped as high density Mearns' quail habitat. Predator/furbearer species that may occur within the project area include coyote, gray fox, bobcat, coati, striped, hooded and spotted skunks, raccoon, badger, and ringtail. The area may be used for foraging and roosting by a variety of bat species including cave myotis, western red bat, Mexican free-tailed bat, pallid bat, Townsend's big-eared bat, the endangered Lesser long-nosed bat and several other species.

The primary issue related to Management Indicator Species (MIS) and general wildlife are the effects of grazing on upland vegetation, specifically as it relates to impacts on Mearns' quail and other species requiring herbaceous cover. The primary TEPS issues identified through the scoping process are the potential effects to the lesser long-nosed bat that result from grazing during the agave bolting (flowering) season and effects to Sonora tiger salamander and Chiricahua leopard frog that are found in stock tanks in the analysis area.

Management Indicator Species

National Forest Management Act (NFMA) implementing regulations (36 CFR 219.19) and Forest Service Manual (FSM) 2600 guidance require that Forest Plans identify certain vertebrate and/or invertebrate species as management indicator species (MIS), and that these species be monitored "in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent (FSM 2620.5)." Thirty-three MIS and one group (primary and secondary cavity nesters) in 8 indicator groups are identified in Appendix G of the LRMP (U.S. Forest Service 1986, pages 128-129). In general, LRMP direction for MIS is to "maintain or improve occupied habitat for...management indicator species." Of the 33 total MIS on the Forest, 10 species and one group (cavity nesters) were selected for analysis as management indicators at the project level based on their known occurrence within or near the project area or presence of suitable habitats (Table 5, species shown in **bold**). The remaining 23 were eliminated from consideration in this analysis because their known distributions are well outside of the project area or the project area does not

contain suitable habitats for those species. Forest-wide trends of all MIS have been assessed and are reported in the Forest-wide Status Report for Management Indicator Species (Coronado National Forest 2002, Doc. 43). The background information and conclusions of this reported are incorporated by reference.

Table 5. Management Indicator Species on the Coronado National Forest and occurrence in the project area.

Species	Evaluation for Analysis
Desert Bighorn Sheep	Does not occur within analysis area; no suitable habitat
Pronghorn antelope	Does not occur within analysis area; no suitable habitat
Mt. Graham Red Squirrel	Does not occur within analysis area; no suitable habitat
White-tailed deer	Occurs within analysis area; widespread suitable habitat. Monitored annually by AGFD.
Black bear	Occurs within analysis area; suitable habitat available. Monitored through harvest data and incidental observations.
Elegant trogon	Does not occur within analysis area; no suitable habitat
Sulphur-bellied flycatcher	Status in the project area unknown; limited suitable habitat.
Gray hawk	Status in the project area unknown; limited suitable habitat.
Blue-throated hummingbird	Status in the project area unknown; limited suitable habitat.
Rose-throated becard	Does not occur within analysis area; no suitable habitat (low elevation cottonwood/willow/sycamore near flowing water)
Thick-billed kingbird	Does not occur within analysis area; no suitable habitat (low elevation deciduous woodland)
Northern beardless tyrannulet	Does not occur within analysis area; no suitable habitat (low elevation deciduous woodland – cottonwood/willow/hackberry/mesquite)
Bell's vireo	Does not occur within analysis area; no suitable habitat, above elevational range.
Buff-breasted flycatcher	Limited suitable habitat present, but not documented from the analysis area. Intensive surveys in suitable habitats in other EMAs.
Mearns' quail	Occurs within analysis area; suitable habitat available. Population trends and recruitment monitored through harvest data.
Merriam's turkey	Historic occurrence in the EMA but not documented from analysis area. Thought to be extirpated from the EMA.
Five-striped sparrow	Does not occur within analysis area; no suitable habitat, above elevational range.
Peregrine falcon	No eyries in analysis area; potential use by wintering or migrating birds. Foraging habitat for birds from nearby eyrie.
Baird's sparrow	Suitable habitat present in plains grassland habitats. Recorded nearby. Surveys in mid 1990s and annually through Christmas bird counts.
Gould's turkey	Potential habitat in analysis area. Survey routes in Huachuca Mountains.
Primary and secondary cavity nesters	Occur within analysis area; suitable habitat available. Monitored through breeding bird survey routes.
Desert Massassauga	Does not occur within analysis area; no suitable habitat.
Twin-spotted rattlesnake	Suitable habitat not present; outside of known range.
Arizona ridge-nosed rattlesnake	Suitable habitat available, documented from analysis area.
Sonora tiger salamander	Occupied sites in the analysis area. Selected tanks monitored annually.
Tarahumara frog	Extirpated. Former range outside of the analysis area.

Species	Evaluation for Analysis
Western barking frog	Status in the project area unknown; limited suitable habitat. And documented nearby.
Arizona treefrog	Does not occur within analysis area; outside of known range (Huachuca Mts. and Canelo Hills).
Mexican stoneroller	Does not occur within analysis area; outside of species'range.
Arizona (Apache) trout	Does not occur within analysis area; outside of species' range.
Gila topminnow	Does not occur within analysis area; suitable habitat downstream
Gila chub	Does not occur within analysis area; occurs in Santa Cruz watershed, upstream from project area (Sheehy Spring, perched above main channel of Santa Cruz River).
Sonora chub	Does not occur within analysis area; outside of known range.
Spikedace	Does not occur within analysis area; outside of known range

Threatened, Endangered, Proposed and Sensitive Species.

A total of 43 Threatened, Endangered, Proposed or Forest Service Sensitive (TEPS) species have been identified as occurring within the project area or for which suitable habitats may be present (Appendix 1). The majority of the species listed in Appendix 1 are Forest Service Sensitive species included on the 1999 revision of the Region 3 Regional Forester's Sensitive Species List (USFS 1999). Many species are on this list because their distribution and habitat requirements are poorly known. Their presence or absence within the project area may not be detected within the time frame of this analysis.

Environmental Consequences

Management Indicator Species

By definition, MIS are species that can represent a broader suite of species that have similar habitat affinities and for which the effects of the proposed action are considered similar. The analysis area supports an abundance of species that may be affected by the proposed action and alternatives. For the purposes of this analysis, effects to MIS are presumed to be representative of effects to other species with similar habitat needs. Project level impacts to selected MIS as a result of this proposal have been evaluated and are reported in the Analysis of Effects to Management Indicator Species, found in the project record (Doc. 23). In general, the MIS occurring in the analysis area and selected for analysis are highly correlated to the presence of adequate cover, especially herbaceous cover and a diverse plant community. Maintenance of these characteristics was identified as an issued during scoping (Docs. 13-19). Species identified in the LRMP as needing herbaceous cover include Mearns' quail, white-tailed deer, turkey and Baird's sparrow. Species needing diversity include white-tailed deer, black bear and buff-breasted flycatcher. Cavity nesters generally benefit from conditions that promote uneven aged forests with older age trees for cavities and sufficient recruitment of younger trees. None of the alternatives is anticipated to affect the distribution of trees in the project area, so no direct, indirect or cumulative effects are anticipated.

None of the alternatives considered is likely to result in negative population trends for MIS in the project area. Nevertheless, some differences between the alternatives can be projected. The effects of the alternatives on affected MIS and the habitat parameters they represent are summarized below.

Alternative 1 (No Action/No Grazing) is expected to result in the greatest development of herbaceous vegetation over the life of the project. This observation is based on observations of portions of the Hayfield Allotment that was lightly grazed or rested between 1998 and 2002 and shows a distinct increase in vegetation structure and plant litter compared to nearby grazed allotments. This alternative would maximize the amount of residual herbaceous cover that provides Mearns' quail habitat within the analysis area and would be expected to meet LRMP standards and guidelines for the quail. However, light to moderate grazing that leaves adequate cover apparently benefits habitat quality when compared to ungrazed areas by increasing the availability of food resources, so the No Action alternative may not be optimum for Mearns' quail. In addition, Mearns' quail populations are highly correlated to the amount and timing of summer precipitation. The elimination of grazing impacts is predicted to increase the amount of available cover, but in the absence of sufficient precipitation, the effects of management changes alone on long-term trends for quail populations are difficult to predict. Bairds's sparrow and other open grassland species would benefit from increased cover in grassland areas on the allotments.

Alternative 2 (Current Management) does not improve livestock distribution and provides less growing season rest than other alternatives. While manual guidance for Mearns' quail would be implemented, the task of retaining sufficient herbaceous cover across the landscape would be complicated by poor distribution. Current management appears to be achieving LRMP objectives for herbaceous cover in most areas, but livestock concentration areas would continue to result in heavier than desirable use in low, flat areas. Fawning cover for white-tailed deer would be less than that available under other alternatives.

Alternative 3 (Light to moderated grazing) is expected to result in effects similar to those described for Alternative 4, below. Under this alternative, utilization will be limited to 25-35% of key species in key areas rather than 45%. The effects of this reduction in utilization in key areas may be slight, but may be more pronounced in areas of steeper terrain. In steeper country, cattle will often stay in flatter areas until forage becomes limited and they move upslope. Since key areas are usually located where livestock graze first, utilization any distance away from key areas would be expected to range from 0-35%. Utilization at this level would achieve full compliance with the Mearns' quail standards in the LRMP, but would require additional monitoring to assure use levels are not exceeded. New waters and fences should reduce use in flat areas and canyon bottoms, which should benefit Mearns'quail, Baird's sparrow and other species found in these areas, but may also result in reduction in herbaceous vegetation in previously little-used areas adjacent to new water developments. Whitetail deer fawning cover is usually located on hillsides where livestock utilization is lighter. This alternative would provide habitat of sufficient quality and abundance to allow white-tailed deer to remain well-distributed throughout the project area.

Alternative 4 (Proposed Action) will result in improvement in upland herbaceous cover. Proposed changes in management that incorporate growing season rest should increase grass plant production. New waters and fences should reduce use in flat areas and canyon bottoms, which should benefit Mearns'quail, Baird's sparrow and other species found in these areas, but may also result in reduction in herbaceous vegetation in previously little-used areas adjacent to new water developments. Growing season rest in the southern Duquesne pastures and on the Lochiel Allotment should increase vegetative structure and plant vigor. Maintaining utilization at 45% or less will allow for the provision of sufficient cover for Mearns' quail. Limiting use to 45% in key areas should result in average use under 35% across the landscape. Areas around water may exceed 45%, but the additional growing season rest should allow for plant recovery before regrazing. Overall, Alternative 4 should maintain occupied habitats for MIS and other wildlife in the analysis area. Assuming the proposed improvements achieve their desired effect of enhancing livestock distribution and are maintained over the life of the project, this alternative should result in reduced impacts to wildlife compared to Alternative 2 on all three allotments, but will not be as effective at achieving desired conditions as would Alternative 3 or Alternative 1.

Threatened Endangered and Proposed Species

Effects of the ongoing grazing activities on the three allotments have been evaluated in Biological Assessments (BA) of Ongoing and Long-term Grazing on the Coronado National Forest (USFS 1998, USFS 2002) and in the associated Biological Opinions from the U.S. Fish and Wildlife Service (USFWS 1999, USFWS 2002). These analyses determined that current grazing is likely to adversely affect Sonora tiger salamander, Chiricahua leopard frog and the lesser long-nosed bat[2]. These finding are based on management practices in place on the allotment at the time the BA was prepared. Because changes in management are proposed on the three allotments, effects of the proposed action on TEPS species have been re-evaluated. For species likely to be affected by the proposed action or alternatives, effects are disclosed below. More extensive discussions, including determinations for species not affected, can be found in the wildlife specialist's reports included in the project record (Docs. 20, 21, 25). These reports are incorporated by reference.

A project-level biological assessment was prepared and submitted to the US Fish and Wildlife Service on May 17, 2004.

Lesser long-nosed bat.
This bat feeds on the nectar and pollen of paniculate agaves during late summer on the Forest. No roosts are known from the project area, but unsurveyed caves and mine adits in the area represent potential habitat. A large roost is located approximately 6 miles

[2] In June 2002, the Forest reinitiated consultation with the US Fish and Wildlife Service on ongoing grazing activities on the Forest. A new Biological Opinion (2-21-98-F-399R1) was issued on October 24, 2002, superceding the findings of the 1999 Biological Opinion. Changes in the listing status of some species, notably Chiricahua leopard frog, have occurred and new guidance criteria have been issued. The new information and guidance were used in the development of the project level BAE for the three allotments.

north of the project area in the Patagonia Mountains. Suitable foraging habitat in the form of mixed grasslands with stands of agave is present throughout the three allotments. Grazing potentially affects this species through removal of food plants either as a result of ground-disturbing livestock management activities or herbivory by livestock on agaves. Within the project area, agaves occur in both lower gradient areas and in steep inaccessible sites. No quantitative measurements of agave density or estimates of the extent of livestock herbivory have been made on the allotments. Field reconnaissance indicates that agaves are not well distributed throughout the allotments.

Alternative 1 would have no effect on lesser long-nosed bat as grazing will not occur on any of the allotments. Alternative 2 (current management) would result in livestock grazing in pastures containing agaves, although on any given year, more than half of the pastures will be deferred during the April-June agave bolting season. Alternatives 3 (light to moderate grazing) and 4 (proposed action) would result in fewer pastures being grazed during April-June as a result in changes in management. The southern pastures on the Duquesne allotment would be rested each year during the April-June period. It is likely that some level of herbivory on agaves will occur under alternatives 3 and 4, but to a lesser degree than under current management. Nevertheless, effects are not considered insignificant or discountable, so the project level BA determined that the proposed action may adversely affect the lesser long-nosed bat. Conservation measures described under the proposed action are in place in the allotments and will be implemented under all action alternatives in order to minimize destruction of agaves.

Mexican spotted owl

Three Mexican spotted owl (MSO) management territories are located within five miles to the north and west of the project area. There are no records of MSO from the project area. However, portions of the analysis area are identified as proposed critical habitat for this species (FR 68 65020). Habitats are typically uneven aged, multi-storied mixed conifer with canopy closures greater than 50%. On the Forest, MSO are also found in Madrean pine-oak forests and steep rock-walled canyons, sometimes with little tree cover. Upper elevation canyons on the Duquesne and Lochiel Allotments support constituent elements that may provide limited MSO habitat.

Alternative 1 will have no effect on MSO, as grazing will not occur on the allotments. Under Alternatives 2, 3, and 4, grazing will occur on the Duquesne and Lochiel allotments in areas within the boundaries of proposed critical habitat. Owls foraging from nearby PACs may occasionally use portions of the allotments, but such use has not been documented. In addition, little or no grazing is anticipated in steep, high elevation canyons that support limited constituent elements for the species. The project-level BA determined that grazing on these allotments may affect but is not likely to adversely affect MSO.

Regarding proposed critical habitat, the Hayfield Allotment is entirely outside of proposed critical habitat. On the Duquesne and Lochiel Allotments, grazing as proposed under the action alternatives should leave sufficient residual herbaceous biomass to support natural fires and provide rodent prey cover. Therefore, grazing under alternatives

2, 3, and 4 is not likely to adversely affect proposed critical habitat for MSO on the Duquesne and Lochiel Allotments.[3]

Sonora tiger salamander
Sonora tiger salamanders (STS) are found in the San Rafael Valley and adjoining foothills of the Patagonia and Huachuca Mountains in stock ponds constructed for livestock watering. Historically, salamanders probably inhabited naturally occurring springs and cienegas in the vicinity of the San Rafael Valley grasslands. Selected stock tanks are surveyed annually. Sonora tiger salamanders have been documented in nine sites on the Hayfield (3 sites) and Duquesne (6 sites) allotments. Conservation measures described under the proposed action are in place in the allotments and will be implemented under all action alternatives in order to minimize harm to the species.

Alternative 1 will have no direct effects on STS, as no grazing will occur. Stock ponds will not be maintained under this alternative. Since salamanders occur exclusively in stock tanks in the project area, some habitats may be lost over time as a result of breached dams or sedimentation of existing pond habitats. This loss may be balanced to some degree by the re-creation of more natural conditions in drainages in the analysis area. However, no natural cienega habitats are known from the analysis area and the creation of sufficient natural habitat in the near term is considered unlikely. Alternative 2 is likely to continue to adversely affect the species through direct exposure of salamanders to livestock. Stock tank maintenance would continue to provide habitats, but aquatic vegetation would be affected because cattle would continue to concentrate around tanks. Under Alternatives 3 and 4, upland water developments will be used to draw livestock out of the bottoms and away from occupied ponds. This will provide the opportunity to fence or otherwise protect occupied sites from livestock, consistent with recovery goals for the species. Tank maintenance would continue to occur. The project BA determined that the proposed action is likely to adversely affect the species because livestock are likely to have some access to occupied sites over the term of the project, but effects should be reduced compared to Alternative 2.

Chiricahua leopard frog (CLF)
Leopard frogs as a group are habitat generalists that can adapt to a variety of wetland situations. According to available records, there are occurrences of Chiricahua leopard frog on the Hayfield and Duquesne allotments and in watersheds downstream from the allotments. Livestock grazing effects on CLF habitat can be beneficial or deleterious. Construction of stock tanks for livestock water has created leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats. Under all action alternatives, conservation measures described under the proposed action will be used to minimize harm to CLF as a result of livestock management activities.

The effect of Alternative 1 are likely to be similar to those described for Sonora tiger salamander. All three action alternatives would likely affect the species as a result of livestock use in occupied habitats. These effects would be greatest under current

[3] In March 2003, the Forest reinitiated consultation on the effects of grazing on proposed critical habitat, Forest-wide. The findings displayed in the EA are consistent with effects determinations found in the Biological Assessment (Doc 26).

management and would be reduced under alternatives 3 and 4 as a result of measures designed to pull cattle out of the bottoms and away from existing stock ponds. The increase likelihood of fencing occupied sites under alternatives 3 and 4 would also be expected to reduce effects. The BA determined that the proposed action is likely to adversely affect the species, although at reduced levels compared to current management.

Gila topminnow

Gila topminnows do not occur in the project area, but have been documented to occur in the upper Santa Cruz River, approximately 4 miles downstream from the project location on private land in the San Rafael Valley (Doc 21). The land is used for livestock grazing. Due to private land considerations in the San Rafael Valley, the distribution of topminnow is not well documented. A second population occurs in a perched spring in the San Rafael Valley, but is east of the Santa Cruz drainage and not influenced by watershed conditions in the project area.

Alternative 1 will have no direct or indirect effects on topminnows. Direct effects to topminnow from Alternatives 2-4 are not anticipated. There is no occupied habitat on the allotments, nor does there appear to be suitable unoccupied habitat. Grazing activities on the three allotments indirectly affect the watershed downstream and can contribute either positively or negatively to downstream water conditions. Most of the major stream courses on the allotments drain directly into Mexico or enter the Santa Cruz River below the location where topminnow have been documented. Nevertheless, watersheds in the northern portion of the Hayfield allotment and in Mowry Wash in the Duquesne allotment may influence flows in the Santa Cruz River. Range conditions are generally good on these allotments with stable or upward trends. Because of the distance between the allotments and occupied topminnow habitat and the presence of intervening private land, the magnitude of effects is difficult to quantify but cannot be entirely discounted. Based on management intensity and utilization levels proposed under the action alternatives, effects are predicted to be greatest under Alternative 2 and least for Alternative 3. Effects of the proposed action will be intermediate.

Sensitive Species

All of the sensitive species identified in Appendix 1 may occur within or near the proposed project area. Occurrence has not been confirmed for several species, but the species are included in the analysis because 1) potentially suitable habitat exists, 2) the analysis area is within the range of the species, or 3) it is currently unclear what composes their preferred habitats. A more detailed analysis is found in the Biological Evaluation (Doc. 20) and is summarized below.

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

Southern pocket gopher	American peregrine falcon
Lowland leopard frog	Western Barking frog
Mexican garter snake	Sonora sucker
Lemmon milkweed	Large-flowered bluestar
Chiricahua sedge	Wooly fleabane
Seeman groundsel	Scudder's duskywing

Mexican meadowfly	Huachuca springsnail

These species are found in habitats that are not affected by the proposed action, have not been found in suitable potential habitats on the allotments, or the project area does not provide suitable habitat.

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

Apache northern goshawk	Gould's turkey
Arizona ridgenosed rattlesnake	Huachuca milkvetch
Bartram's stonecrop	Mock pennyroyal
Huachuca golden aster	Lemmon morning glory
Escoba	Beardless cinchweed
Thurber hoarypea	Sonoran noseburn
Arizona giant skipper	Poling's giant skipper
Ursine giant skipper	*Amblycheila baroni*
Arizona metalmark	

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

The proposed management includes several measures that are predicted to improve soil, watershed, vegetation and riparian condition over the term of the project. These include conservative grazing utilization (35-40%), increased pasture rest and fencing of sensitive aquatic sites. Implementation of these measures should improve habitats for sensitive species.

Neotropical Migratory Birds and Important Bird Areas

Executive Order 13186, of January 10, 2001 directs Federal agencies to support migratory bird conservation and to "ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern". Birds of Conservation Concern are identified by the U.S. Fish and Wildlife Service Office of Migratory Bird Management by Bird Conservation Region (USFWS 2002. Birds of Conservation Concern. Div. of Migratory Bird Management http://migratorybirds.fws.gov/reports/bcc2002). The Project area lies within the Sierra Madre Occidental Region. Thirty-nine birds of conservation concern are identified for this region. Effects to selected migratory bird species were analyzed in the Wildlife Specialist's Reports (Docs. 20, 25) by species and habitat type. Under all alternatives, effects to migratory birds are anticipated to be positive or insignificant as a result of projected improvements in riparian habitats and herbaceous cover.

The closest Important Bird Area (IBA) identified by the National Audubon Society is the lower San Pedro River, approximately 15 miles from the project boundary. Activities within the project area are not expected to affect the San Pedro River IBA. Harshaw Creek, which has its headwaters in the northern end of the Duquesne allotment, has recently been nominated for designation as an important bird area. The portion of the creek that has been nominated is approximately six miles north of the project area and will not be affected to any degree by activities on the allotments.

Cumulative Effects – Wildlife

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

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

There are several stock ponds within the watershed that support populations of non-native fish or bullfrogs. The spread of non-natives into occupied aquatic sites occupied by native salamanders and frogs, either through natural dispersal or through intentional introduction by humans, could impact the recovery of amphibian populations notwithstanding improvements in riparian and stream conditions.

Human activities in the project area include hiking, hunting and vehicle use on unsurfaced roads. The area is well known for its Mearns' quail hunting opportunities and is heavily visited by deer hunter in the fall. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas. They do not contribute significant cumulative effects.

Portions of the area show evidence of trailing by undocumented aliens and/or drug traffickers. In addition, the area has seen a substantial but unquantified increase in vehicle traffic related to drug and immigration interdiction efforts on the part of the U.S. Border Patrol and other enforcement agencies. These activities result in localized

disturbance within the project area, but the proposed action is not expected to contribute adversely to the existing level of effects resulting from these activities.

Rural and urban development on private lands in the project area has resulted and will continue to result in the loss or fragmentation of wildlife habitats. The proposed action and alternatives are not expected to contribute cumulatively to habitat fragmentation since no developments are planned. In addition, much of the private land in the project are is protected by conservation easements that prevent the subdivision of the tracts for development.

Non-native invasive plant species are known or suspected from the project area. These include Lehmann lovegrass in the uplands and Johnson grass, salt cedar and tree of heaven in various locations on the allotments. The removal of noxious weeds or invasive plants may be proposed in the future and effects of any treatments have been analyzed under a separate analysis. Grazing under the proposed action is not expected to preclude projects designed to eliminate invasive plants, nor is grazing as proposed expected to contribute significantly to the spread of invasive species over current levels. As currently proposed, invasive plant treatments are not expected to result in significant impacts to wildlife resources. Cattle can contribute to the distribution of invasive plant seeds and can disturb soils, thereby creating conditions conducive to the growth of invasive plants. However, except for Lehmann lovegrass, invasive plant infestations in the project area are limited in extent. There is no documentation that cattle have contributed significantly to the spread of invasive exotic plants in the project area. Monitoring of rangeland by the Forest Service and the permittee will lead to early identification of invasive exotic plant populations.

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

Soils and Watershed (Issue 2)

Affected Environment

A soil conditions analysis was completed in 2004 for all three allotments using protocols from Forest Service Handbook 2509.18-99-1. Soil condition was evaluated by using a combination of field inspections, Digital Elevation Models, aerial photo interpretation, and topographic maps. Interpretations were based on historical livestock use patterns and slope characteristics. Field data collection consisted of visiting key areas, Parker Three Step clusters and pace transect locations. The soil condition rating procedure evaluates soil quality based on an interpretation of factors that affect three primary soil functions. The primary soil functions evaluated are soil stability, soil hydrology and nutrient cycling (See Appendix 2 for soil condition definitions).

The satisfactory soil condition class covers about 93% of the three allotments. These soils are functioning properly and retain their inherent productivity. The impaired soil condition class covers the remaining 7% of all the allotments (Table 6).

TABLE 6. Soil Condition Rating Acres by Allotment

ALLOTMENT	Satisfactory Soil Condition		Impaired Soil Condition		Unsatisfactory Soil Condition		Grand Total
	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Duquesne	10,182	91%	994	9%	0	0%	11,176
Lochiel	2,039	89%	246	11%	0	0%	2,285
Hayfield	6,526	97%	178	3%	0	0%	6,704
Grand Total	18,747	93%	1,418	7%	0	0%	20,165

Environmental Consequences

The soils were analyzed strictly on the basis of the effects from grazing. The predicted effects of livestock use on soil conditions only evaluated the direct/indirect effects of livestock grazing relative to existing base soil conditions regardless of outside variables. The effects analysis reflects what would happen in the long term as it relates to potential recovery. It is important to note that the actual soil condition class is not expected to change within the ten-year analysis period, even under Alternative 1. Improved change in soil condition class is a long-term process with many influences. This analysis does reflect the direction that is expected under each of the alternatives and provides a way to compare alternatives. The predictions upon soil conditions show to what degree the change will impact soil condition direction as it relates relatively to livestock grazing. Variables other than grazing are discussed in the cumulative effects section.

In all allotments the Alternative 2 (Current Management) demonstrates the baseline condition; these conditions are the result of current management. All of the other alternatives effects are compared relative to Alternative 2.

Alternative 1. In the impaired soil condition areas, the potential increase of vegetation groundcover (VGC) and elimination of livestock compaction would contribute to an improved nutrient cycling and improved soil structure. The improved soil structure would contribute to the functional hydrologic condition. In the satisfactory soil condition areas, the adequate diversity and VGC would contribute to maintaining a satisfactory nutrient cycling and soil structure. The hydrologic function and runoff would continue to be satisfactory.

Alternative 2. In the areas of impaired soil condition, the lack of VGC and moderate compaction is partially due to limited number of watering locations, which concentrates livestock. The lack of additional watering areas would potentially continue to stress the impaired soils and may produce a decline in condition. In the areas of satisfactory soil condition, the soils would probably continue to be satisfactory.

Alternative 3. In the impaired soil condition areas, the potential increase of VGC due to the lower utilization would help the nutrient cycling and soil stability. The rotation

modification and range improvements would help all the soil functions by increasing the livestock distribution and allowing more rest. Improvements to the soil condition could be achieved. In the satisfactory soil condition areas, the potential increase of VGC due to the lower utilization would also help the nutrient cycling and soil stability. The rotation modification and range improvements could increase use in historically underused areas and therefore potentially impact the soil conditions in these areas.

Alternative 4. Similar to Alternative 3 but to a lesser extent. Potential improvements in impaired soil condition areas and a potential to impact the condition in the satisfactory areas.

Upland Vegetation (Issue 3)

Affected Environment

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

Range condition is evaluated in terms of its ecological status, which is an evaluation of the status or health of the vegetation and soil relative to their combined potential to produce a stable biotic community. For the purposes of determining rangeland condition, vegetation conditions were evaluated between 1999 and 2003 in the project area. The project area falls within the Mexican oak-pine woodland and oak savannah land resource unit (41-1AZ). The reference range site used to describe the potential natural community is clayloam upland range site designation in the 16-20 inch precipitation zone (PR Doc. 37). Range condition classifications are excellent, good, fair, poor and very poor.

The Coronado National Forest LRMP calls for rangelands to be brought into satisfactory range condition. Satisfactory range condition is defined in the LRMP as fair or better range condition with a stable or upward trend and stable soil (USFS 1986). Range and soil condition in the analysis area currently meets LRMP standards (Table 1, page 2), but areas could be enhanced through improved management.

Environmental Consequences

Utilization by grazing animals affects vegetation composition and productivity. Moderate to high utilization on a repeated basis or for extended periods can cause changes in the frequency and vigor of preferred forage plants. Vegetation condition can be improved through reductions in the intensity of utilization or by increasing the amount of rest to allow for grazed plant recovery.

Under **Alternative 1** (No Grazing), there would be no direct or indirect effects as a result of livestock utilization. Some light use by wildlife may occur, but there are no large wild grazing herbivores in the project area, so use would be negligible. Over the long term, the effects of this alternative would be increases in preferred forage plant frequency, plant density and plant vigor.

Under **Alternative 2**, livestock distribution and utilization levels would continue. Annual monitoring would be used to insure that utilization does not exceed allowable levels, but this task would be made more difficult because of the absence of additional improvements to aid livestock distribution. On the Hayfield allotment, conditions may continue to improve because the existing infrastructure is sufficient to provide management flexibility. On the Duquesne and Lochiel allotments, the lack of flexibility and less growing season rest compared to other alternatives, would be projected to maintain existing conditions, but may not contribute significantly to improvements in lower condition areas.

Alternative 3 would contribute to increased vegetation condition over existing condition by providing additional growing season rest on the Lochiel and Duquesne allotments, by providing additional upland waters to control livestock distribution and by reducing utilization to 25%-35% maximum. Utilization at this level will provide sufficient residual herbaceous vegetation to protect soils and maintain plant vigor. Flexible stocking rates, based on existing resource conditions should allow management to respond proactively to changing conditions before problems occur.

Under **Alternative 4**, improved livestock distribution would be expected to occur as new water sources are created. Additional growing season rest every year (Lochiel) or every other year on all pastures in the project area should allow for recovery of grazed plants and increases in plant vigor. Allowable use levels of 35-45% are expected to provide sufficient residual herbaceous vegetation to protect soils and contribute to improved range conditions over time. Forage removal would be somewhat higher than under Alternative 3, but is considered sustainable based on past management experience. Flexible stocking rates, based on existing resource conditions should allow management to respond proactively to changing conditions before problems occur.

Several comments were received stating a concern that 45% utilization limits exceed current accepted standards for utilization (often citing studies and summaries such as Holechek, 1999) and that such standards are not sustainable. Such concerns may be based to some degree on a misunderstanding of Forest Service key species/key area monitoring compared to expressions of average utilization found in the literature. Maximum utilization of 45% of key species in key areas should result in average use of less than 45% across the landscape. Utilization data cited in Holechek 1999 were derived from numerous studies using different methodologies, but generally refer to average utilization across a pasture and over time. It cannot be directly compared to Forest Service key species/key area monitoring. For example, in 2003, measured utilization on 19 range sites on the Hayfield Allotment ranged from 10-55%. Utilization on 3 of the 19 sites exceeded 45% and therefore exceeded Forest standards. However, the *average* utilization across the allotment was 28% (Doc. 5, PR), which is well below 45%.

Cumulative Effects – Vegetation

Past, present and future actions in the project area that affect rangeland vegetation are similar to those described for wildlife (above, pp. 19-20). In addition to the effects described above, the forest may propose the mechanical removal of extensive stands of manzanita in the northern portion of the Duquesne allotment. This action, if

implemented, would involve the crushing of mature manzanita using a rubber tired shredder. The purpose would be to reduce woody fuels, create openings favorable to the growth of grasses and increase herbaceous soil cover. This action would result in short term soil disturbance but is expected to contribute to plant community health over the long term by restoring a more natural fire regime and increasing herbaceous cover in treated areas. Treatments may require deferment of some pasture during project implementation. A separate environmental analysis will be prepared for this project.

Economics (Issue 4)

Affected Environment

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

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

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

Environmental Consequences

Table 7 summarizes costs associated with each alternative by allotment. Costs are based on data provided by District personnel (Bill Edwards, pers. comm., February 2004, Doc. 28). The costs shown in Table 7 are for materials only; permittees will provide the labor to install the improvements as a cost-share.

Table 7. Costs of planned improvements by alternative for the Duquesne, Lochiel and Hayfield Allotments.

Allotment	Description of proposed improvement	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Duquesne	Three storage tanks	0	0	$23,000	$23,000
	Pipeline (29.5 miles)	0	0	$51,400	$51,400

	Drinking troughs (73)	0	0	$14,600	$14,600
	Fencing (1.25 miles)	0	0	$3,750	$3,750
	Total Duquesne	0	0	$92,750	$92,750
Lochiel	Storage tank	0	0	$5,000	$5,000
	Pipeline (2 miles)	0	0	$3,500	$3,500
	Drinking troughs (7)	0	0	$1,400	$1,400
	Fencing (1 mile)	0	0	$3,000	$3,000
	Total Lochiel	0	0	$12,900	$12,900
Hayfield		0	0	0	0
	Total all allotments			$105,650	$105,650

Alternative 1 would have the lowest cost as no new improvements would be authorized and only limited maintenance would occur. There would, however, still be costs associated with management of the allotments. Maintenance or removal of existing structural improvements may become necessary and costs would be borne by the Forest Service. Allotment boundary fence maintenance would be shifted from the permittees to the Forest Service or adjacent permittees. Alternative 2 would involve no new improvements, but maintenance costs would occur in order to maintain existing structural improvements. These costs would likely be more than alternative 1, but significantly less than alternatives 3 and 4, especially on the Duquesne allotment. The costs of improvements are projected to be similar for Alternatives 3 and 4.

Net ranch income under the various alternatives is shown in Table 8. Net ranch income represents gross returns minus operating costs. Specific operating costs and revenue estimates were not available for each ranch, so the analysis is based on data developed by Gao (1996) and reported in Ruyle, et al 2000 (Doc. 27) who analyzed income and expenditure for ranches throughout Arizona using data for the years 1980-1993. The economic return considers total ranch revenue and costs of production per animal unit year (AUY), but does not consider non-cash fixed assets such as depreciation and the opportunity cost of capital investments. Excluding non-cash fixed assets, the return to grazing permits, management and risk was calculated by Gao to be $78.50 per AUY (1993 dollars). For the purposes of the analysis shown in Table 8, this return was recalculated to reflect the current Forest Service grazing fee of $1.43 per animal unit month, resulting in an estimated return of $108 per AUY. When non-cash fixed assets were included in the calculations, net ranch revenue showed a negative return, or loss, of -$44.18 per AUY (1993 dollars) (Doc. 27). The data in the table are based on numerous assumptions about the "average" ranch in Arizona. Actual ranch income and expenditures will vary from year to year as a result of market fluctuations and

management decisions. Nevertheless, the data provide a basis for a comparison of the relative costs and benefits of the alternatives.

Table 8. Estimated revenues before fixed non-cash expenses by alternative.

Allotment	Alternative	Stocking (AUM)	Animal Unit Years	Return/ AUY	Gross revenue	Grazing Fee	Net Revenue
Duquesne	1	0	0	0	0	0	0
	2	3485	290	$108	$31,365	$4,984	$26,381
	3	2015	168	$108	$18,135	$2,881	$15,254
	4	2170-2932	181-244	$108	$19,548-$26,352	$3,103-$4,192	$16,445-$22,160
Lochiel	1	0	0	0	0	0	0
	2	1283	107	$108	$11,547	$1,835	$9,712
	3	621	52	$108	$5,616	$888	$4,728
	4	594-782	50-61	$108	$5,400-$6,588	$849-$1,118	$4,551-$5,470
Hayfield	1	0	0	0	0	0	0
	2 and 4	3215	268	$108	$29,003	$4,597	$24,405
	3	2818	235	$108	$25,380	$4,030	$21,350

Net revenue is the amount left after expenses available to provide for basic living expenses such as food, clothing and medical needs. For purposes of the comparison, net revenues displayed in Table 8 represent maximum stocking as currently permitted (Alternative 2), at 35% utilization (Alternative 3) and at 45% utilization (Alternative 4). Based on past sustainable stocking on the allotments, it is likely that in most years net revenue would be intermediate between the values displayed for Alternatives 3 and 4. Weather, market conditions and management decisions will continue to affect net revenue on an annual basis. Estimated net annual revenues vary from zero under the no action alternative to a maximum of $26,381 on the Duquesne allotment at maximum stocking under the current permit. Stocking under alternative 3 would result in an annual average of 20% less revenue on the allotments. Assuming maximum stocking over the ten-year term of the permits, long-term potential revenue reductions would be $69,090 on the Duquesne allotment, $30,550 on the Hayfield allotment and $8,190 on the Lochiel allotment.

Estimates of ranch living expenses cited by Ruyle (Doc. 27) vary form $11,500 to over $20,000, depending on the size of the ranch. Based on this it appears that net revenue on

the three allotments will allow the permittees to break even at best. It appears likely that the permittees will be dependant on outside sources on income at least in some years in order to cover living expenses. Outside income is important, as on average Arizona ranches derive about half of their income from outside (non-ranching) sources. The permittees have not indicated that the action alternatives are not economically viable. However, economies of scale are important to the overall costs and returns of ranching operations, and alternatives providing for less than approximately 100 CYL are likely to lose money.

Annual grazing receipts to the Forest Service are shown in Table 8 in the Grazing Fee column. Of this, twenty five percent go to Santa Cruz County (Table 9). Values shown assume maximum stocking for comparison purposes. This would be a positive source of revenue since the County does not incur any costs as a result of the action. The remaining 75% of fees are returned to the Forest Service, but are unlikely to cover recurring administrative costs or the costs of proposed improvements.

Table 9. Annual payments to Santa Cruz County by alternative (25% of grazing fees).

Allotment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Duquesne	0	$1,246	$720	$1,048
Lochiel	0	$459	$222	$260
Hayfield	0	$1,149	$1,007	$1,149

Cumulative Effects

Domestic livestock grazing contributes to the economy of local communities and counties. Individual allotments provide incremental contributions to the economy, and changes in several allotments may have cumulative impacts. The analysis does not suggest that there will be significant cumulative economic impacts to local communities and counties from adoption of any of the alternatives considered, and other reasonably foreseeable actions.

Other Environmental Components

Riparian

Affected Environment

Drainages mapped as Management Area 7 (riparian) include Duquesne Wash, Finley Adams Canyon, Chino Draw and Mowry Wash. Management Area 7 is subdivided into two classifications: 7A and 7B. True wet riparian area with deciduous vegetation are classified as 7A. Areas with flora and fauna unique enough to require special management practices but that do not support deciduous riparian communities are classified as 7B. This classification includes dry riparian areas, such as oak and mesquite bottoms.

The streams in the three allotments are considered Management Area 7B dry riparian areas. Generally, the streams have upland species in the bottoms of the canyons. These upland species are usually more robust and denser than in the adjacent uplands. The goals and objectives for Management Area 7B are "to perpetuate the unique wildlife or vegetative species while producing livestock forage and fuelwood on a sustained basis" (LRMP Page 71). Unlike Management Area 7A, Management Area 7B does not have quantitative vegetation or stream bank standards.

None of the streams support year round surface water flow (perennial), nor are there any mapped wetlands in the project area. However, below the surface, the water table may be shallow in spots or have subsurface flow. This subflow may be close enough to the surface to sustain small areas of riparian type vegetation. Fluctuations in the subflow may cause the depth of free flowing water, or capillary moisture, to not be within reach of roots for undefined periods of time. Drought conditions and groundwater pumping are the primary causes for a reduction in subflow.

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

Table 10 presents data collected using RASES in select streams in the project area. These areas appear to be meeting forest plan goals and objectives for vegetation.

TABLE 10. Existing Condition of Riparian Areas (Management Area 7B)

Allotment	Stream Name	Tree Species Recruitement (Young Seedlings Species of Total Species)	Tree and Shrub Canopy (Percent Shade)	Vigor
Duquesne	Duquesne Wash	3 of 4	20	Fair
	San Antonio Wash	3 of 3	15	Good
Hayfield	Finley and Adams Canyon	4 of 4	60	Good
	Adams Canyon	3 of 3	30	Fair
	Chino Draw	1 of 3	25	Good

Stream channel and stream bank information was also collected at these same locations (Table 11). Not all locations are meeting Forest Plan goals and objectives for stream channels. Generally, the unsatisfactory areas are characterized by having a degraded channel, steep banks, and minimal floodplain development.

TABLE 11. Existing Condition of Stream Channels



Allotment	Stream Name	Bank Protection (Percent of bank not occupied by bedrock, boulders, stones, or cobbles)	Channel Condition
Duquesne	Duquesne Wash	8%	Unsatisfactory
	San Antonio Wash	49%	Satisfactory
Hayfield	Finley and Adams Canyon	44%	Unsatisfactory
	Adams Canyon	69%	Satisfactory
	Chino Draw	19%	Unsatisfactory

Environmental Effects

Alternative 1. The potential increase of vegetation groundcover (VGC) on the banks, elimination of livestock bank alteration and compaction and reduction in browse in the riparian areas would contribute to an improved riparian function.

Alternative 2. Would maintain the existing conditions of the riparian areas. Vegetation would continue to meet LRMP standards, but continued livestock grazing in bottoms would be expected to contribute to bank instability.

Alternative 3. The potential improvement in livestock distribution due to the new water locations and fencing will help reduce the impacts to natural concentration points like the bottom of canyons and stream sides. This will improve the riparian condition. The rest-rotation system will allow the vegetation to not be impacted by grazing for a complete growing season potentially causing positive gains in plant vigor, recruitment and bank stability. Riparian condition improvements would be higher than Alternative 4, due to less intensive use, and considerably more improvement than Alternative 2.

Alternative 4. The potential improvement in livestock distribution, due to the new water locations and fencing, will help reduce the impacts to natural concentration points like the bottom of canyons and stream sides. This will improve the riparian condition. The rest-rotation system will allow the vegetation to not be impacted by grazing for a complete growing season potentially causing positive gains in plant vigor, recruitment and bank stability. Tapping into wells and running piping to new troughs would create the proposed new watering locations. The additional water withdrawal from the subflow or aquifer could reduce water quantities since the waters will come from wells located in the allotments. Depending on the location and quantities of water withdrawn, riparian conditions may be impacted.

Air

Affected Environment

The Clean Air Act established air quality standards for three classes of airsheds. Class I airsheds are the most restrictive and generally include National Parks and Wilderness

areas. Class II airsheds are generally rural areas and Class III airsheds generally are the more urbanized areas.

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

Environmental Effects

Activities resulting from this grazing project will not significantly affect the factors contributing to a high quality air shed. Therefore, grazing will not have an effect on the air resources in this Class II airshed. Because there are no measurable effects, there will be no cumulative effects to air quality as a result of any of the alternatives considered here (Doc. 33).

Water

Water Quality and Quantity

The Duquesne, Lochiel and Hayfield Allotments are divided between three Fifth Code Watersheds: the Santa Cruz River Headwaters 5th Code Watershed (HUC code 1505030101), the Middle Santa Cruz River (HUC code 1505030103), and the Sonoita Creek 5th Code Watershed (HUC 1505030102). The Lochiel and Hayfield Allotments are located completely within the Santa Cruz River Headwaters Watershed. Most of the Duquesne Allotment is also in the Santa Cruz River Headwaters Watershed, however, a small portion is located in the Sonoita Creek Watershed and the Middle Santa Cruz River Watershed (Table 12). All three allotments are at or near the top of their respective watersheds.

Table 12. Allotments Acres by 5th Code Watersheds

ALLOTMENT	Santa Cruz River Headwaters		Middle Santa Cruz River		Sonoita Creek		Grand Total
	Acres	Percent	Acres	Percent	Acres	Percent	Acres
Duquesne	10,364	93%	31	0%	781	7%	11,176
Lochiel	2,273	99%	12	1%	0	0%	2,285
Hayfield	6,704	100%	0	0%	0	0%	6,704
Grand Total	19,341	96%	43	0%	781	4%	20,165

The three watersheds are large in size totaling approximately 173,800 acres and the three allotments make up approximately only 12% of the total acres of the three watersheds (Table 13).

Land uses on private land are those associated with agriculture, rural development and mining. Uses on public lands are primarily grazing and recreation.

Table 13. 5th Code Watersheds Acres

Watershed	Area inside of the allotments		Area outside of the 3 Allotments		Grand Total
	Acres	Percent	Acres	Percent	Acres
Santa Cruz River Headwaters	19,341	22.6%	66,424	77.4%	85,765
Middle Santa Cruz River	43	0.2%	28,442	99.8%	28,485
Sonoita Creek	781	1.3%	58,809	98.7%	59,590

Environmental Effects

Surface water quality and water quantity peak flow is affected by hydrologic function, which is the ability of soil to capture, hold and release water. Hydrologic function is strongly influenced by soil condition. If soil conditions degrade significantly, then the water quality of the watershed can degrade due to a compromised hydrologic function. Runoff is usually increased and the time that water sits on the land (water residence time) decreases. This decrease of water residence time increases peak flow discharges and limits the ability of the soil to absorb and transmit water, resulting in a reduction of the capability to filter soluble solids and sediments thereby impacting water quality. Turbidity is generally considered a gauge of watershed water quality. Low turbidity would indicate good water quality and stable soil conditions.

Effects of the alternatives have been analyzed in a soil and water specialist's report (Doc. 29) and are summarized below. In the following section, increased water quantity refers to increases of water quantity in the aquifer, subflow and soil. Therefore, an increase in water quantity will be a positive effect rather than a negative one.

Alternative 1. In the impaired soil condition areas, the potential increase of vegetation groundcover (VGC) and loss of potential livestock compaction would contribute to an improved hydrological function resulting in less runoff, better infiltration and an improvement in water quantity. Water quality would improve due to less sediment moving in the system and less turbidity. In the satisfactory soil condition areas, the adequate diversity and VGC would contribute to maintaining a satisfactory hydrological function and runoff would continue to be satisfactory. Water quality and water quantity would continue to be satisfactory.

Alternative 2. The variable VGC and soil structure would potentially result in a static water quality and quantity trend.

Alternative 3. Water quality and water quantity improvements would be slightly higher than Alternative 4, due to more VGC, and considerably more than Alternative 2 due to a reduction in impacts to the impaired soil condition areas.

Alternative 4. Livestock management would modify the rotation schedule and install new range improvements (additional water locations and fencing, etc.) to improve livestock distribution. The allowable utilization would remain at 45%, similar to Alternative 2 (current management). Tapping into wells and running piping to new troughs would create the proposed new watering locations. The additional water

withdrawal from the subflow or aquifer could reduce water quantities since the waters will come from wells located in the allotments. In the impaired soil condition areas, the potential increase in livestock distribution, due to the new water locations, will help increase the hydrological function and soil stability for these areas. This will increase the water quality and water quantity for these areas.

No change in hydrologic function at a watershed scale is expected from changing livestock management, though changes in hydrologic function are expected on some localized map units.

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

Cumulative Effects – Soils and Water Components

Past, present and foreseeable future projects or actions that have affected or will affect soil and water resources in the project area include historic heavy grazing, prescribed and natural fires, wildfire suppression, invasive exotic plants and water developments. These occurrences have contributed incrementally to effects that have changed ecological conditions of the area. The proposed action and alternatives, because they are designed to implement properly managed grazing will not contribute effects that would adversely change the ecological conditions of the analysis area. The proposed action will not preclude future projects designed to eliminate invasive exotic species, eliminate invasive brush, or those designed to return fire to a more natural role in the ecosystem.

Historic heavy livestock grazing throughout the watersheds around the turn of the century resulted in a reduction in native grasses and an increase in shrubs. In some areas, removal of vegetation by grazing resulted in significant soil loss. Best Management Practices (BMPs) to mitigate grazing effects have since been implemented on most Federal lands, with a general improvement in conditions. Soil loss, however, is most likely irretrievable in human time frames (100 years).

Recreation impacts are primarily from vehicle use on un-surfaced roads. This will increase sediment in stream channels, and in the case of off-road use, severely disturb vegetation and soils. Presently, OHV use is not significant in this area. However, as this outdoor recreation activity grows in popularity, unregulated use generally creates wildcat roads, which can pose a huge impact to watersheds.

Mining activity has occurred within the project area since the mid 1800's. Historic surface and underground mining is a ground disturbing activity by definition and causes many effects, some irreversible, to the environment. Historic mining activity can have adverse effects to soil and water quality caused by excess sediment and pollutants from areas of waste rock dumps or processed ore. Also, historic use of the area by hundreds of miners, for decades, can compact the soils and impact the watersheds. Vegetation can be impacted due to the need for large volumes of fuel wood to process ore. Currently, there is no planned commercial mining activity reported within the project area. However,

since the area is a mining district with historic mineral production, there is a potential, that within the next century, renewed exploration and extraction could occur.

Borderland activities associated with a shared border between the United States and the Republic of Mexico is an increasing impact to watersheds. The watersheds of the project area have been used by undocumented aliens (UDAs) to cross back and forth between the two countries. Activities associated with the UDA's include the creation of wildcat foot trails which impacts soils, leaving trash and debris, vandalizing water facilities and leaving gates open or cutting fences allowing livestock to drift to pastures which are resting. Activities associated with Border Patrol use of the watersheds is the regular use of double track roads by large vehicles and OHV use in areas which have historically had little use. Future activities could include look out towers and other surveillance techniques within the project area.

Heritage Resources

Affected Environment

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

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

Environmental Effects

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

and would cover the improvements included in Alternatives 2 and 3. A concurrence was received from SHPO on September 20,2004 (Doc. 38).

Chapter 4 - Consultation and Coordination

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

- Arizona Game and Fish Department, Tucson
- U.S. Fish and Wildlife Service, Tucson
- Arizona State Historic Preservation Office
- Arizona Department of Environmental Quality

List of Preparers

- Richard Gerhart, NEPA Team Leader/Biologist
- Salek Shafiqullah, Hydrologist/ Soil Scientist
- William Edwards, Range Management Staff, Sierra Vista Ranger District
- Bill Gillespie, Archeologist, Coronado N.F.
- Tom Deecken, Biologist, Sierra Vista Ranger District

Appendix 1. Special Status Species in the Project Area

Species	Status	Comments
Mammals		
Jaguar *Panthera onca*	Endangered	Documented in project area, 1965 (hunter kill).
Ocelot *Felis pardalis*	Endangered	Historic range in SE Arizona. Last confirmed sighting in 1964.
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	Endangered	Suitable foraging habitat in project area. No roost sites known from project area.
Southern pocket gopher *Thomomys umbrinus intermedius*	Sensitive	Suitable habitat present but species not documented. Taxonomic uniqueness debated.
Birds		
Bald Eagle *Haliaeetus leucocephalus*	Threatened	No records from project area, but possibly migrant or wintering individuals.
Mexican spotted owl *Strix occidentalis lucida*	Threatened	No PACs in project area, but limited suitable habitat present in canyons.
Yellow-billed cuckoo *Coccyzus americanus*	Candidate	Limited suitable habitat, possible downstream effects.
American peregrine falcon *Falco perigrinus anatum*	Sensitive	No active eyries. Possible foraging habitat.
Apache northern goshawk *Accipter gentilis apache*	Sensitive	Nest on Duquesne allotment
Gould's turkey *Meleagris gallopavo mexicana*	Sensitive	Suitable habitat present.
Amphibians		
Chiricahua leopard frog *Rana chiricahuensis*	Threatened	Occupied and suitable habitats.
Sonora tiger salamander *Ambystoma tigrinum stebbinsi*	Endangered	Occupied and suitable habitats
Lowland leopard frog *Rana yavapaiensis*	Sensitive	Record from 1979, but same record listed as *R. chiricahuaensis* in Sredl, et al (1999).
Western barking frog *Eluetherodactylus augusti cactorum*	Sensitive	Suitable habitat present; recently documented in Harshaw Canyon.
Reptiles		
Arizona ridgenosed rattlesnake *Crotalus willardi willardi*	Sensitive	Documented in the project area.
Mexican garter snake *Thamnophis eques megalops*	Sensitive	Documented in project area. Suitable habitat present.
Fish		
Gila topminnow *Poeciliopsis occidentalis*	Endangered	Upper Santa Cruz watershed.
Gila chub *Gila intermedia*	Proposed	Occurs in upper Santa Cruz watershed upstream from project area. Probably outside of watershed affected by proposal.

Species	Status	Comments
Sonora sucker *Catastomus clarki*	Sensitive	Occurs downstream from project area in Santa Cruz River.
Plants		
Asclepias lemmoni Lemmon milkweed	Sensitive	Suitable habitat present.
Amsonia grandiflora Large-flowered bluestar	Sensitive	Suitable habitat present.
Astragalus hypoxylus Huachuca milk-vetch	Sensitive	Recorded from project area.
Carex chihuahuensis Chihuahuan sedge	Sensitive	Suitable habitat present.
Carex ultra Cochise sedge	Sensitive	Suitable habitat present.
Graptopetalum bartramii Bartram's stonecrop	Sensitive	Suitable habitat present.
Hedeoma dentatum Mock pennyroyal	Sensitive	Suitable habitat present.
Heterotheca rutteri Huachuca golden aster	Sensitive	HDMS record for project area.
Ipomoea plummerae var. cuneifolia Huachuca morning glory	Sensitive	HDMS record for project area
Laennecia eriophylla Wooly fleabane	Sensitive	Suitable habitat present.
Lilaeopsis schnaffneriana var. recurva Huachuca water-umbel	Endangered	Possibly downstream from project area.
Marina diffusa Escoba	Sensitive	Suitable habitat present; however only a single record from west Patagonia Mountains several miles away.
Pectis imberbis Beardless cinchweed	Sensitive	Suitable habitat present, occurs near project area.
Senecio carlomasonii Seeman groundsel	Sensitive	Suitable habitat present, occurs near project area.
Tephrosa thurberi Thurber hoary pea	Sensitive	Suitable habitat present.
Tragia lacianata Sonoran noseburn	Sensitive	Suitable habitat present.
Invertebrates		
Amblycheila baroni A tiger beetle	Sensitive	Suitable habitat present; within range of the species.
Agathymus aryxna Arizona giant skipper	Sensitive	Suitable habitat present; within range of the species.
Agathymus polingi Poling's giant skipper	Sensitive	Suitable habitat present; within range of the species.
Agathymus ursus ursus Ursine giant skipper	Sensitive	Suitable habitat present; within range of the species.
Calephelis arizonensis Arizona metalmark	Sensitive	Suitable habitat present; within range of the species.
Erynnis scudderi Scudder's dusky wing	Sensitive	Suitable habitat present; within range of the species.
Sympetrum signiferum	Sensitive	Suitable habitat present; within range of the

Species	Status	Comments
Mexican meadowfly		species.
Pyrgulopsis thompsoni Huachuca springsnail	Sensitive	Suitable habitat present; within range of the species.

Appendix 2 - Glossary

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

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

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

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

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

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

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

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

Grazing Suitability: A determination of whether livestock grazing is an appropriate use of capable rangeland, made during the Forest planning process and not during project-level analysis. The Coronado National Forest defines suitable rangelands as areas under 40% slope.

Key Area. A portion of rangeland selected because of its location, use or grazing value as a monitoring location for grazing use, range condition and trend. Key areas are usually 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.

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

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

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

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

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

- 80% of natural bank protection is present.
- 80% of natural shade over water is present in fish-bearing streams.
- 60% or more of the woody stems are in three or more riparian tree species.
- At least three age classes of riparian woody plants are present, with at least 10% of the woody plant cover in sprouts, seedlings, and saplings of riparian species.
- 60% of natural shrub and tree crown cover is present

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

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

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

Stream Condition (Proper Functioning Condition):

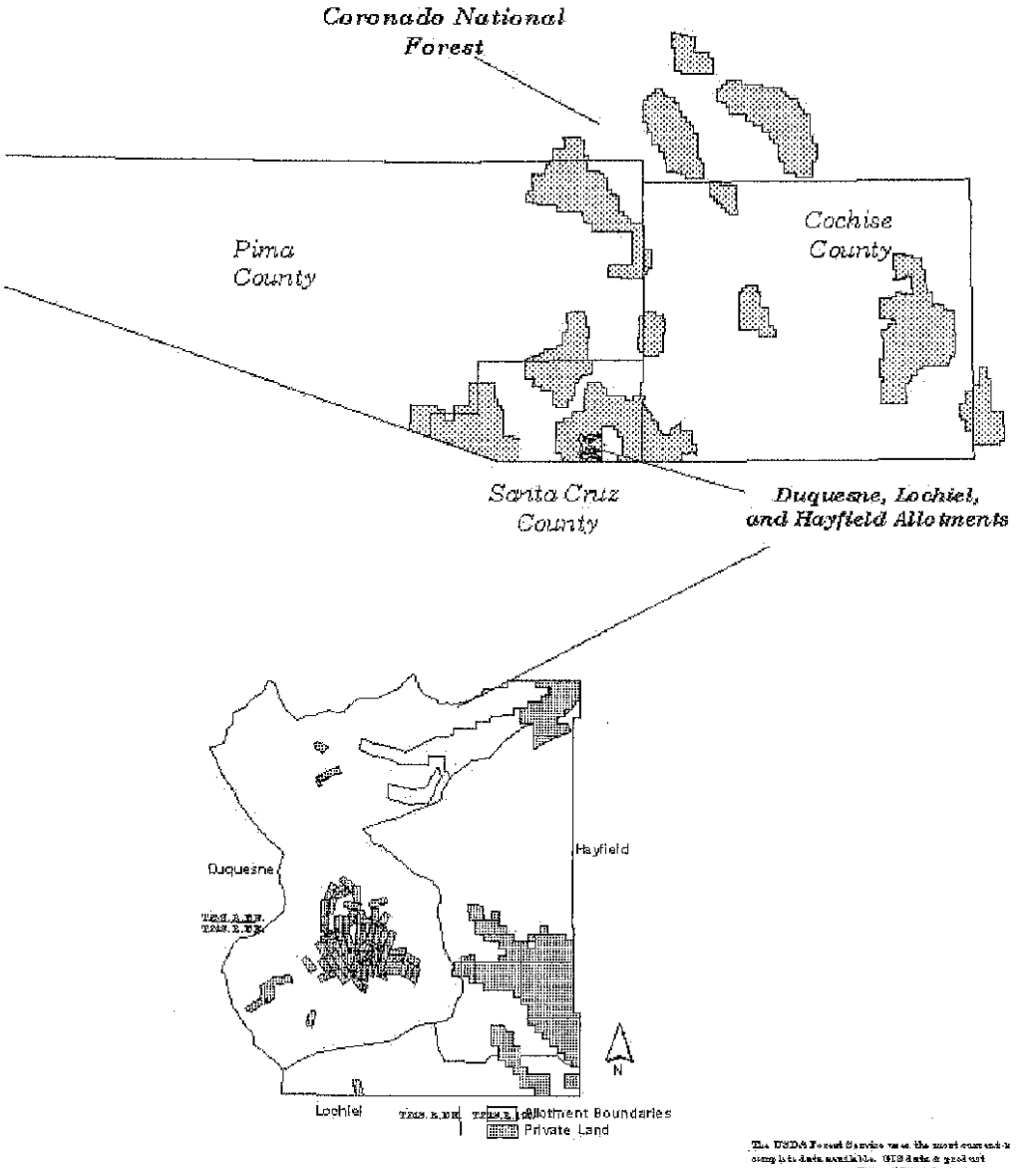
a. *Functional:* riparian-wetland areas where there is adequate vegetation, landform, or large woody debris to: 1) Dissipate stream energy associated with high water flow, thereby reducing erosion and improving water quality; 2) Filter sediment, capture

bedload, and aid floodplain development; 3) Improve flood-water retention and ground-water recharge; 4) Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and 5) Support greater biodiversity.
b. *Functional-at risk:* riparian-wetland areas that are in functional condition but an existing soil, water or vegetation attribute makes them susceptible to degradation.
c. *Nonfunctional:* - riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to meet the criteria listed for functional.

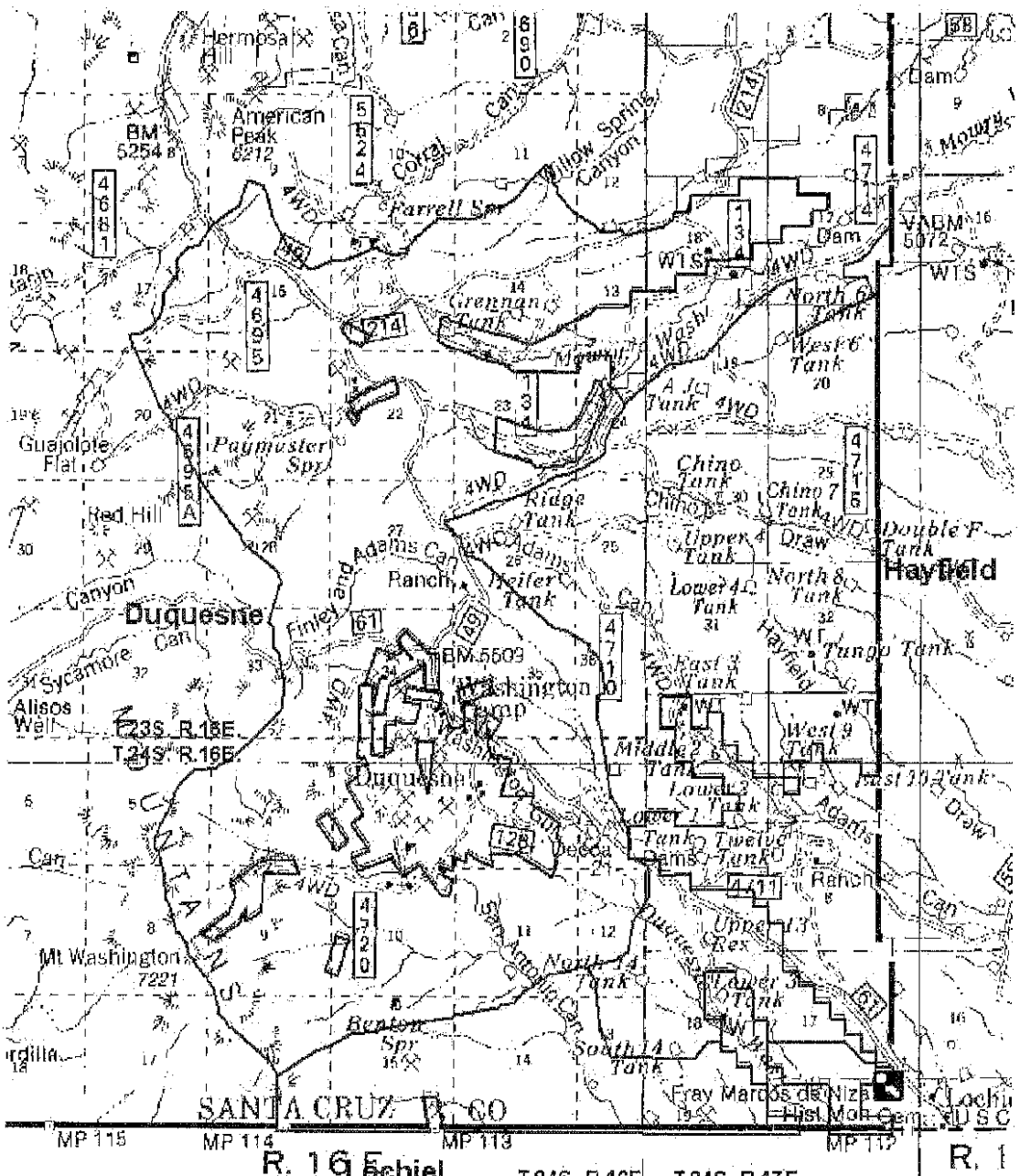
Water Quality Limited: A water body that does not maintain surface water quality standards for its designated uses, and neither existing technology nor permit controls is sufficient to maintain water quality standards. In the case of water bodies within the project area, designated uses include aquatic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

Appendix 3 – Maps

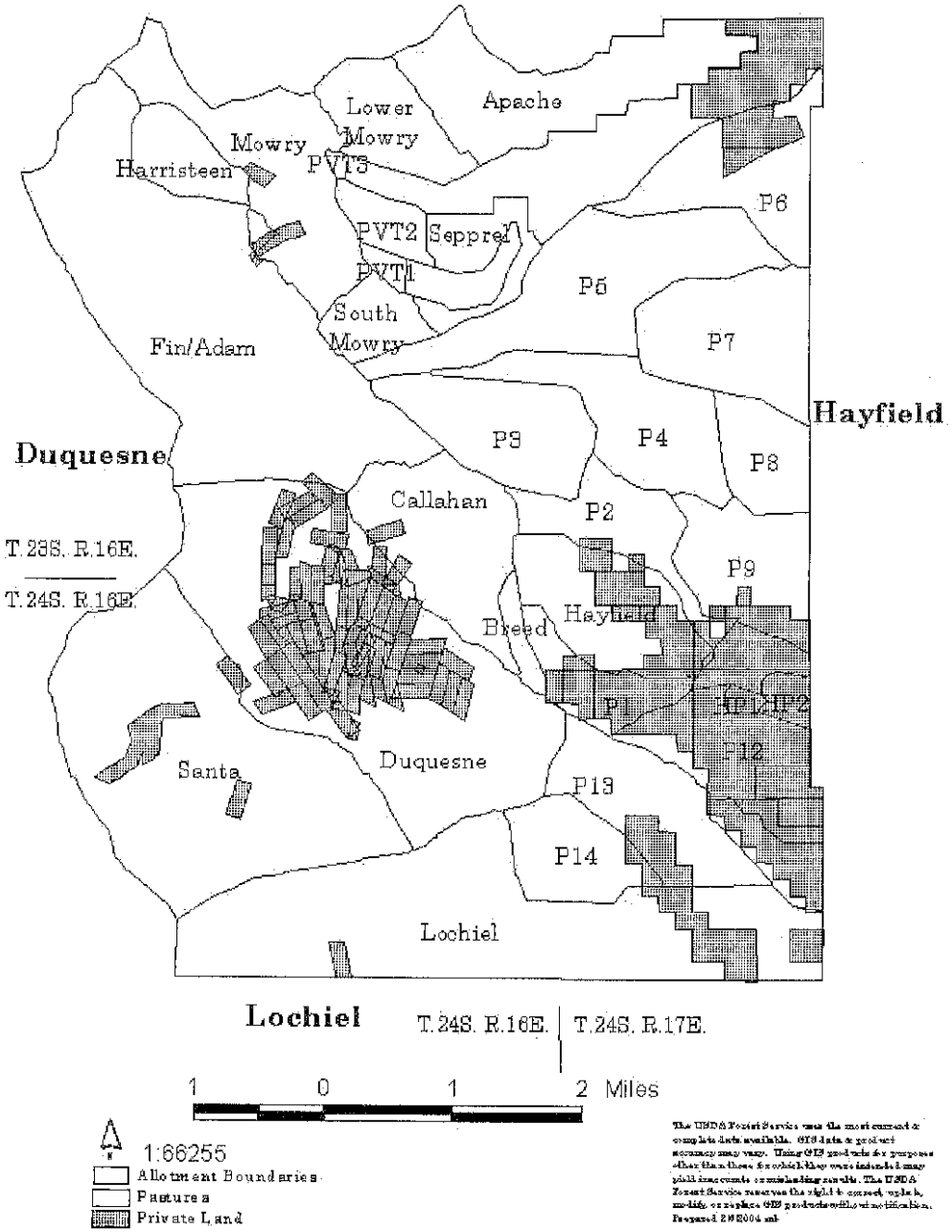
Project Location



Project Area.

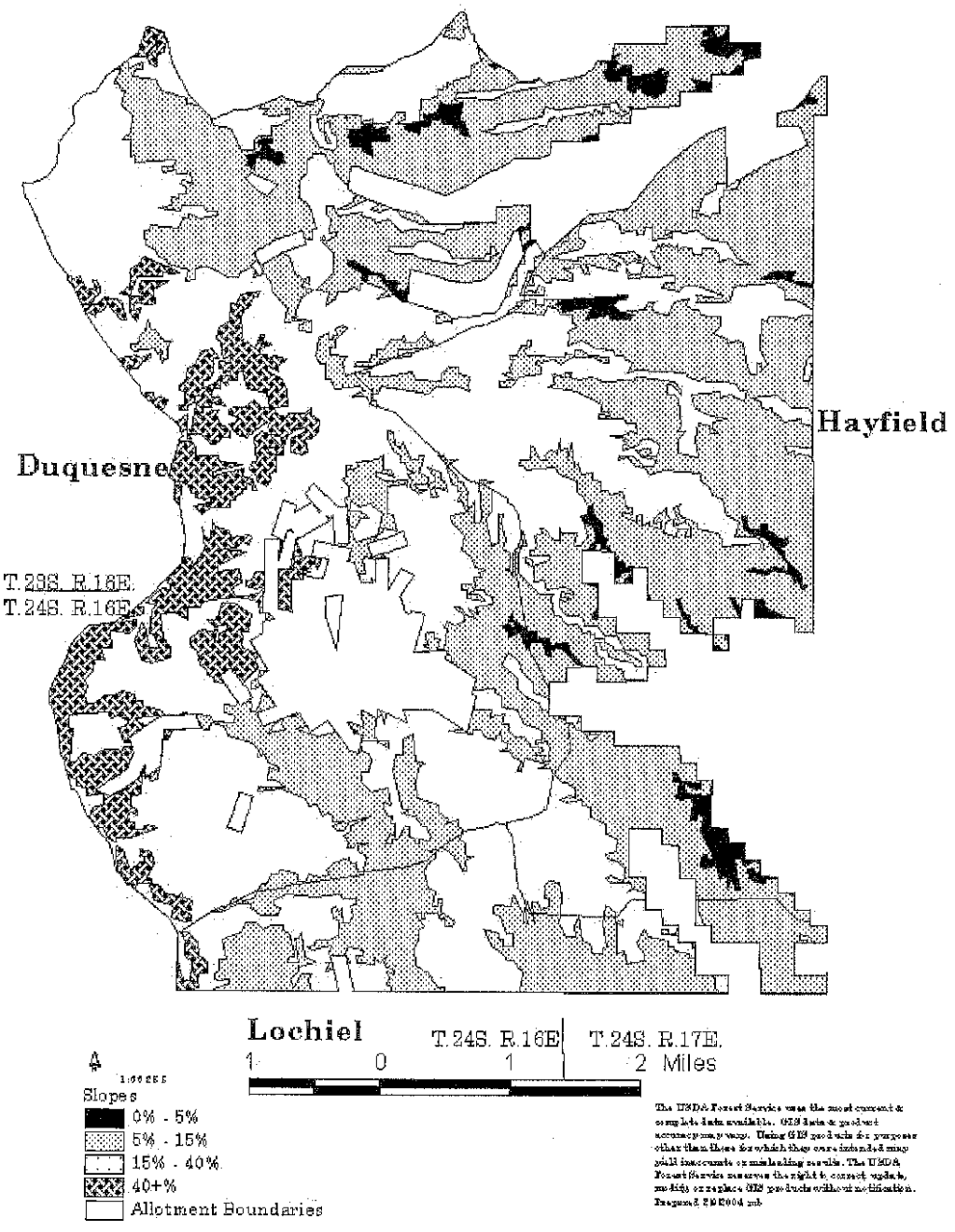


Duquesne, Lochiel, and Hayfield Allotments with Pasture Boundaries Private Land



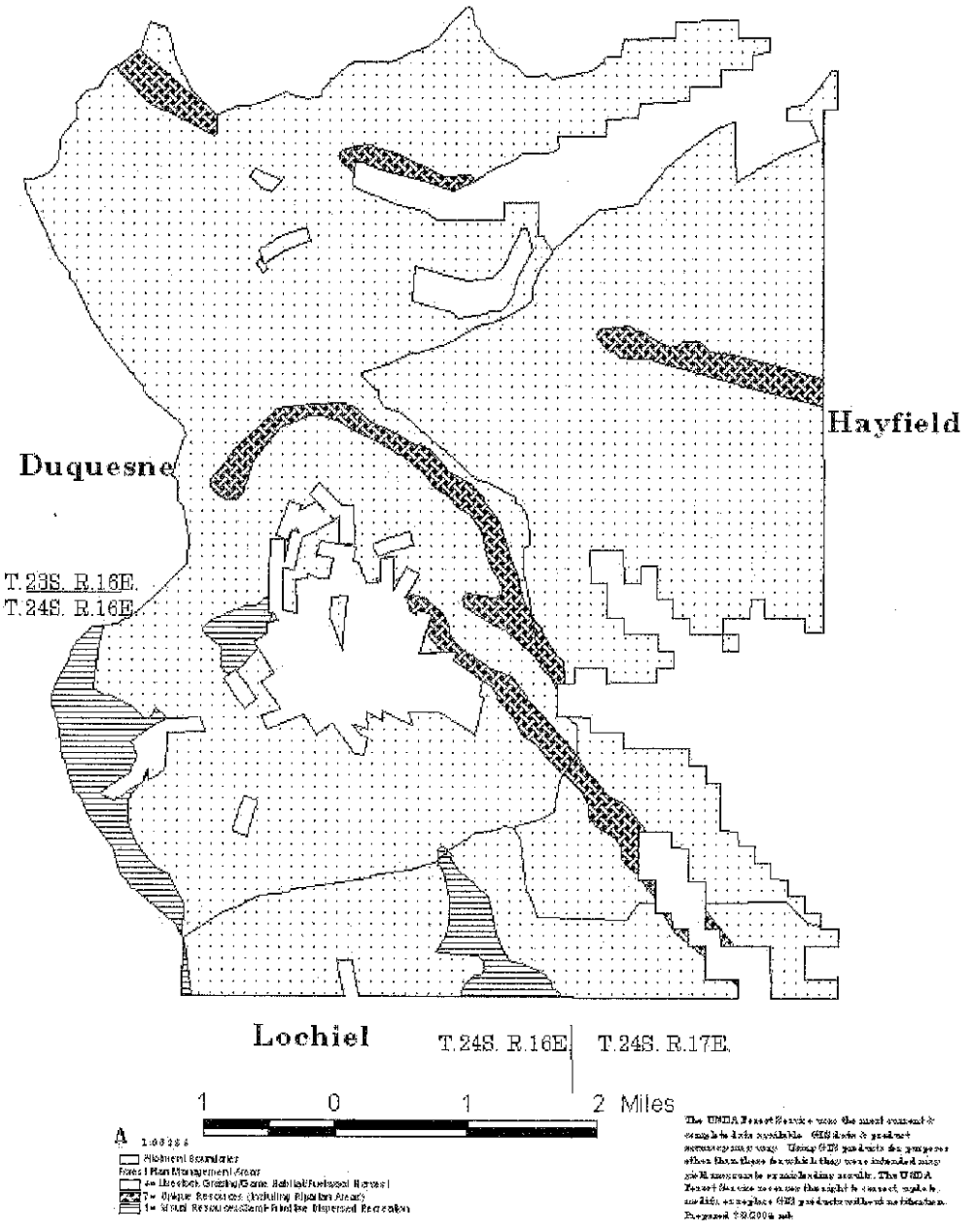
The USDA Forest Service uses the most current & complete data available. GIS data & product accuracy may vary. Using GIS products for purposes other than those for which they were intended may yield inaccurate or misleading results. The USDA Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. Prepared 2/6/2004 ml

Duquesne, Lochiel, and Hayfield Allotments
Slopes



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Duquesne, Lochiel, and Hayfield Allotments
Forest Plan Management Areas



Duquesne, Lochiel, and Hayfield Allotments
Soil Condition

