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AESO/SE
2-21-98-F-399-R1 October 24, 2002

Mr. John McGee, Forest Supervisor
Coronado National Forest
300 West Congress, 6th Floor
Tucson, Arizona 85701

RE: Reinitiation of Biological Opinion 2-21-98-F-399; Continuation of Livestock Grazing on the Coronado National Forest

Dear Mr. McGee:

This document transmits the U.S. Fish and Wildlife Service's (Service) final biological opinion and conference opinion on the proposed continuation of livestock grazing on the Coronado National Forest (Forest) in New Mexico (Hidalgo County) and Arizona (Cochise, Santa Cruz, Pima, Pinal, and Graham counties) pursuant to section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). We appreciate the cooperation and assistance of your staff and permittees during the consultation period. We look forward to assisting you with the implementation of this biological opinion. If you have any questions on the biological opinion please contact Thetis Gamberg at 520/670-4619, Mima Falk at (520) 670-4550, or Sherry Barrett at (520) 670-4617 of my Tucson staff.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

2 Enclosures:
biological opinion
zip disk

cc: Assistant Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES) (Attn: Sarah Rinkevich)
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
Refuge Manager, Fish and Wildlife Service, San Bernadino National Wildlife Refuge, Douglas, AZ

Director, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Director, New Mexico Department of Game and Fish, Albuquerque, NM

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FINAL

BIOLOGICAL OPINION
and
CONFERENCE
OPINION

Continuation of Livestock Grazing on the Coronado National Forest

Arizona Ecological Services Field Office
US Fish and Wildlife Service

AESO/SE 2-21-98-F-399R1

October 25, 2002

FINAL BIOLOGICAL OPINION and CONFERENCE OPINION
AESO/SE 2-21-98-F-399-R1

We prepared this final biological opinion (BO) and conference opinion in response to your April 18, 2002, request for reinitiation of formal consultation. Reinitiation was requested for the following reasons: 1) the Chiricahua leopard frog was listed as threatened on June 13, 2002, and effects from livestock grazing were not evaluated in the previous opinion; 2) the previous biological opinion expired on July 29, 2002; 3) the proposed action has been modified, asking for coverage of all on-going grazing activities for a period of ten years from the date of this opinion; 4) three allotments (A Bar Draw, Paradise, and Dragoon) have been added to the proposed action; 5) revised guidance criteria were issued on April 15, 2002, and all of the allotments had to be reviewed against the new criteria; 6) terms and conditions for several species were not accomplished; and 7) as a result of recent court cases, we were asked to review all of the incidental take statements from the previous opinion to ensure that they met the standards set out in those court decisions (Arizona Cattle Growers Association v. U.S. Fish and Wildlife Service and Bureau of land Management, 97-02416 PHX-SMM [D.Ariz] and Arizona Cattle Growers' Association v. U.S. Fish and Wildlife Service and U.S. Forest Service, 99-0673 PHX RCB[D.Ariz]).

At issue are effects that may result from continuing livestock grazing actions on the Coronado National Forest (Forest) in New Mexico (Hidalgo County) and Arizona (Cochise, Santa Cruz, Pima, Pinal, Graham counties), on the Chiricahua leopard frog (*Rana chiricahuensis*), New Mexico ridgenose rattlesnake (*Crotalus willardi obscurus*), Sonora tiger salamander (*Ambystoma tigrinum stebbensi*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), southwestern willow flycatcher (*Empidonax traillii extimus*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), Sonora chub (*Gila ditaenia*), Yaqui chub (*Gila purpurea*) with critical habitat, lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), Mexican long-nosed bat (*Leptonycteris nivalis*), Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*), and Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) following section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). You requested concurrence on the above species, for various allotments, as well as for the American bald eagle, *(Haliaeetus leucocephalus*), northern aplomado falcon (*Falco femoralis septentrionalis*), Mexican spotted owl (*Strix occidentalis lucida*), and jaguar (*Panthera onca*). You also requested a conference opinion for the Gila chub (*Gila intermedia*), with critical habitat, a species we proposed for listing as endangered on August 9, 2002, (67 FR 51948).

This biological and conference opinion supersedes and replaces the following biological opinions:

Arizona: On-Going and Long-Term Grazing for the Coronado NF: 2-21-98-F-399.
Arizona: Black Diamond: 2-21-01-F-071.
Arizona: Marijilda, Hawk Hollow, Shingle Springs, White Streaks: 2-21-00-F-017.
Arizona: Alisos/Sierra Tordilla allotment: 2-21-95-F-293.
New Mexico: A Draw, Dragoon, Paradise: 2-22-99-F-016.

The terms and conditions issued in the above listed opinions have been incorporated into this opinion. If they are not in this opinion, they have either been met or they have been removed from consideration.

You requested formal consultation on May 29, 2002, for livestock grazing activities on the Canelo, Lyle Canyon, and Manila allotments (2-21-02-F-201). Those proposed actions are analyzed herein.

This biological and conference opinion was prepared using the following information: your July 30, 2002, biological assessment (BA), correspondence between our agency staff, telephone, electronic, and personal conversations, field investigations, correspondence from applicants and the Arizona Game and Fish Department (AGFD), and other sources of information such as revisions, updated and expanded information, and changes from you, peer-reviewed and published literature, and other experts.

References cited in this biological opinion are not a complete bibliography of all literature available on the species of concern, livestock grazing and its effects, or on other subjects considered in this opinion. A complete administrative record of this BO is on file at our office.

We concur with your determination that the proposed action may affect, but is not likely to adversely affect, the remainder of the species as consulted on in your proposed action as charted in the Allotment Summary Tables, as contained in your July 2002 BA. The rationale for these concurrences are documented in Appendix A, Concurrences.

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Consultation History

The following history has occurred regarding past livestock grazing and this BO.

- We issued BO 00087RO on December 19, 1997. (Note: the Terms and Conditions in that consultation regarding amended Land and Resource Management Plans are included in this reinitiation by reference. Further information is included in our original biological opinion 2-21-98-F-399).
- We issued BO 000089RO on February 2, 1999.
- We issued BO 2-22-99-F-016 on June 30, 1999.
- We issued BO 2-21-98-F-399 on July 26, 1999; this referenced your 1998 biological assessment (BA).
- We issued BO 2-21-01-F-071 on April 30, 2001.
- You requested reinitiation for the continuation of livestock grazing on the Forest in your letter of April 18, 2002.
- We acknowledged that request with our letter of June 11, 2002.
- We listed the Chiricahua leopard frog as threatened on June 13, 2002.
- We notified you of our extension period (to October 1, 2002), via our letter of July 16, 2002.
- We received your BA for this reinitiation on July 30, 2002.
- We proposed the Gila chub, with critical habitat, for listing as endangered on August 9, 2002.
- We issued a draft biological opinion and conference opinion for your review on August 30, 2002.
- We received a consolidated summary of your and permittee comments on the draft BO on October 2, 2002, and continued to receive comments through early October 2002 from your permittees and other interested parties.
- We received 2002 information regarding presence of Sonora chub in pools accessible to livestock on October 1, 2002.
- We received corrected allotment summary tables (containing the proposed action) from you electronically on October 3, 2002.
- We received your addendum BA regarding Gila topminnow on October 7, 2002.
- We received personal communication from Nogales Ranger District personnel regarding presence of Sonora chub and the proposed action on the Bear Valley allotment on October 9, 2002.

- We received your additional changes to the proposed action regarding lesser long-nosed bat on October 17, 2002, and additional measures for the protection of Sonora tiger salamander on October 18, 2002.

FINAL BIOLOGICAL OPINION and CONFERENCE OPINION

DESCRIPTION OF THE PROPOSED ACTION

Your 1998 BA (USFS 1998), presented a comprehensive description of the proposed livestock grazing for 187 allotments. You informed us in your 2002 BA (USFS 2002), that all of the proposed actions remain the same, with the exception of 8 allotments. These allotments are listed in Table 1, below. Livestock grazing on three allotments (A Draw, Dragoon, and Paradise), which were covered under a previous opinion (2-22-99-F-016), have been added to this BO. The proposed actions for these three allotments, along with all of the remaining allotments on the Forest, are located in Appendix C. A description of all the proposed improvements are included in Appendix C, but further consultation may be required for site-specific implementation regarding these planned improvements. Prescribed fire activities are not included in this BO.

TABLE 1: Summary of grazing allotments under consultation that have changed since the Service's July 1999 BO.

Allotment Name	Original numbers	Proposed numbers	Original season of use	Proposed season of use
Barboot	450 cow/calf	450/cow/calf	11/1 - 6/30	11/1 - 4/30
Boss	32 cow/calf, 3 horses	25 yearlings 20 bulls 4 horses	3/1 - 2/28 3/1 - 2/28	11/1 - 4/30 9/1 - 2/28 3/1 - 2/28
Bruno (reduction in capable acres from 7,978 to 6,239)	266 cow/calf	266 cow/calf	10/16 - 4/30	10/16 - 4/30
East Whitetail	200 cow/calf	100 cow/calf	11/15 - 5/15	11/1 - 4/30
Maverick	184 cow/calf, 7 horses (private land permit)	184 cow/calf, 7 horses (private land permit)	11/20 - 2/15	3/1 - 2/28
Sanders (combined with Oak Allot.)	32 cow/calf	80 cows	1/1 - 3/31	10/1 - 5/14
Sanford	16 cow/calf	32 cow/calf	3/1 - 2/28	11/1 - 4/30
Willie Rose	31 cow/calf	31 cow/calf	11 -15 - 12/31 and 3/1 -4/30	11/16 - 5/15

The livestock grazing and associated effects on listed species were determined using the April 15, 2002, revised guidance criteria (Appendix D). The results are presented in your 2002 BA.

The duration of the proposed action is ten years from the date of this biological opinion. No further consultation will be necessary unless one of the four reinitiation criteria (50 CFR 402.16) are met. This also applies to reauthorizations of permits. You have requested that one allotment be addressed for only one year under this opinion (Kunde allotment in the Huachuca Ecosystem Management Area [EMA]). This is because the Kunde allotment is currently undergoing National Environmental Preservation Act (NEPA) review for permit reauthorization. You expect a change in the proposed action by 2003. The Montana allotment (Tumacacori EMA) is not covered in this BO; livestock grazing on the Montana allotment was addressed in our 2001 biological opinion (2-21-00-F-344). You submitted two general processes as part of your proposed action; one for drought conditions and one for permit violations. These are included as Appendices D and E. The action area for this analysis encompasses the entire Coronado National Forest, including State lands associated with individual Forest permits. You have proposed to include the following measures to reduce effects to listed species as part of your proposed action:

General Measures

Allotments will be monitored every third year for compliance with permitted forage utilization. By the end of the third year, all allotments will be monitored and the process will start over again. This does not apply to allotments within the Santa Catalina EMA; all allotments in this EMA will be monitored for forage utilization compliance every year.

All livestock exclosures established on behalf of threatened and endangered species will be monitored once a year to ensure fences are functional. These are:

ALLOTMENT NAME	**EXCLOSURE NAME**	**SPECIES**
Montana (California Gulch)	Lower exclosure /Border	Sonora chub
Montana (California Gulch)	Upper exclosure/Tinaja	Sonora chub
Sycamore Canyon	Sycamore Canyon	Sonora chub
Seibold	Pig Camp	Gila topminnow
Seibold	Oak Grove Spring	Gila topminnow
Kunde	Falls	Gila topminnow
Kunde	Gate Spring	Gila topminnow
San Rafael	Cott Tank	Gila topminnow
Papago	O'Donnell	Huachuca water umbel, Canelo Hills ladies-tresses, Gila chub
Papago	Freeman Spring	Huachuca water umbel
Lone Mountain	Wakefield	Huachuca water umbel
Lone Mountain	Middle Scotia	Huachuca water umbel
Manila	West Gate	Huachuca water umbel
Alisos/Sierra Tordilla	Two exclosures in Mezquital pasture	Pima pineapple cactus

Species-Specific Measures

Sonora tiger salamander

- You agreed to use the methods in the "Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander, referenced in the tiger salamander recovery plan for stock tank maintenance, as written by and developed by us, you, local ranchers, and AGFD. The measures are listed below:

1. Personnel education programs, minimization of project impacts, and well-defined operational procedures (including pre-project surveys for salamanders) shall be implemented.

2. Livestock permittees within the range of the species shall be informed yearly that: (1) take of salamanders is prohibited under the Endangered Species Act, and (2) permittees are to notify you before stock tank maintenance activities begin.

3. Prior to any surface-disturbing activities at stock tanks on the Forest within the range of the Sonora tiger salamander, the presence/absence of the salamander shall be determined by a qualified biologist approved by the Forest. If salamanders are not encountered during seining of the pond, the salamander will be considered absent. If salamanders are observed in the water or can be captured with a dip net, seining is not necessary.

4. Individuals authorized by you to maintain, dredge, or clean out stock tanks occupied by Sonora tiger salamanders shall be informed of the legal and sensitive status of the species and shall have a copy of these guidelines.

5. New surface disturbances and clearing of vegetation during work at stock tanks shall be minimized to the extent practical.

6. Maintenance, dredging, and cleaning of occupied stock tanks shall not occur from January 1 through May 31, annually.

7. Oil, fuel, and other equipment fluid shall be stored away from occupied stock tanks in secure containers. Any leaks shall be cleaned up and properly disposed of as soon as they occur.

8. If salamanders or larvae are present prior to dredging or cleaning out of stock tanks and a qualified biologist believes seining of salamanders and larvae out of the tank would reduce mortality and injury, then the tank shall be seined and animals held in suitable tanks, aquaria, or holding ponds and returned to the tank after construction is complete if, in the judgement of the qualified biologist, the tank contains enough water to support the salamanders.

9. During maintenance activities, the amount of underwater objects (logs, rocks, etc.) for salamander cover and egg deposition shall be maintained or increased.

10. Vegetation cover at tanks occupied by salamanders shall be retained or increased through (but not limited to) the use of partial fencing, construction of water lots, double tanks, or alternative waters such as wells and pipelines.

11. Except as needed in emergency situations to abate fire threat regarding loss of life or property, no water shall be drafted from stock tanks known to be occupied by Sonora tiger salamanders. Other water sources, such as Parker Lake, wells, and water tenders shall be considered for firefighting use, before drafting water from occupied stock tanks.

12. In non-emergency situations, water shall be drafted from stock tanks within the range of the salamander only if other sources of water are not available or reasonably accessible, and only if the tanks are not occupied by salamanders, pursuant to #15, below.

13. An objective of fire suppression activities shall be protection of occupied Sonora tiger salamander habitat, including the watersheds of those habitats.

14. All occupied tanks and apparently suitable tanks (free of nonnative predators) within the range of the Sonora tiger salamander shall be retained in public ownership.

15. If water is drafted from a stock tank within the range of the salamander, it shall not be refilled with water from another tank, Parker Lake, or other sources of water that may support fish, salamanders, or bullfrogs.

16. As opportunities arise, work with AGFD and us in the development of interpretive materials for users of the Forest that includes information about legal protection of the salamander and prohibitions on use of live baitfish, crayfish, waterdogs, and transport of live bullfrogs in the San Rafael Valley.

17. Your employees will clean their equipment (waders, nets, etc) with a 10 percent bleach solution while working in salamander habitat and stock tanks as a preventive measure to reduce disease transmission in salamander habitat.

Sonora chub

- You agreed to visit Bear Valley allotment and verify that your and our anticipated grazing use is, indeed, “light, in the areas of the Sonora chub sites discovered in 2002. Should the use be determined to be more than “light, this would serve to trigger reinitiation of formal consultation for this species in this area.

Lesser long-nosed bat and Mexican long-nosed bat

- Bat roost sites on any allotment will not be disturbed or modified.

- Range project construction will be conducted in such a way that no more than one percent of agaves and saguaros within 0.5 mile of the project area will be affected.

- For lesser long-nosed bat, you have agreed to monitor agave flowering stalk density on the allotments within 11 miles of at least two large roosts: Patagonia Bat Cave and State of Texas Mine, both located in the Huachuca EMA. Additional monitoring within 11 miles of an unnamed roost in the Mustang mountains will be considered by you within a year after implementation of monitoring activities at the other two sites. The specific monitoring methodology will be detailed in a monitoring plan to be developed by you and us by March 31, 2003. This monitoring will occur annually for the life of this plan. In any given year, if agave flowering densities drop below 0.2 flowering plants per hectare (see the lesser long-nosed bat section) we would consider this new information, requiring reinitiation of consultation.

Huachuca water umbel

- The lower portion of Scotia Canyon, on the Lone Mountain allotment (Huachuca EMA) will be fenced to exclude livestock for a period of at least five years. You proposed in your October 1, 2002, comments, that the entire Scotia pasture be excluded from livestock grazing rather than fencing the lower portion of the pasture. Since this pasture has been rested since 2001, five years will elapse in December 2005. At that time, conditions in the stream channel will be analyzed by you and us and a decision will be made whether to continue or extend the exclosure for the life of this BO.

- Wakefield and Peterson pastures, on the Lone Mountain allotment, will only be grazed December through March when winter rains are adequate to encourage livestock dispersal.

- Only winter grazing will occur in the Bear Canyon exclosure on the Lone Mountain allotment and monitoring will ensure this.

- When livestock are present in the Bear Canyon, Wakefield, and Peterson pastures, the following measures will apply: a) retain an average residual stubble height on deergrass (*Muhlenbergia rigens*) of 24.5 cm (10 in) on sod-forming plants and 33 cm (13 in) on solitary plants; 2) utilization of annual growth of apical meristems of riparian broad-leaved trees less than two m (six ft) tall will not exceed 30 percent; and 3) livestock cannot alter more than 10 percent of the alterable bank.

- The populations of Huachuca water umbel (Scotia, Bear, and Sunnyside canyons) on the Lone Mountain allotment will be monitored, according to our protocol, every two years, for the life of this BO.

- Monitoring of forage utilization will occur on an annual basis on uplands and in the riparian areas when livestock are present, for the life of this BO.

Pima pineapple cactus

- On the Alisos/Sierra Tordilla (Huachuca EMA), Proctor (Santa Rita EMA), and Sopori (Tumacacori EMA), allotments, all Pima pineapple cactus will be monitored and reported annually, for the life of this BO.

Conclusions of this biological opinion are based on full implementation of the project as described in the description of the proposed action, the allotment summary tables, the appendices, and any other updated or clarified information.

SCOPE OF THE CONSULTATION

This BO evaluates the effects of the livestock grazing on 187 allotments on the Forest. The timeframe of the proposed action is ten years.

The effects of actions that are interrelated and interdependent to the proposed action are considered effects of the proposed grazing on the Forest. “Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. “Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). Our Section 7 Handbook provides further guidance on the definition of interrelated and interdependent actions by establishing the following rule: determining if an action is interrelated or interdependent depends on the “but for test. We ask whether the Federal, State, or private activity could occur “but for the proposed action. Effects of interrelated and interdependent actions are particularly important for grazing activities on non-Federal lands within your allotments such as allotments associated with State lands. You have 45 allotments associated with State land leases.

ENVIRONMENTAL BASELINE AND DESCRIPTION OF THE ACTION AREA

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the project area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that are contemporaneous with the consultation process. The environmental baseline defines the status of the species and its habitat in the action area to provide a platform from which to assess the effects of the action now under consultation.

Effects of livestock management on the landscape is related to numerous factors (Holechek et al. 1998). Environmental parameters such as precipitation, temperature regimes, and growing season provide the basics upon which a grazing program is developed (Schmutz 1977). Abiotic factors include soils, climate, geography, and topography. Stocking rates, utilization levels, and rotation patterns are choices in livestock management.

Grazing utilization levels assigned to the various allotments on the Forest generally range from 35 to 55 percent for uplands. Utilization levels for riparian areas, when given, are about 10 percent less than the surrounding uplands. These levels are applied widely across EMAs and do not account for site-specific range, watershed, or soil conditions. The amended Forest plan established standards and guidelines for grazing activities which are to apply when site-specific information is lacking. When site-specific information is available, the amendment is considered discretionary and other standards may be developed. Site-specific information is applied when it is available, so standards from the amended plan would not apply in these cases. The maximum utilization limits have been provided for in the Forest Plan, regardless of the condition of an individual allotment. In addition, the issue of site-specific information within the amended Forest Plan can be extended to the need for information on how grazing practices affect listed species, as well as other resources. The amended Forest Plan grazing management standard is “Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.

Reviews of grazing literature for southwestern habitats support the need to limit levels of utilization (Martin 1973, 1975, Holechek et al. 1998). Martin and Cable (1974), working on the Santa Rita Experimental Range in southern Arizona, found that perennial grass vigor declined when average utilization for a 10-year period exceeded 40 percent. The numbers used by these researchers represent average utilization rates (Holechek et al.1998). The averages may cover a whole pasture, and not just one key area, and be for more than one year. The application of average utilization rates on a landscape which is not homogenous is problematic. Livestock do not distribute themselves evenly through a pasture, regardless of efforts by the permittee to move them. It is certain that some areas will be used much greater than the average, and thus may lead to more localized impacts.

The Forest contains 12 distinct geographical units in Arizona and New Mexico and is divided into 12 corresponding EMAs. The EMAs also correspond with most of the higher mountain ranges in southeast Arizona and far southwestern New Mexico. In Arizona, the Forest lies in Pinal, Graham, Pima, Cochise, and Santa Cruz counties. In New Mexico, Hidalgo County is the only county that the Forest lies within. The Forest is also divided into five Ranger Districts: Douglas, Nogales, Sierra Vista, Safford, and Santa Catalina (USFS 2002).

The Forest encompasses about 647,497 ha (1,600,000 ac). Of this, about 420,362 ha (1,068,734 ac) are capable, or used in determining range capacity. The other 227,135 ha (561,260 ac) are considered unsuitable, generally due to steep or very rocky terrain. Livestock rarely access these steep and rocky areas even though the areas are not typically fenced off from the rest of the allotment. The numbers of livestock permitted are 37,991 cattle and 121 horses (Debbie Sebesta pers. comm. 2002).

Range conditions are classified as low, moderately-low, moderately-high, and high. These classifications are further defined by their trend; downward, static, or upward. Much of the area within the 187 allotments is in moderately-high or moderately-low range condition and in a static or upward trend. Soil condition on the Forest is about 50 percent satisfactory, 40 percent impaired or unsatisfactory, and 10 percent unsuited. These trends and conditions have not appeared to have changed significantly in the last three years (see Appendix B, Allotment Summary Tables). Vegetation types covering the Forest are mostly Sonoran Desert, Madrean woodland, or coniferous forest. There are moderate amounts of plains grassland, chaparral, and various riparian types (USFWS 1999a). For the following EMAs, see corresponding maps in the Figures section of this document. Figure 1 shows the EMAs Forestwide.

Chiricahua EMA

The Chiricahua EMA (Figure 2), covers about 117,000 ha (290,000 ac) and is mostly Madrean woodland, coniferous forest, or desert grassland. There are about 81,000 ha (199,000 ac) rated as capable. Most of the EMA is in moderately-low or moderately-high range condition in a static or upward trend. The maximum vegetation utilization ranges from 45 to 55 percent in the uplands and from 40 to 45 percent in riparian areas.

Dragoon EMA

The Dragoon EMA (Figure 3) covers about 22,000 ha (54,000 ac) and is composed mostly of Madrean woodland, desert grassland, or chaparral. Capable hectares are about 11,000 (28,000 ac). Most of the EMA is in moderately-high or moderately-low range condition in a static or upward trend. The maximum vegetation utilization ranges from 45 to 55 percent in the uplands and from 40 to 45 percent in riparian areas.

Peloncillo EMA

The Peloncillo EMA (Figure 4) covers about 36,000 ha (88,000 ac) in Arizona and New Mexico. Capable hectares are about 34,000 (83,000 ac). The vegetation is mostly Madrean woodland, desert grassland, or chaparral. Most of the EMA is in moderately-high or moderately-low range condition in a static or upward trend. The maximum vegetation utilization ranges from 45 to 50 percent in the uplands and is 45 percent in riparian areas.

Santa Rita EMA

The Santa Rita EMA (Figure 5) covers about 60,000 ha (148,000 ac) and is mostly Madrean woodland, grassland, or desertscrub. Capable hectares are 42,000 (103,000 ac). Most of the EMA is in moderately-high range condition in a static trend. The maximum vegetation utilization in the uplands ranges from 35 to 55 percent with no specific riparian utilization standards.

Tumacacori EMA

The Tumacacori EMA (Figure 6) covers about 83,000 ha (204,000 ac) and includes the Tumacacori, Atascosa, and Pajarito Mountains. Vegetation is mostly Madrean woodland and desert grassland. Capable hectares are 68,000 (169,000 ac). Most of the EMA is in moderately-high range condition in a static trend. The maximum vegetation utilization in the uplands ranges from 35 to 55 percent with no specific riparian utilization standards.

Huachuca EMA

The Huachuca EMA (Figure 7) covers about 113,000 ha (278,000 ac) and is mostly Madrean woodland, grassland, or various riparian types. Capable hectares are about 97,000 (239,000 ac). Most of the EMA is in a static trend. The maximum vegetation utilization in the uplands ranges from 35 to 45 percent with no riparian utilization standards.

Whetstone EMA

The Whetstone EMA (Figure 8) covers about 18,000 ha (45,000 ac) and is mostly Madrean woodland and desert grassland. Capable hectares are about 8,000 (20,000 ac). All of the EMA is in moderately-high or moderately-low range condition in a static or downward trend. The maximum vegetation utilization in the uplands is 45 percent with no specific riparian utilization standards.

Galiuro EMA

The Galiuro EMA (Figure 9) covers about 55,000 ha (135,000 ac) and is mostly Madrean woodland, desert grassland, or desertscrub. Capable hectares are 15,000 (38,000 ac). Most of the EMA is in moderately-high range condition in an upward or static trend. The maximum vegetation utilization ranges from 25 to 50 percent in the uplands and is 40 percent in riparian areas.

Pinaleno EMA

The Pinaleno EMA (Figure 10) covers about 81,000 ha (199,000 ac) and is mostly Madrean woodland, desertscrub and grassland, or coniferous forest. Capable hectares are 48,000 (118,000 ac). Most of the EMA is in moderately-high range condition in an upward or static trend. The maximum vegetation utilization from 40 to 50 percent in the uplands and is 40 percent in riparian areas.

Santa Teresa EMA

The Santa Teresa EMA (Figure 11) covers about 20,000 ha (50,000 ac) and is mostly chaparral and Madrean woodland. Capable hectares are 4,900 (12,000 ac). Most of the EMA is in moderately-high range condition in an upward or static trend. The maximum vegetation utilization ranges from 35 to 50 percent in the uplands and is 40 percent in riparian areas.

Winchester EMA

The Winchester EMA (Figure 12) covers about 11,000 ha (28,000 ac) and is mostly Madrean woodland and various riparian types. Capable acres are 2,400 ha (6,000 ac). Most of the EMA is in moderately-high range condition in an upward or static trend. The maximum vegetation utilization ranges from 30 to 50 percent in the uplands and from 30 to 40 percent in riparian areas.

Santa Catalina EMA

The Santa Catalina EMA (Figure 13) covers about 107,000 ha (265,000 ac) and is mostly Madrean woodland and desertscrub. Capable hectares are about 50,000 (124,000 ac). Most of the EMA is in moderately-low or moderately-high range condition with no trend. The maximum vegetation utilization ranges from 30 to 45 percent in the uplands with no specific riparian utilization standards.

EFFECTS OF THE ACTION (FORESTWIDE)

A large body of research and literature exists on the effects of improper livestock grazing, positive, negative, or neutral; on numerous parts of many ecosystems and can be found in several bibliographies (Ffolliott et al. no date, Willoughby 1997, Burgess 1999). The following section identifies some of the general effects that livestock grazing has on ecosystems, habitat types, and species groups. Livestock grazing effects to specific species will be discussed in the appropriate section.

The extensive and intensive effects of livestock grazing on soil and vegetation have been documented many times in many areas. All grazing, including that of domestic livestock, can alter vegetation composition, structure, and biomass; cause soil erosion and compaction, reduce water infiltration rates, and increase runoff (Klemmedson 1956, Ellison 1960, Arndt 1966, Gifford and Hawkins 1978, Webb and Stielstra 1979, Guthery et al. 1990, Orodho et al. 1990). Livestock grazing effects to native southwestern fishes and their habitats have been long recognized (Chamberlain 1904, Miller 1961, Hendrickson and Minckley 1984, Minckley et al. 1991b).

<u>General Effects</u>

Livestock may graze plants that are listed, provide forage for listed species, or provide cover or protection for listed species. Grazing can also affect the vegetative community and ecosystem functioning (Shreve 1931, Niering et al. 1963, Abouholder 1992, USFWS 1999a). Physical damage to Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) from livestock has been documented (USFS 1996).

Livestock may directly affect fish through trampling of adults, larvae, or eggs (Roberts and White 1992); likely the same holds true for frogs. Actual trampling of adult frogs or fish is probably rare, except in localized situations, or with smaller fish such as Gila topminnow. Livestock waste is potentially poisonous to some fish (Cross 1971, Taylor et al. 1991).

Livestock grazing can alter the species composition of communities, disrupt ecosystem functioning, and alter ecosystem structure (Fleischner 1994). The main direct impacts from cattle are the grazing of plants and trampling of vegetation and soil (Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands.

Some grasses are adapted to respond to grazing because growth originates at the basal meristem, close to the soil surface. Plants may regenerate quickly if the root crown is not damaged and if sufficient photosynthesis has taken place to provide for root development and annual replacement. Light or moderate grazing may stimulate growth in some plants (Ellison 1960), because removal of plant material containing carbohydrate reserves may increase photosynthetic activity to replace the lost material (Humphrey 1958).

Grazing can alter the prey availability of certain predators by removing herbaceous vegetation which serves as food and cover for small mammals (Ward and Block 1995). Grazing also alters fire regimes, which may have positive or negative effects to listed species, but generally is deleterious to ecosystem functioning.

Reductions in vegetation cover increases raindrop impact, decreases soil organic matter and soil aggregates, and decreases infiltration rates (Blackburn 1984; Orodho et al. 1990). Other detrimental impacts include increased overland flow, reduced soil water content, and increased erosion (DeBano and Schmidt 1989a, Guthery et al. 1990, Orodho et al. 1990). Continuous year-long grazing can result in large, bare earth areas around water sources and creation of unvegetated trails to and from points of livestock concentrations (Platts 1990).

Watershed condition and function can be affected by impacts to vegetation and litter from livestock grazing (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989a, Belnap 1992, Belsky and Blumenthal 1997). Heavy grazing effects are well known and can be severe (Guthery et al. 1990, Platts 1990). Conflicting information exists about the effects of more moderate grazing schemes (Gifford and Hawkins 1979, Blackburn 1984). Studies by Dadkhah and Gifford (1980) in the western United States show trampling by livestock causes a decline in infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50 percent.

A system which provides ample rest periods and grazing deferments should improve plant vigor and herbage production, and, with enough time, change the species composition to a more diverse vegetation type with "more desirable species (Hormay 1970, Hughes 1979, Van Poolen and Lacey 1979). The time required and the amount of change expected will vary from site to site depending on the site potential of the particular range site, soils, watershed and trends, and grazing levels. The lighter the grazing, the quicker the recovery. Riparian vegetation tends to rebound quickly with rest or less grazing (Platts and Nelson 1985b, Elmore and Beschta 1987, Schulz and Leininger 1990).

Watershed function is an important factor in maintaining stream function (Platts 1986, Meehan 1991, Chaney et al. 1993) and is extremely important to cienegas which are sensitive to flood disturbance (Hendrickson and Minckley 1984). The riparian vegetation and streambank riparian condition in tributaries, including intermittents and ephemerals, form essential screening between upland effects and perennial streams (Erman et al. 1977, Mahoney and Erman 1981, Osborne and Kovacic 1993).

Livestock grazing in riparian areas can cause changes in plant species composition (Ryder 1980, Schulz and Leininger 1991, Stromberg 1993a), reduce structural complexity (Ohmart and Anderson 1986), reduce understory, and replace native species with nonnative species (Krueper 1995). Greater soil erosion and compaction, changed flooding regimes, and decreased water quality can result from livestock presence in riparian areas (Lusby et al. 1971, Lusby 1979, DeBano and Schmidt 1989b, Szaro 1989, Armour et al. 1991, Platts 1991, Fleischner 1994). Cattle can disrupt streambanks through chiseling, sloughing, compaction, and collapse. These lead to wider and shallower stream channels (Armour 1977, Platts and Nelson 1985b, Platts 1990, Meehan 1991). These changes in channel morphology can affect fish habitat elements (Bovee 1982, Rosgen 1994). Livestock damage to riparian and aquatic zones occurs shortly after livestock entry into the area and occurs at all levels of use (Marlow and Pogacnik 1985, Platts and Nelson 1985a, Goodman et al. 1989). Even after rest, the recovery of streambanks and vegetation may be halted or lost soon after cattle return (Duff 1979, Platts and Nelson 1985a).

The most commonly acknowledged impact of livestock grazing is increased sediment production and transport (Platts 1990, Johnson 1992, Weltz and Wood 1986). Negative impacts of sediment to fish and fish habitat are well documented (Newcombe and MacDonald 1991, Barrett 1992, Megahan et al. 1992). Gila topminnow and Yaqui chub are not especially sensitive to sediment loads, but excess sediment can cause a change or loss of habitat used by the fish. Excess sediment can also smother invertebrates, reducing production and availability of fish food. Livestock grazing has also been demonstrated to increase nutrients in streams (Kaufman and Krueger 1984).

SPECIES WITH ADVERSE EFFECTS DETERMINATIONS

AMPHIBIANS & REPTILES

Chiricahua leopard frog (*Rana chiricahuensis*)

STATUS OF THE SPECIES

We listed the Chiricahua leopard frog as threatened, without critical habitat, in a Federal Register notice (65 FR 37343) published on June 13, 2002. We included a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act.

This frog is distinguished from other members of the *Rana pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 54 to 139 millimeters (mm) [2.1 to 5.4 inches (in)] (Stebbins 1985, Platz and Mecham 1979). The Ramsey Canyon leopard frog *(Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, but it often grows to a larger size and has a distinct call that is typically given under water (Platz 1993).

The Chiricahua leopard frog is an inhabitant of cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations between 3,281 feet to 8,890 feet in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, and northern Durango (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997, Sredl and Jennings in press). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable; however, the distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994 to 1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of populations extant in Arizona from 1993 to 1996 were found in stock tanks (Sredl and Saylor 1998).

Northern populations of the Chiricahua leopard frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Recent genetic analyses, including a 50-loci starch gel survey, morphometrics, and analyses of nuclear DNA supports describing the northern populations as a distinct species (Platz and Grudzien 1999). Multiple haplotypes within *chiricahuensis* were also identified using mitochondrial DNA analysis (Benedict and Quinn 1999), providing further evidence of genetically distinct population segments.

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Rana tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977 to 1978) (Hale and May 1983). From 1983 to 1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During subsequent extensive surveys from 1994 to 2001, the Chiricahua leopard frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities. (Sredl et al. 1997). In New Mexico, the species was found at 41 sites from 1994 to 1999; 31 of those were verified extant during 1998 to 1999 (Painter 2000). During May through August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994 to 1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 75 percent of its historical localities in Arizona and New Mexico. The status of the species in Mexico is unknown.

Based on Painter (2000) and the latest information (2002) for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically, with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has not been located recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. This species is now absent (2002) from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions, Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter, pers. comm. 2000).

Threats to this species include predation by nonnative organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination. Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey et al. 2001). Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by nonnative organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum mavortium*), crayfish (*Oronectes virilis*, and possibly others), and several other species of fish (Fernandez and Rosen 1998, 1996; Rosen et al. 1996a; Snyder et al. 1996; Fernandez and Bagnara 1995; Sredl and Howland 1994; Clarkson and Rorabaugh 1989). In the Chiricahua region of southeastern Arizona, Rosen et al. (1996a) found almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and nonnative predatory fish. Rosen et al. (1996a) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl et al. 1997, Sredl and Howland 1994). Chiricahua leopard frog populations are often small and habitats are dynamic, resulting in a relatively low probability of long-term population persistence. Historically, populations were more numerous and closer together. If populations disappeared due to drought, disease, or other causes, extirpated sites could be recolonized via immigration from nearby populations; however, as numbers of populations declined, populations became more isolated and were less likely to be recolonized if extirpation occurred. Recolonization is now even less likely to occur because most of the larger source populations along major rivers have disappeared.

Fire frequency and intensity in southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870 to 1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer et al. 1997, Swetnam and Baisan 1996). Absence of vegetation and forest litter following intense crown fires exposes soils to surface and rill erosion during storms, often causing high peak flows, sedimentation, and erosion in downstream drainages (DeBano and Neary 1996). Following the 1994 Rattlesnake fire in the Chiricahua Mountains, Arizona, a debris flow filled Rucker Lake, a historical Chiricahua leopard frog locality. Leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) apparently disappeared from Miller Canyon in the Huachuca Mountains, Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (Tom Beatty, Miller Canyon, pers. comm. 2000). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats. Bowers and McLaughlin (1994) listed six riparian plant species they believed might have been eliminated from the Huachuca Mountains as a result of floods and debris flow following destructive fires.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Rana pipiens*) commonly move up to 800 m from their place of metamorphosis, and three young males established residency up to 5.2 km from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the year northern leopard frogs successfully dispersed to downstream ponds 2.1 km from the source pond, upstream 1 km, and overland 0.4 km. At Cypress Hills, a young-of-the-year northern leopard frog moved 8 km in one year (Seburn et al. 1997). The Rio Grande leopard frog *(Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh, in press). After the first rains in the Yucatan Peninsula, Rio Grande leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season; however, evidence shows there can be substantial frog movements even in Arizona. In August of 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen et al. (1996a) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of nonnative predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.2 to 4.3 miles distant. In the Dragoon Mountains, Arizona, Chiricahua leopard frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 mile downcanyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (1.1 miles downcanyon from Halfmoon Tank). There is no breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon; it appears observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.6 mile away, suggesting immigration.

Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Sebum et al. 1997). Displaced northern leopard frogs will home, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western States), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, "western Africa , and Kenya), Mexico (Sonora), and United States (eight States) (Speare and Berger 2000, Longcore et al. 1999, Berger et al. 1998, Hale 2001). Ninety-four species of amphibians have been diagnosed as infected with the chytrid, *Batrachochytrium dendrobatidis*. The proximal cause of extinctions of two species of Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely chytridiomycosis. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000).

In Arizona, chytrid infections have been reported from four populations of Chiricahua leopard frogs (M. Sredl, AGFD, pers. comm. 2000), as well as populations of Rio Grande leopard frogs (*Rana berlandieri*), Plains leopard frogs (*Rana blairi*), lowland leopard frogs (*Rana yavapaiensis*), Tarahumara frogs (*Rana tarahumarae*), canyon treefrogs (*Hyla arenicolor*), striped chorus frogs (*Psudacris triseriata*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Davidson et al. 2000, Sredl and Caldwell 2000, Morell 1999, Hale 2001, V. Miera, persl. Comm. 2002). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at three other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000).

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined. It appears Chiricahua leopard frog populations can exist with the disease for extended periods; the frog has coexisted with chytridiomycosis in Sycamore Canyon, Arizona since at least 1974. At a minimum, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population decline, and because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of Chiricahua leopard frogs in Grant County, New Mexico was attributed to post-metamorphic death syndrome (Anonymous, Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. In both cases, symptoms of moribund frogs matched those of chytridiomycosis. The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974

(Hale 2001). The earliest record for chytridiomycosis in Arizona (Tarahumara frogs in 1974) corresponds to the first observed mass die-offs of ranid frogs in Arizona.

The origin of the disease is unknown, but epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into native populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger et al. 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other factors that cause stress (Carey et al. 2001, Daszak 2000, Pounds and Crump 1994). If it is a new introduction, its rapid colonization could be attributable to humans. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in Australia and bullfrogs in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000). Chytrids could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. We and AGFD are using preventative measures to ensure the disease is not spread by aquatic sampling.

Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl et al. (1997), Jennings (1995), Degenhardt et al. (1996), Sredl and Howland (1994), Platz and Mecham (1984, 1979), and Sredl and Jennings (in press).

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD Heritage Data Management System (HDMS), and field observations from your district biologists, habitat surveys, and observations of frog experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for Chiricahua leopard frog states:

No Effect (must meet criteria 1a and 1b or must meet criteria 2):

1.a. No livestock grazing or livestock management activities on the allotment will occur in suitable or potential habitat **and**

1.b. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will not degrade watershed condition and livestock grazing is not proposed in areas that contribute to unsatisfactory watershed condition. This **does not apply** to stock tanks, irrigation sumps, acequias, mine adits, backyard ponds, or other suitable man-made habitats that are typically not affected by watershed condition.

2. Based on surveys conducted using FWS protocol, no Chiricahua leopard frogs are present on or within 5 miles of the allotment or there is no potential or suitable habitat on or within 5 miles of the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. No livestock use or livestock management activities will occur in occupied or likely to be occupied aquatic habitat.

2. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will contribute to the improvement of the subwatershed or will not contribute to a continued decline in subwatershed condition. Indicators of watershed health and Chiricahua leopard frog habitats demonstrate that effects from grazing and livestock management activities will be insignificant and discountable. This **does not apply** to stock tanks**,** irrigation sumps, acequias, mine adits, backyard ponds, or other suitable man-made habitats that are typically not affected by watershed condition.

3. Proposed livestock management activities will not result in increased public access to aquatic sites occupied or likely to be occupied by Chiricahua leopard frogs, or increase the likelihood that non-native predators or chytrid fungi will colonize or be introduced to such aquatic sites.

You determined that livestock grazing on 51 allotments may adversely affect the species. The allotments are:

Chiricahua EMA: Barboot, Big Bend, Cave Creek, Lower Rock Creek, Paradise, Pine, Pinery, Turkey Creek and Upper Rock Creek.

Dragoon EMA: Black Diamond and Walnut Springs.

Santa Rita EMS: Apache Springs, Box Canyon, Fort, and McBeth.

Tumacacori EMA: Bear Valley, Carrizo, Jarillas, Marstellar, Murphy, Oro Blanco, Pena Blanca, and Ramanote.

Huachuca EMA: A Draw, Blacktail, Campini, Canelo, Duquesne, Farrell, Harshaw, Hayfield, HQ, Lochiel, Lone Mountain, Lyle Canyon, O'Donnell, Post Canyon, San Rafael, Sawtelle, Seibold, and UD.

Galiuro EMA: Bass Canyon, Bull Tank, Deer Creek, Harrison Canyon, High Creek, North Ash, South Ash, Squaw Basin, Sunset, and Wear.

EFFECTS OF THE ACTION

Our prior discussion of livestock grazing effects in the previous Effects of the Action (Forestwide) section are incorporated here by reference.

Maintenance of viable populations of Chiricahua leopard frogs is thought to be compatible with well-managed livestock grazing. Grazing occurs in most of the habitats occupied by this frog. One large and healthy population of Chiricahua leopard frogs coexists with cattle and horses on the Tularosa River in New Mexico (Randy Jennings, Western New Mexico University, 1995).

Throughout their range, Chiricahua leopard are often found living in dirt stock tanks (created by mounding dirt around a drainage site by bulldozer). These tanks are heavily used by livestock, especially cattle. Poorly managed livestock grazing activities can negatively impact this species and its habitats.

Livestock grazing effects on ranid frog populations are not well studied. Munger et al. (1994) found that sites that supported adult Columbia spotted frogs (*Rana luteiventris*) had significantly less grazing pressure than sites that did not support spotted frogs. In a subsequent survey, Munger found no differences between the two types of use in these types of areas (Munger et al. 1996). Bull and Hayes (2000) evaluated reproduction and recruitment of the Columbia spotted frog in 70 ponds used by cattle and 57 ponds not used by cattle. Significant differences were not found in the number of egg masses or recently metamorphosed frogs in grazed and ungrazed sites in this study. Seventeen percent of the sites were livestock tanks. The California red-legged frog (*Rana aurora draytonii*) coexists with managed livestock grazing in many places in California. Ponds created as livestock waters have created habitats for red-legged frogs, and livestock may help maintain habitat suitability by reducing coverage by cattails, bulrush, and other emergent vegetation (USFWS 2000). In another study, exclusion of cattle from the Simas Valley (Contra Costa County, California), corresponded with re-establishment of native trees and wetland herbs, re-establishment of creek pools, and expansion of red-legged frog populations (Dunne 1995).

Livestock grazing effects on Chiricahua leopard frog habitat include both creation of habitat and loss and degradation of habitat (Sredl and Jennings, in press). Construction of stock tanks for livestock water has created leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats (Sredl and Saylor 1998). Sixty-three percent of extant Chiricahua leopard frog localities in Arizona are stock tanks, versus only 35 percent of extirpated localities (Sredl and Saylor 1998), suggesting Arizona populations of this species have fared better in stock tanks than in natural habitats. Stock tanks provide small patches of habitat that are often dynamic and subject to drying and elimination of frog populations; however, Sredl and Saylor (1998) also found that stock tanks are occupied less frequently by non-native predators (with the exception of bullfrogs) than natural sites.

Adverse effects to the Chiricahua leopard frog and its habitat as a result of livestock grazing and management actions may occur under certain circumstances. These effects include: facilitating dispersal of nonnative predators; trampling of egg masses, tadpoles, and frogs; deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease (USFWS 2000b, Belsky et al. 1999, Bartelt 1998, Ohmart 1995, Hendrickson and Minckley 1984, Arizona State University 1979, Jancovich et al. 1997). Creation or maintenance of livestock waters in arid environments may provide the means for nonnative predators such as bullfrogs and crayfish to move across landscapes that would otherwise serve as barriers to their movement.

Vehicle use at or near habitats of the frog could result in animals being run over. For instance, a Chiricahua leopard frog was found in September 2002, on Ruby Road in the Pajarito Mountains. Frogs were also found at the same time in a pool within 10 feet of the road (J. Rorabaugh, pers. comm.). Ruby Road is the primary access route for ranchers and others in the mountain range, and traffic is continually increasing on this road. Frogs move, although not very quickly, onto and across roads searching for food, cover, mates, or water. Frogs on the road will be crushed by vehicles. Ruby Road is one of many roadways in the vicinity of Chiricahua leopard frog localities.

Maintenance of livestock tanks can result in death or injury of frogs. Tanks are periodically dredged out to remove silt. Dredging is usually conducted with large equipment when the tank is dry or nearly dry. As tanks dry, frogs take refuge in cracks in the mud around tanks or clumps of emergent vegetation. Walt's Tank on the Coconino National Forest was drying and scheduled for cleanout in September 2002. As the tank was drying, several Chiricahua leopard frogs were excavated out of the soil cracks in and around the tank. If backhoes or other equipment had been brought in to dredge out the tank before frogs were searched for and removed, those frogs would have perished.

Increased erosion in the watershed caused by livestock grazing can accelerate sedimentation of deep pools used by frogs (Gunderson 1968). Sediment alters primary productivity and fills interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Eggs, tadpoles, and metamorphosing Chiricahua leopard frogs are probably trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartelt 1998, USFWS 2000b). Juvenile and adult frogs can probably avoid trampling when they are active; however, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997), where they may be subject to trampling during the winter months. Cattle can remove bankline vegetation that provides escape cover for frogs and a source of insect prey. Dense shoreline or emergent vegetation in the absence of grazing may favor some predators, such as garter snakes (*Thamnophis* spp.), and the frogs may benefit from some open ground for basking and foraging. At a tank in the Chiricahua Mountains of southeastern Arizona, Sredl et al. (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die-off of Chiricahua leopard frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die-off occurred (USFWS 2000b).

Chytrid fungus can survive in wet or muddy environments and could conceivably be spread by livestock carrying mud on their hooves and moving among frog habitats. Personnel working at an infected tank or aquatic site and then traveling to another site, thereby transferring mud or water from the first site could also spread this disease. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, nets, boots, or other equipment. This disease is known to occur in one or more drainages in the Pajarito and Huachuca mountains, in the San Bernardino Valley, and at Empire Cienega, at or near known Chiricahua leopard frog localities on the Forest, and certainly elsewhere. We anticipate some movement of chytrids among sites due to vehicles associated with livestock grazing moving among wetted areas, or via muddy boots or other equipment that is not thoroughly dried or bleached before use at another site. Chytrids cannot survive complete drying; if equipment is allowed to thoroughly dry, the likelihood of disease transmission is greatly reduced. Bleach or other disinfectants can also be applied to tools and vehicles and will kill chytrids (Loncore 2000).

Chytrid fungus transfer could also occur during intentional introductions of fish or other aquatic organisms. Maintenance of roads and tanks needed for livestock grazing could provide fishing opportunities and facilitate tank access by anglers, hunters, or other recreationists. These people (and possibly their dogs) may inadvertently introduce chytrids from other locales, or may intentionally introduce nonnative predators for angling or other purposes. Such activities would also facilitate introduction of nonnative predators with which the Chiricahua leopard frog cannot coexist.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Livestock grazing and associated activities on non-Federal lands, private land development and water use, and the presence and/or introduction of exotic fish and amphibians in the project area watersheds may have a bearing on the species or its habitat, as well as land and water use practices in adjacent Sonora, Mexico.

CONCLUSION

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, and the anticipated effects of the reinitiation of your livestock grazing, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Chiricahua leopard frog because the Chiricahua leopard frog appears to coexist with well-managed livestock grazing practices.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by you so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

The proposed action occurs over the largest part of the species' range in Arizona, and the majority of the known extant populations of the frog in Arizona occur on the allotments. Given the many opportunities for take to occur, both temporally (10-year project life) and spatially, we believe take is reasonably certain to occur, as described below and in the Effects of the Action section. Although we believe take will occur, precise levels of anticipated take are not easily derived. The levels provided below represent our best assessment based on the best scientific and commercial data available to us. As we develop more information about how grazing affects frogs and as we update our inventory of frogs on the allotments, these anticipated levels of take may be revisited. Refer to the Effects of the Proposed Action section for further supporting information on why we anticipate take in the forms and levels provided here. We anticipate take for the following allotments, based on current known locations:

Chiricahua EMA: Barboot, Big Bend, Cave Creek, Lower Rock Creek, Paradise, Pine, Pinery, Turkey Creek and Upper Rock Creek.

Dragoon EMA: Black Diamond and Walnut Springs.

Santa Rita EMA: Apache Springs, Box Canyon, Fort, and McBeth.

Tumacacori EMA: Bear Valley, Carrizo, Jarillas, Marstellar, Murphy, Oro Blanco, Pena Blanca, and Ramanote.

Huachuca EMA: A Draw, Blacktail, Campini, Canelo, Duquesne, Farrell, Harshaw, Hayfield, HQ, Lochiel, Lone Mountain, Lyle Canyon, O'Donnell, Post Canyon, San Rafael, Sawtelle, Siebold, and UD.

Galiuro EMA: Bass Canyon, Bull Tank, Deer Creek, Harrison Canyon, High Creek, North Ash, South Ash, Squaw Basin, Sunset, and Wear.

Because Chiricahua leopard frogs occur in numerous cattle tanks and stream habitats on the above allotments, we anticipate take per the following, for the life of the plan;

1. Direct mortality or injury of all frogs at all livestock tanks where maintenance activities result in significant disturbance at the tank (e.g. dredging or silt removal, major repair of berms) and frogs are present during the maintenance activities.

2. Direct mortality or injury through trampling and destruction of egg masses, small tadpoles, and metamorphosing frogs, and ingestion of small larvae and eggs at all stock tanks at which cattle have access to the tank from March through October; trampling and destruction of small tadpoles and overwintering frogs at all stock tanks where cattle have access from November through February. These life stages of frog are very vulnerable to damage; egg masses are fragile, small tadpoles do not move rapidly to escape danger, and metamorphosing frogs are small and cannot swim or hop well to quickly escape from danger. During winter months, frogs hibernate on the bottom of stock tanks, where they are vulnerable to trampling.

3. Harm through mortality of frogs at one locality (livestock tank, stream, or spring) due to unintentional introduction of chytridiomycosis resulting from cattle moving among frog populations or transport of water or mud among aquatic sites by ranch hands, or other activities associated with the grazing management program. Maintenance of roads to or near tanks is expected to promote public access and increased incidence of chytridiomycosis.

4. Harm through mortality and lost productivity of Chiricahua leopard frogs due to loss of bankline and emergent cover at three Chiricahua leopard frog sites where cattle have access to banklines of occupied frog habitats. Harm through mortality and lost reproductive output of Chiricahua leopard frogs due to sedimentation of pools or other forms of habitat degradation at three Chiricahua leopard frog sites where cattle are contributing to erosion in watersheds upstream of occupied Chiricahua leopard frog habitat. Sediments smother egg masses and fill in breeding ponds. Cover at banks and around the stock tanks help reduce predation of frogs as they bask and give them needed cover to hide so they can quickly escape predators. Note that our anticipation of take at three sites due to loss of cover and sedimentation is a reasonable estimate, because based on our experience, although many tanks with frogs occur on allotments, relatively few have vegetation bankline cover that will be affected, and most stock tanks are located so that any degraded upstream watersheds do not deliver large amounts of sediment to the tank.

5. Harm to Chiricahua leopard frogs at three tanks due to unintentional movement of nonnative bullfrogs, fish, salamanders, or crayfish to a tank occupied by Chiricahua leopard frogs. During hauling of water to troughs or tanks as part of a livestock program, fish, bullfrogs, salamanders, or crayfish may be pumped with water from one source and delivered unintentionally to a site occupied by Chiricahua leopard frogs. Maintenance of roads to or near tanks is expected to promote public access and increased stocking of nonnative aquatic species. These nonnative predators would prey upon and may extirpate Chiricahua leopard frogs from the site. Chiricahua leopard frogs could also be pumped from the water source and killed or injured. These conditions are reasonably certain to occur, but not frequently. Based on our best information and scientific judgement, three tanks are reasonably certain to experience this type of take within the 10-year life of the plan.

6. Harm to Chiricahua leopard frogs at three livestock tanks where cattle have access to the tank and fouling of the water occurs to such an extent that conditions become toxic for frogs (see Sredl et al. 1997, and discussion in Effects of the Proposed Action). These conditions are reasonably certain to occur, but not frequently. Based on our best information and scientific judgement, three tanks are reasonably certain to experience this type of take within the 10-year life of the plan.

Occupancy of suitable habitats by Chiricahua leopard frogs is dynamic. Discovery of new populations, recolonization of extirpated sites, and extirpation of occupied sites are common occurrences with this species; therefore, we expect that over the life of this action, sites where take may occur (sites occupied by Chiricahua leopard frogs) will change across the allotments. The above anticipated take takes into account the dynamic nature of frog occupancy; thus, we do not believe reinitiation is needed whenever a new population of Chiricahua leopard frogs is found, or a population is extirpated.

This biological opinion does not anticipate any form of take not incidental to implementation of the reinitiation of livestock grazing on the Forest. If the incidental take anticipated by this opinion is exceeded, you must immediately reinitiate consultation with us to avoid a violation of section 9 of the Act. In the interim, you must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species, and provide this office with an explanation of the cause of the taking.

Direct take not incidental to the proposed action would include intentional killing or intentional introduction of nonnative aquatic species into occupied Chiricahua leopard frog habitat. Such take is not covered in this incidental take statement.

EFFECT OF THE TAKE

In this BO, we determined that this level of anticipated take is not likely to result in jeopardy to the Chiricahua leopard frog.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

The following reasonable and prudent measures are necessary and appropriate to minimize take of Chiricahua leopard frog. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with their accompanying terms and conditions in regard to the proposed action. These terms and conditions are nondiscretionary and implement the reasonable and prudent measures as described. These measures shall apply to the following allotments:

Chiricahua EMA: Barboot, Big Bend, Cave Creek, Lower Rock Creek, Paradise, Pine, Pinery, Turkey Creek and Upper Rock Creek.

Dragoon EMA: Black Diamond and Walnut Springs.

Santa Rita EMA: Apache Springs, Box Canyon, Fort, and McBeth.

Tumacacori EMA: Bear Valley, Carrizo, Jarillas, Marstellar, Murphy, Oro Blanco, Pena Blanca, and Ramanote.

Huachuca EMA: A Draw, Blacktail, Campini, Canelo, Duquesne, Farrell, Harshaw, Hayfield, HQ, Lochiel, Lone Mountain, Lyle Canyon, O'Donnell, Post Canyon, San Rafael, Sawtelle, Siebold, and UD.

Galiuro EMA: Bass Canyon, Bull Tank, Deer Creek, Harrison Canyon, High Creek, North Ash, South Ash, Squaw Basin, Sunset, and Wear.

1. Measures shall be implemented to reduce direct mortality or injury associated with livestock tank maintenance.

The following terms and conditions implement reasonable and prudent measure number 1:

a. At least 20 days prior to maintenance or cleanout of livestock tanks, the permittee shall inform you of planned activities. This allows adequate time for you to plan for frog salvage. Prior to cleanout or other maintenance of known frog localities (per your July 30, 2002, BA, and all updates and corrections), the area shall be thoroughly surveyed for frogs. Care shall be taken to carefully survey for presence of frogs in aquatic emergent vegetation (e.g. cattails) and in cracks in the mud of bottom sediments. Any frogs observed in these surveys shall be collected and held off-site for later release at the capture site, following cleanout and refilling of tanks. Because tanks will be dry or very nearly so for cleanout, it is unlikely more than a few frogs will be found, although one tank on the Coconino National Forest yielded 17 frogs.

You shall make an agreement or arrangement for the Arizona-Sonora Desert Museum, the Phoenix Zoo, or other qualified institution approved by us, to hold frogs salvaged from tanks until the tanks are refilled and the frogs can be returned. You shall notify us of any collected frogs within 10 calender days. At other tanks with suitable habitat for frogs, surveys shall be conducted prior to cleanout or maintenance and measures described herein will be implemented if frogs are found.

b. Tank cleanout will limit disturbance and work areas to the minimum area practicable, leaving stands of emergent vegetation in place whenever possible.

2. Personnel education programs and well-defined operational procedures in writing shall be implemented to minimize take from the introduction of non-native species and chylid contamination.

The following terms and conditions implement reasonable and prudent measure number 2:

a. Live fish, crayfish, bullfrogs, leopard frogs, salamanders, or other aquatic organisms shall not be introduced into any livestock tanks or other aquatic sites where Chiricahua leopard frogs are known to exist, as these predators can consume Chiricahua leopard frogs and eliminate local populations.

b. If a site is identified as occupied by Chiricahua leopard frogs, water shall not be hauled to the site from another aquatic site or tank that supports leopard frogs, bullfrogs, tiger salamanders, crayfish, or fish, to minimize spread of nonnative predators and chytrids. In addition, water shall not be pumped or diverted from a site occupied by Chiricahua leopard frogs.

c. At all sites where Chiricahua leopard frogs occur, all personnel authorized to work, inspect or survey at any aquatic site within the allotment (on Forest lands), will be required to clean and treat any and all equipment (shovels, nets, buckets, fence posts, boots, etc.), used at an aquatic site with a 10 percent bleach solution, or allow all equipment to dry thoroughly, before using the same equipment at another aquatic site on the allotment. While personnel and their gear are not the only source of disease transmission, this is a controllable action people can take to reduce the spread of this disease.

d. All field personnel, including ranch, construction, and maintenance workers, and any other people known to be visiting aquatic sites associated with the proposed action, will be given, in a letter delivered to them within 45 days of the date of this biological opinion or in their Annual Operating Plan, whichever comes sooner, a copy of these terms and conditions, and informed of the requirement to comply with them.

3. Measures shall be implemented to reduce cattle access to aquatic sites occupied by Chiricahua leopard frogs, thereby minimizing direct mortality and injury due to trampling, and reducing harm due to destruction of bankline cover and deterioration of water quality.

The following term and condition implements reasonable and prudent measure number 3:

In regard to stock tanks and other aquatic sites occupied by Chiricahua leopard frogs, you shall use your authorities, seek funding, and develop agreements with permittees to fence portions of as many of these sites as is feasible and reasonable to limit access by cattle. Sites with the following characteristics shall be targeted for fencing first: (1) banklines are trampled, and bankline and emergent vegetation are absent or heavily impacted, (2) water quality is severely degraded due to livestock presence, (3) chytrids are known to occur on the allotment, and/or (4) the population at the site is small and is the only one known from that region. Portions of stock tanks can be left unfenced to allow access by cattle and places for frogs to bask.

4. You shall monitor incidental take resulting from the proposed action and report the findings of that monitoring.

The following term and condition implements reasonable and prudent measure number 4:

You shall monitor incidental take as it occurs; note the time requirements in the Disposition of Dead and Injured Listed Species section of this BO. You shall continue to submit an annual report to us that, at a minimum, briefly summarizes for the previous calender year: (1) The implementation of terms and conditions and conservation recommendations, and (2) documentation of take or monitoring for listed species; if Chiricahua leopard frogs are found on the Forest in areas outside of those currently known (per your July 30, 2002, BA), you shall notify us (by telephone, electronic transmission, facsimile, or letter) within 10 calendar days of your knowledge of these site(s) and propose a site plan to minimize take at the new location. The report shall also make recommendations for modifying or refining these terms and conditions to enhance protection of the Chiricahua leopard frog or reduce needless hardship on you or your permittee(s). A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species

We recommend the following:

1. Work with AGFD and us to translocate the Chiricahua leopard frog to suitable habitats in the Forest, enhancing metapopulation dynamics.

2. Conduct or support comprehensive surveys for the Chiricahua leopard frog in all suitable habitats on the Forest.

3. Work with AGFD and us to begin an aggressive program to control nonnative aquatic organisms on the Forest, particularly bullfrogs, fish, and crayfish.

4. Work with us to develop a recovery plan for the species.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed or proposed species, we request notification of implementation of any conservation actions.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

New Mexico ridgenose rattlesnake (*Crotalus willardi obscurus*)

STATUS OF THE SPECIES

We listed the New Mexico ridgenose rattlesnake as threatened in a Federal Register notice (43 FR 34479), dated August 4, 1978. Critical habitat was designated in Bear, Spring, and Indian canyons of the Animas Mountains between 1,833 to 2,521 m (6,048 to 8,320 ft) in elevation. At the time of listing, the subspecies was not known to occur in the Peloncillo Mountains.

The New Mexico ridgenose rattlesnake is a small [maximum of 66 cm (2.19 ft) total length] montane species known only from the Animas Mountains, Hidalgo County, New Mexico; Peloncillo Mountains, Hidalgo, and Cochise counties, Arizona; and the Sierra San Luis, Sonora and Chihuahua, Mexico (Campbell et al. 1989, Painter 1995, Degenhardt et al. 1996, Keegan et al 1999). The New Mexico ridgenose rattlesnake is one of five subspecies of the ridgenose rattlesnake found from montane areas of southeastern Arizona and southwestern New Mexico, south through the Sierra Madre to Zacatecas, Mexico.

The New Mexico ridgenose rattlesnake is an inhabitant of insular woodlands that were more widespread and continuous during Pleistocene glaciation events (Maldonado-Koerdell 1964, Barker

1992, Van Devender 1995) A Pleistocene fossil ridgenose rattlesnake (*Crotalus willardi*) from the San Pedro River Valley (Mead 1975), suggests ridgenose rattlesnakes tracked the distribution of the woodlands. When climates warmed and became drier, the ranges of this and other montane woodland reptiles presumably contracted with that of the woodland communities and are now isolated on mountain tops in the Madrean region. Isolation and subsequent evolution have contributed to subspecific differences within *Crotalus willardi* (Barker 1992).

The New Mexico ridgenose rattlesnake is found in steep, rocky canyons with intermittent streams or on talus slopes at elevations ranging from approximately 1,576 to 2,576 m (5,200 to 8,500 ft) (Campbell et al. 1989, Barker 1991, Painter 1995, Degenhardt et al. 1996, A. Holycross, Arizona State University, pers. comm., 1997), and likely occurs as low as 1,515 m (5,000 ft) in the Peloncillo Mountains (Holycross 1999b). The subspecies is found primarily in areas of Madrean evergreen woodland and Petran montane coniferous forest (Brown 1982, Pase and Brown 1982). Dominant vegetation characterizing the habitat of this subspecies includes several species of oak (*Quercus* spp.), Douglas fir (*Pseudotsuga menziesii*), Apache pine (*Pinus engelmannii*), Chihuahua pine (*P. leiophylla* var. *chihuahuana*), Arizona madrone (*Arbutus arizonica*), manzanita (*Arctostaphylos pungens*), and grasses (Degenhardt 1972, Barker 1991, Degenhardt et al. 1996, Holycross 1998). Access to rock shelters with moderate interstitial spaces is probably a key habitat component (Barker 1991); however, the subspecies also uses perennial bunch grasses for cover (Painter 1995). The New Mexico ridgenose rattlesnake apparently moves less frequently, moves relatively short distances, and shows high fidelity to specific rock shelter sites as compared to other rattlesnake species (Barker 1991, Holycross 1995a and 1995b).

Holycross and Smith (2001) prepared and updated a report and map of potential core habitat of New Mexico ridgenose rattlesnake in the Peloncillo Mountains. Habitats were mapped as: 1) habitats 3 and 4 (probably or likely supports a deme of New Mexico ridgenose rattlesnakes, 2) habitats 1 and 2 (either very unlikely or unlikely that the subspecies occurs there), and 3) habitats identified as possible habitat but which burned destructively in the Maverick Prescribed Fire and no longer contain habitat characteristics. Habitats 3 and 4 were found in canyons and woodland patches from Skeleton Canyon on the north to the headwaters of Baker Canyon, near Little Bunk Robinson Spring, on the south. Few habitats rated as 1 and 2 were noted; these were limited to about seven patches scattered throughout the Peloncillos. Approximately 12 to 18 patches were identified that burned in the Maverick prescribed fire, including numerous woodland patches within a mile of Geronimo Trail, an area about a mile east of Cedar Spring, and woodland patches near Bunk Robinson Peak.

In the recovery plan for the species (USFWS 1985), 250 to 500 adult snakes were estimated to inhabit the Animas Mountains, but based on eight years of mark and recapture data in West Fork Canyon, Animas Mountains, Holycross (1999b) suggests this is an underestimate. Encounter rates by experienced herpetologists suggest the densest populations may occur in the portions of the Sierra San Luis, with comparatively moderate and low densities in the Animas and Peloncillo mountains, respectively (Holycross 1998). Densities probably vary greatly within mountain ranges, and encounter rates may not be indicative of population densities. In the U.S., the largest known population is in the Animas Mountains (Holycross and Douglas 1997).

Young snakes are live born probably in late June through August (Holycross 1995b, Painter 1995). Mean litter size for 12 broods was 5.5 (Applegarth 1980). Fecal samples from 246 New Mexico ridgenose rattlesnakes and a literature record identified 95 identifiable prey. Juvenile snakes fed primarily on spiny lizards (*Sceloporus* spp.) and centipedes (*Scolopendra* spp.); adults preyed mostly on small mammals, spiny lizards, and passerine birds (Holycross et al. in prep.). Based on more limited samples, other workers have come to similar conclusions regarding the diet of the New Mexico ridgenose rattlesnake (Applegarth 1980, Barker 1991).

The subspecies occurs in three (or more), small, disjunct populations. As a result, its viability is sensitive to habitat destruction or modification, and collection. After publication of the Animas locality in 1961 (Bogert and Degenhardt 1961), the area was reportedly heavily collected. Harris and Simmons (1976) reported encountering 15 collectors from six states during August 1974 in the Animas Mountains. We (1985) estimated as many as 130 New Mexico ridgenose rattlesnakes may have been collected in the Animas Mountains between 1961 and 1974. Collection during this period may have significantly affected the Animas population (Harris and Simmons 1976, USFWS 1985).

The Animas Mountains are privately owned, access to habitat areas is now strictly controlled, and the New Mexico ridgenose rattlesnake population there is now considered protected from collection; still, most habitat of the ridgenose rattlesnake in the Peloncillo Mountains is managed by you and the Bureau of Land Management (BLM) and is open to public use, providing greater opportunity for illegal collecting.

Catastrophic, stand-replacing fire events are a serious threat to the subspecies and its woodland habitat (Smith et al. 2001, Barker 1991). Catastrophic, stand-replacing fire occurred in the snake's habitat in the Animas Mountains in 1989 (Swetnam and Baisan 1996) and in the Sierra San Luis in 1989 (Barker 1991) and before 1952 (Marshall 1957). The 1997 Maverick prescribed fire in the Peloncillo Mountains consumed large portions of woodlands in one of the thirteen locations where New Mexico ridgenose rattlesnakes were observed in that mountain range. Overgrazing can adversely affect the subspecies (USFWS 1985, 1999), and mining, development, and logging are potential threats (USFWS 1985). Jim Jarchow (pers. comm. [in Johnson 1983]), found that the New Mexico rattlesnake suffers from a variety of diseases and pathogenic organisms; however, there is no evidence that ridgenose rattlesnake populations are threatened by disease (USFWS 1985).

Further information on the taxonomy, range, distribution, biology, and threats to the New Mexico ridgenose rattlesnake can be found in Applegarth (1980), Barker (1992, 1991), Campbell et al. (1989), Degenhardt (1972), Degenhardt et al. (1996), Johnson (1983), Painter (1995), Holycross (2000, 1999a &b, 1998, 1996, 1995a & b), Holycross and Douglas (1997), Holycross et al. (in prep.), Smith et al. (2001), and in the 1985 recovery plan.

ENVIRONMENTAL BASELINE

The New Mexico ridgenose rattlesnake only occurs within the Peloncillo EMA, so only those allotments were considered in the analysis of livestock grazing activities on the New Mexico ridgenose rattlesnake. The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria do not address this species.

You determined that livestock grazing on 11 allotments in the Peloncillo EMA may adversely affect this species. The allotments are: Clanton/Cloverdale, Fairchild, Geronimo, Graves, Guadalupe, Juniper Basin, Maverick, Outlaw Mountain, Robertson, Skeleton Canyon, and Walnut Canyon.

Four allotments in the Peloncillo EMA have documented locations and occurrences of the New Mexico ridgenose rattlesnake; Fairchild, Geronimo, Maverick, and Walnut Canyon.

The Peloncillo Mountains are relatively dry and low compared to the Chiricahua Mountains to the west and the Animas Mountains to the east. Hilly and mountainous terrain dissected by several major drainages characterizes the area; major drainages include Deer Creek, Skeleton Canyon, Whitmire Canyon, Clanton Draw, Cottonwood Canyon, Cloverdale Creek, and Sycamore, Estes, Baker, and Guadalupe canyons. The vegetation of the lower slopes is characterized by shrubs and grasses, with velvet mesquite (*Prosopis velutina*), juniper (*Juniperus spp.*), whitethorn acacia (*Acacia constricta*), and various perennial grasses predominating. In the higher elevations, pinyon pine (*Pinus edulis*), Apache pine, Chihuahua pine, and oaks are more abundant. Riparian vegetation is found in Clanton Draw, Cloverdale Creek, Guadalupe Canyon, and at several other sites, and includes Arizona ash (*Fraxinus velutina*), Arizona sycamore (*Platanus racemosa* var. *wrightii*), cottonwood (*Populus fremontii*), mesquite, and netleaf hackberry (*Celtis laevigata*).

A total of 27 ridgenose rattlesnakes and one hybrid snake have been found in the Peloncillo Mountains in 13 general areas from upper Miller Canyon on the south to South Skeleton Canyon on the north (Holycross and Smith 2001). Three of the ridgenose rattlesnakes were found in Arizona, all in South Skeleton Canyon.

Areas in which ridgenose rattlesnakes have been found in the Peloncillo Mountains are characteristically more arid, lower in elevation, and less vegetated than typical habitats in the Animas Mountains of New Mexico. In the Animas Mountains, the species is often found on talus slopes, but talus is apparently absent from the Peloncillo Mountains. The species is also much more difficult to find in the Peloncillo Mountains. An average of 33 person-days is needed to find one ridgenose rattlesnake in the Peloncillo Mountains. In the Animas Mountains, the encounter rate is about one snake per four person-days of search time (Holycross, pers. comm., 1998).

A listing of threats to the New Mexico ridgenose rattlesnake that contribute to its status as a threatened species is found in the Status of the Species section (above) and in USFWS 1985. Activities that may affect the ridgenose rattlesnake in the Peloncillo Mountains include prescribed fire, wildfire, poaching, cattle grazing, commercial beargrass (*Nolina microcarpa*) harvesting, and low to moderate levels of recreational activities such as birding, driving on or off roads, backpacking, camping, hunting, and nature study. The Peloncillo Mountains are much more accessible than the Animas or San Luis ranges, which makes illegal collection and other human activities potentially more important threats than elsewhere in the range of the snake. Also, the likely small population size and possible disjunct nature of their populations in the Peloncillo Mountains make these populations especially vulnerable to habitat degradation and collection.

A long history of livestock grazing, coupled with active fire suppression, changing climate, and possibly other factors, have favored a decline in fire frequency and subsequent conversion of grasslands to shrublands in much of the Southwest (Weltzin and McPherson 1994, Bahre 1995, McPherson 1995, Van Devender 1995, Villanueva-Diaz and McPherson 1996, Curtin and Brown undated). Data are lacking to quantify recent patterns of vegetation community change in the Peloncillo Mountains, but anecdotal accounts suggest some areas such as Cottonwood Basin once supported more open communities, and fire, which probably was a regular occurrence in the range, is now a rare event. As a result, woody fuel loads have built up in the woodland habitats of the ridgenose rattlesnake. These fuels, when ignited, could possibly result in a crown fire and loss of woodland habitat.

The 1997 Maverick prescribed fire burned 2,800 to 3,200 ha (7,000-8,000 ac) from about Sycamore Canyon on the south to just north of Geronimo Trail. Twelve to eighteen woodland patches thought to be habitat of the New Mexico ridgenose rattlesnake were consumed by stand-replacing fire, including one of the 13 general areas in which the species has been found in the Peloncillo Mountains. We visited some areas mapped as being exposed to intense fire on April 10, 2001. In the places we visited, the canopies were intact, some of the ladder fuels were removed, and they did not exhibit signs of severe erosion. Some of the areas within the 1997 Maverick burn did burn at high intensity, but this does not necessarily mean that they are lost forever as New Mexico ridgenose rattlesnake habitat. Fire does not usually burn at consistent temperatures within any given area, except under extreme fire conditions; therefore, even areas that were delineated as experiencing high intensity fire will likely contain some patches that did not burn at that intensity.

You reassessed allotment conditions on the Fairchild, Geronimo, Maverick, and Walnut Canyon allotments (Peloncillo EMA) and included your information in your report to us and in the allotment summary tables (Appendix G). Your report noted that livestock grazing did not appear to impede the continued improvement of the allotments under the current action. Overall trends were upward. The rates of soil condition were between 75 to 97 percent satisfactory, with impaired soils ranging from three to 24 percent. All four allotments showed moderately high range condition for the majority of the allotments, with three upward trends and one static.

Trends in range, soils, and watershed conditions are some of the most important information to be gained from monitoring. From this information, livestock management actions can be adjusted to continue to improve allotment conditions over time, benefitting livestock as well as native species of plants and animals. Allotment conditions were checked on site for Fairchild, Geronimo, Maverick, and Walnut Canyon, the four allotments with documented occurrences for the species. Trends for Fairchild, Geronimo, and Maverick were upward and range conditions were between 70 to 100 percent in moderately high condition. The overall trend for Walnut Canyon is static, with 10 percent in moderately high range condition with an upward trend, 85 percent in moderately high condition with a static trend, and 5 percent moderately low with a static trend. All four allotments evidence improved conditions compared with the 1990 General Ecosystem Survey (GES).

Within the project area, the New Mexico ridgenose rattlesnake occurs at elevations above 1,542 m (5,000 ft), primarily in canyons and mature woodlands in the Peloncillo Mountains in extreme southeastern Cochise County and southwestern Hidalgo County (Holycross 1999b). Holycross believes in lower elevations, the species probably occurs primarily in the bottoms of steep, heavily-wooded canyons. At higher elevations the species is found in woodlands, open woodlands, and chaparral on exposed slopes and plateaus, but mature woodlands are apparently the essential core habitats for the New Mexico ridgenose rattlesnake (Holycross 1999b).

Prior to this opinion, we issued five biological opinions on the New Mexico ridgenose rattlesnake. On May 3, 1997, we issued a biological opinion to you for the proposed Maverick prescribed fire. On September 26, 1997, we issued a biological opinion to the BLM on the Safford and Tucson Field Offices' grazing program. On December 19, 1997, we issued a biological opinion to the Southwest Region of the Forest Service on land and resource management plans for eleven national forests and grasslands. On July 29, 1999, we issued a biological opinion to you on your livestock grazing, including 12 allotments in the Peloncillo Mountains. On April 20, 2001, we issued a biological opinion on the proposed Baker II prescribed fire. We determined in each of these five cases that the proposed action was not likely to jeopardize the continued existence of the rattlesnake or result in destruction or adverse modification of critical habitat.

EFFECTS OF THE ACTION

Effects of grazing on this or other species of rattlesnakes are largely speculative and poorly studied. Direct effects to snakes are possible due to cattle stepping on animals. Holycross (USFWS 1999a), related an incident told to him by another herpetologist in which a rat snake (*Elaphe guttata)* and a milk snake *(Lampropeltis triangulum)* were killed when a cow stepped on the rock under which they had taken refuge. Given the proposed number of livestock on the 11 allotments (permitted at 1,711 animals) and the duration of the action (up to 10 years), similar incidents involving ridgenose rattlesnakes are reasonably certain to occur.

New Mexico ridgenose rattlesnakes have been found from April to October in the Peloncillo Mountains (our files), and are probably active somewhat earlier and somewhat later than this period. During the winter months, they are most likely dormant in rock shelters or other sites protected from trampling, so trampling is most likely to occur where livestock remain year-long in rattlesnake habitat.

Rattlesnakes are frequently killed by the public. Snakes can be killed by permittees or ranch hands during snake encounters, and snakes can be trampled by horseback riders performing duties associated with grazing activities or run over on roadways. Rattlesnakes are commonly found run over by vehicles on roads, whether the roads are paved or dirt. Rattlesnakes move to search out food, cover, and mates; one of the 27 New Mexico ridgenose rattlesnakes from the Peloncillo Mountains was located within 100 feet of the Geronimo trail, the most-traveled access route through the mountain range. Roads created or maintained as part of the grazing program provide access for the public and will facilitate illegal collecting or killing of ridgenose rattlesnakes. For the term of this BO, no road construction is proposed in any of the allotments containing suitable habitat, per your July 30, 2002, BA.

New Mexico ridgenose rattlesnakes can be killed or injured during construction or maintenance activities. Water developments above 1,524 m (5,000 ft) could draw cattle into rattlesnake habitat and increase the probability of trampling or habitat degradation. New water developments could also destroy and inundate ridgenose rattlesnake habitat. Mesquite is not abundant at the higher elevations where ridgenose rattlesnakes occur, so the proposed mesquite control project on the Clanton/Cloverdale allotment would probably affect little or no ridgenose rattlesnake habitat.

Livestock grazing in montane and valley grasslands and subsequent effects to bunch grass lizard (*Sceloporus slevini*) populations have been investigated on the Forest in the Chiricahua Mountains (Ballinger and Congden 1996) and off-Forest near Elgin (Bock et al 1990). In both cases, the lizard occurred only in low densities in grazed areas but was relatively abundant in areas that were ungrazed. Bock et al (1990) suggested the lizard requires bunch grasses for protection from predation. The New Mexico ridgenose rattlesnake also uses large bunch grasses, such as *Muhlenbergia* and *Aristida*, for cover (USFWS 1999a). These grasses are very palatable to livestock. During fieldwork from 1995 to 1997, Holycross and Douglas (1997) observed livestock grazing in portions of ridgenose rattlesnake habitat in the Peloncillo Mountains that removed all grass cover taller than about 4 cm (1.5 in). Heavy grazing was also observed in Whitmire Canyon on the Walnut Canyon allotment and in wooded canyons on the Maverick allotment. Holycross (USFWS 1999a), believes loss of ground cover causes snakes to move less during key foraging or mating periods, and predation of snakes increases due to their increased visibility to their predators. The snake's prey base is negatively affected by reduction of seeds and vegetation available for rodents and herbivorous insects, of which the former is rattlesnake prey, and the latter supports lizard populations, which are also prey for the snake (Holycross and Douglas 1997). Reduced grass cover can change natural fire frequency, with associated effects to snake habitat discussed later herein. Holycross and Douglas (1997) recommended limiting grazing to the winter season in ridgenose rattlesnake habitat in the Peloncillo Mountains.

Permitted maximum utilization rates in the allotments range from 45 to 50 percent. In semi-desert grasslands, Holechek et al. (1998) recommended that utilization average about 35 percent. For semi-desert grass/shrub rangelands, Martin (1975) recommended that average utilization rates should be about 40 percent, but may range as high as 60 percent in dry years to as low as 20 percent in high production years. To affect an improvement in degraded range condition, lower utilization rates should be applied (Martin 1973, Holechek et al. 1998). The maximum utilization rates authorized by you in key areas may not reflect average utilization over space and time within the allotments. Because they are higher than the averages recommended by Holechek and Martin, the potential exists under permitted grazing to average more than 40 percent utilization, which may be more than the rangeland can sustain without degradation. The observations of Holycross and Douglas (1997), suggest overgrazing may be adversely affecting ridgenose rattlesnake habitat in the Peloncillo Mountains. Areas they observed where grass was cropped to 4 cm (1.5 in) were probably grazed well in excess of the authorized 55 percent maximum. In late April 1997, our personnel observed heavy grazing near the crest of the mountains in the Maverick allotment that well exceeded 55 percent utilization (USFWS 1999a).

Although other factors likely played some role in the elimination of frequent ground fires, most authors agree that livestock grazing was probably the most important, at least before effective fire suppression began in the 1930s (Bahre 1991, 1995, Swetnam and Baisan 1996, Danzer et al. 1997). Livestock grazing removes herbaceous fine fuels that normally carry fire. Without fire, ladder fuels and woody material build up in woodlands, which may promote stand-replacing fire. The effects of livestock grazing on fire spread in the Peloncillo Mountains could be seen after the Maverick prescribed fire. The fire burned through Cottonwood Basin on the Geronimo allotment but stopped at the boundary of the Maverick allotment, because grazing had removed enough of the grasses and other fine fuels to halt the fire. Fire suppression efforts have been few in the Peloncillo Mountains, so livestock grazing may be the most important factor in apparent altered fire regimes in this mountain range.

In the short term, livestock grazing can protect the woodland habitats of the rattlesnake from fire by removing fine fuels, but this can promote infrequent crown fires that destroy woodland habitats of the rattlesnake. A long history of grazing and the absence of fire from the Peloncillo Mountains has resulted in a situation where when fire does occur during warm seasons when fuels are dry, many woodland patches are reasonably certain to burn with greater intensities, and the loss of rattlesnake habitat will occur under very intense fire conditions. Current fire planning by you, the Natural Resource Conservation Service, BLM, the Malpai Borderlands Group, and others is targeting mid- to high-elevation areas of the Peloncillo Mountains, including habitats of the ridgenose rattlesnake. To change fire regimes back to a more natural pattern of frequent ground fires without destroying woodland habitats will require careful application of cool season or low-intensity fire in woodlands in a way that consumes ladder fuels and understory vegetation without creating a crown fire. Any attempt to reestablish a natural fire regime in the Peloncillo Mountains will depend upon properly managed livestock grazing so that sufficient fine fuels remain on the landscape to carry a fire. We believe effects of livestock grazing that remove fine fuels and lead to buildup of woody fuels and increased chance of catastrophic, stand-replacing fire in woodlands will be addressed satisfactorily in the Peloncillo Programmatic Fire Plan.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The majority of potential habitat for the ridgenose rattlesnake in the Peloncillo Mountains is administered by you. Smaller areas are privately owned or administered by the BLM; activities in BLM lands would be Federal actions subject to consultation and are not considered cumulative. Livestock grazing and other ranching activities occur on the limited private lands in the Peloncillo Mountains above 2,525 m (5,000 ft). These activities may result in localized habitat degradation.

CONCLUSION

After reviewing the current status of the New Mexico ridgenose rattlesnake, the environmental baseline for the action area, and the anticipated effects of the reinitiation of your livestock grazing on the Forest, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the New Mexico ridgenose rattlesnake. Critical habitat has not been designated for this species in the Peloncillo Mountains; therefore, none will be affected. We based our conclusion on the following:

1. The bulk of the range and population of this species is located in New Mexico, in the Animas Mountains, where critical habitat has been designated. The Animas Mountains are not part of the Coronado National Forest, and are outside the scope of this BO.

2. Two of the four allotments (Fairchild and Geronimo) currently known to have documented occurrences of New Mexico ridgenose rattlesnake will experience less than year-long grazing, thus reducing habitat degradation. The other two allotments (Maverick and Walnut Canyon) have year long grazing. All allotments are showing improvements in range and soil conditions, contributing to habitat improvement for the snake.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by you so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

The proposed action occurs over the entire range of the species in the Peloncillo Mountains. Given the many opportunities for take to occur, both temporally (10-year project life) and spatially, take is reasonably certain to occur, as described below and in the Effects of the Action section. Although we believe take will occur, precise levels of anticipated take are not easily derived. The levels provided below represent our best assessment based on the best scientific and commercial data available to us. As we develop more information about how grazing affects snakes, these anticipated levels of take may be revisited. We anticipate take for the following four allotments, based on known snake locations: Fairchild, Geronimo, Maverick, and Walnut Canyon.

We provide here some explanation of how the proposed action will result in incidental take. More detailed descriptions of the ways snakes are anticipated to be taken can be found in the Effects of the Proposed Action section.

We anticipate take per the following, for the life of the plan:

1. Direct mortality or injury of two New Mexico ridgenose rattlesnakes as a result of trampling by cattle or horses associated with the grazing program, snakes run over by vehicles associated with livestock grazing, and/or snakes killed or injured during construction and maintenance of range projects. We expect this to occur, but not frequently. It is our best scientific judgement that it would be reasonable to anticipate such take twice in the life of the plan.

2. Harm of two New Mexico ridgenose rattlesnakes due to livestock grazing having reduced vegetation cover quantity or quality. Reduced cover can result in increased predation of the snake. Reduced vegetation food and cover for prey species will likely result in lower prey availability for snakes, with subsequent reduced reproductive output and/or increased mortality. Grazing policies by you that improve degraded range condition and maintain good conditions should limit this form of take, hence our anticipation that this would only occur twice in the life of the plan.

This biological opinion does not anticipate any form of take not incidental to implementation of the reinitiation of the livestock grazing program on the Forest. If the incidental take authorized by this opinion is exceeded, you must immediately reinitiate consultation with us to avoid a violation of section 9 of the Act. In the interim, you must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species, and provide to this office an explanation of the cause of the taking.

Direct take not incidental to the proposed action would include intentional killing or poaching New Mexico ridgenose rattlesnakes. Such take is not anticipated under this BO.

EFFECT OF THE TAKE

For the reasons set out above, we believe the anticipated level of take is not likely to result in jeopardy to the New Mexico ridgenose rattlesnake.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

The following reasonable and prudent measures are necessary and appropriate to minimize take of the New Mexico ridgenose rattlesnake. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with their accompanying terms and conditions in regard to the proposed action. These terms and conditions are nondiscretionary and implement the reasonable and prudent measures as described. These measures shall apply to areas above 1,524 m (5,000 ft) in the Fairchild, Geronimo, Maverick, and Walnut Canyon allotments. Take is reasonably certain to occur within these areas of the allotments because of the known distribution and the concentration of suitable habitat within these allotments.

1. Reasonable measures shall be included in range management projects to ensure minimization of mortality and injury of New Mexico ridgenose rattlesnakes associated with construction and maintenance of such projects.

The following term and condition implements reasonable and prudent measure number 1:

> In the design of range management projects you shall include minimization measures to reduce effects to New Mexico ridgenose rattlesnake. Some examples could be limiting surface disturbances to the smallest area needed, and not moving rock piles or cutting slopes. Range management activities include, but are not limited to, road maintenance, reconstruction, or construction, (except Geronimo Trail) for the purposes of livestock grazing management; fences, pipelines, corrals, waters, windmills, and any other surface-disturbing activities associated with livestock grazing management.

2. To ensure minimization of direct mortality, injury and harm of New Mexico ridgenose rattlesnakes due to encounters between range personnel and snakes, you shall include personnel education in project-level activities.

The following term and condition implements reasonable and prudent measure number 2:

> You shall ensure permittees and all field personnel who implement any portion of the proposed action shall be informed in writing (either in an Annual Operating Plan or by letter), before each grazing season, that intentional killing, disturbance, or harassment of threatened or endangered species, including the New Mexico ridgenose rattlesnake, is a violation of the Act and could result in prosecution. All personnel shall be advised that care should be exercised when operating vehicles in the project area to avoid killing or injuring snakes on roads.

3. You shall monitor incidental take resulting from the proposed action and report the findings of that monitoring.

The following term and condition implements reasonable and prudent measure number 3:

> You shall monitor incidental take as it occurs; note the time requirements in the Disposition of Dead and Injured Listed Species section of this BO. In the annual monitoring report described in the general terms and conditions in this biological opinion, you shall briefly summarize for the previous calendar year: 1) the effectiveness of these terms and conditions, and 2) documentation of take, if any. If such activities or monitoring occurs, the report shall also include summaries of: (1) grazing actions initiated or completed, such as range projects, development of allotment management plans, and vegetation management; (2) allotment inventory, evaluation, and monitoring results; and (3) any records of New Mexico ridgenose rattlesnakes or evaluations of snake habitat. A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Coordinate with us, AGFD, New Mexico Department of Game and Fish, BLM, and willing organizations, to inventory potential New Mexico ridgenose rattlesnake habitat in the Peloncillo Mountains, focusing on areas of potential habitat that have yet to be adequately surveyed.

2. Coordinate with us, AGFD, New Mexico Department of Game and Fish, BLM, and willing organizations, to fund or help with research designed to clarify life history and ecology of the species. Such research should quantify the effects of your authorized activities, particularly livestock grazing and recreation, on the status of the snake.

3. Recognize the habitat requirements of New Mexico ridgenose rattlesnake in the Peloncillo Mountains and incorporate them into your Forest Plan Revision (beginning in 2004).

4. Adopt average utilization rates of 35 to 40 percent to maintain or improve range condition and vegetation communities in the long-term. Areas of allotments with unsatisfactory soil conditions, moderately low or low range condition, and areas with downward trends in range condition should be especially targeted for reduced utilization rates.

5. Continue development of the Peloncillo Programmatic Fire Plan, in coordination with AGFD, New Mexico Department of Game and Fish, and others.

6. Work with us on preparing a revised recovery plan for the species and its subsequent implementation.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species, we request notification of implementation of any conservation actions.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*)

STATUS OF THE SPECIES

We listed the Sonora tiger salamander as endangered in a Federal Register Notice (62 FR 665), dated January 6, 1997, without critical habitat. The final recovery plan was signed in September, 2002, and is expected to be released very soon.

The Sonora tiger salamander is a large salamander with a dark venter and light-colored blotches, bars, or reticulation on a dark background. Snout-to-vent lengths of metamorphosed individuals vary from about 2.6 to 4.9 in (Jones et al. 1988, Lowe 1954). Larval salamanders are aquatic with plume-like gills and well-developed tail fins (Behler and King 1980). Larvae hatched in the spring are large enough to metamorphose into terrestrial salamanders from late July to early September, but only an estimated 17 to 40 percent metamorphose annually. Remaining larvae mature into branchiates (aquatic and larval-like, but sexually mature salamanders that remain in the breeding pond) or overwinter as larvae (Collins and Jones 1987; James Collins, Arizona State University, pers. comm. 1993).

The Sonora tiger salamander is known from about 53 breeding localities, although not all are currently occupied (USFWS 2002c, Abbate 1998, Collins and Jones 1987, Collins 1996). During intensive surveys in 1997, from one to 150 Sonora tiger salamanders were found at 25 stock tanks (Abbate 1998). Populations and habitats are dynamic, so the number and location of extant aquatic populations changes over time, as exhibited by the differences between survey results in 1985 and 1993 to 1996 (Collins and Jones 1987; Collins 1996; James Collins, pers. comm. 1996). In 1999, Dr. James Collins's laboratory crew (Arizona State University), found Sonora tiger salamanders at 17 localities (Collins 1999). All sites where Sonora tiger salamanders have been found are located in Arizona in the Santa Cruz and San Pedro river drainages, including sites in the San Rafael Valley and adjacent portions of the Patagonia and Huachuca mountains in Santa Cruz and Cochise counties. All confirmed historical and extant aquatic populations are found in livestock tanks or impounded cienegas within 19 miles of Lochiel, Arizona. A population of salamanders at Los Fresnos, a natural cienega in the San Rafael Valley, Sonora, may be *A. t. stebbinsi* (Varela-Romero et al. 1990).

Historically, Sonora tiger salamanders probably inhabited springs, cienegas, and possibly backwater pools of the Santa Cruz River and streams in the San Rafael Valley where permanent or nearly permanent water allowed survival of mature branchiates. The grassland community of the San Rafael Valley and adjacent montane slopes, where all extant populations of Sonora tiger salamander occur, may represent a relict grassland and a refugium for grassland species. Tiger salamanders in this area became isolated and, over time, genetically distinct from ancestral *A. t. mavortium* and *A. t. nebulosum* (Jones et al. 1995). The Sonora tiger salamander apparently has opportunistically taken advantage of available livestock tank habitats as natural habitats disappeared (Hendrickson and Minckley 1984), or were invaded by nonnative predators with which the salamander can not coexist (USFWS 2002c).

Although most records for Sonora tiger salamanders occur at livestock tanks where breeding occurs, terrestrial metamorphic (metamorphs) forms may wander considerable distances from these aquatic habitats, and are occasionally encountered in upland habitats. A Sonora tiger salamander was captured in a pit fall trap at Oak Spring in Copper Canyon, Huachuca Mountains, by AGFD personnel. The nearest known breeding site was about 0.6 mile to the south, suggesting the salamander may have moved at least that far. Capture in a pit fall trap also confirms that the individual was surface active. In other subspecies of *Ambystoma tigrinum*, metamorphs may disperse hundreds of meters from the breeding pond, or may remain nearby (Petranka 1998, Gehlbach et al. 1969). Of hundreds of marked *Ambystoma tigrinum nebulosum* in northern Arizona, two were found to move from 0.9 to 1.2 miles to new ponds (J. Collins, pers. comm. 1998). On Fort Huachuca, Sheridan Stone (pers. comm. 1998) reported finding terrestrial tiger salamanders (probably *A. t. mavortium*), from 1.9 to 2.5 miles from the nearest known breeding pond. Referring to conservation of the California tiger salamander, *A. californiense*, Petranka (1998) found, based on studies of movements of other *Ambystoma* species, conservation of a 650 to 1,650 ft radius of natural vegetation around a breeding pond would protect the habitat of most of the adult terrestrial population. Adults of western subspecies of *A. tigrinum* typically live in or around mammal burrows (Petranka 1998), although metamorphs may construct their own burrows, as well (Gruberg and Stirling 1972, Semlitsch 1983). Some species of salamanders exhibit seasonal migrations of up to several miles each way from breeding sites to upland habitats (Stebbins and Cohen 1995). If such migrations occur in the Sonora tiger salamander, we have no information about migration corridors or non-breeding habitat. Because of the arid nature of the environments in the region where the subspecies occurs, if salamanders move very far from breeding ponds, they may use wet canyon bottoms as movement corridors.

Primary threats to the salamander include predation by nonnative fish and bullfrogs, diseases, catastrophic floods and drought, illegal collecting, introduction of other subspecies of salamanders that could genetically swamp *A. t. stebbinsi* populations, and stochastic extirpations or extinction characteristic of small populations. Predation by catfish, bass, mosquito fish, and sunfish can eliminate livestock tank populations of Sonora tiger salamander (Jonathan Snyder, Arizona State University, pers. comm. 1996; Collins et al. 1988). The salamanders can apparently coexist with bullfrogs, but bullfrogs prey on salamanders (J. Snyder, pers. comm. 1996) and, if they are present in sufficient densities, bullfrogs could reduce or eliminate salamander populations. Tadpoles of wood frogs (*Rana sylvatica*), are known to feed on spotted salamander (*Ambystoma maculatum*), eggs (Petranka et al. 1998), but under experimental conditions, bullfrog tadpoles do not feed on viable salamander eggs or hatchlings (Collins 1996, J. Collins, pers. comm. 1996). Recent genetic analysis confirmed that barred salamanders (*A. t. mavortium*) or hybrids between barred salamanders and Sonora tiger salamanders are present at seven livestock tanks in the southeastern portion of the San Rafael Valley (Ziemba et al. 1998). A salamander population in Garden Canyon, Fort Huachuca, near the crest of the Huachuca Mountains, may also contain hybrids (Storfer et al. 1999).

Tiger salamander populations in the western United States and Canada, including populations of the Sonora tiger salamander, exhibit frequent epizootics (Collins et al. 2001). Sonora tiger salamander populations experience frequent disease-related die-offs (about eight percent of populations are affected annually) in which almost all salamanders and larvae in the pond die. *Ambystoma tigrinum* virus (ATV) is the pathogen believed to be primarily responsible for these die-offs (Jancovich et al. 1998), as well as die-offs observed in other tiger salamander populations in the United States and Canada (Collins et al. 2000). It is also possible that some die-offs might occur as a result of low pH (M. Pruss, AGFD, pers. comm.). A copper smelter at Cananea, Sonora, less than 25 miles south of the border, may have released sulfur plumes resulting in acid precipitation (Blanchard and Stromberg 1987), but currently there is no evidence to connect salamander die-offs with the copper smelter, and the smelter has not been operated since 1999. ATV may be spread by bullfrogs, birds, livestock, or other animals that move among tanks (Jancovich et al. 1998). The disease could also be spread by researchers or anglers if equipment such as waders, nets, or fishing tackle used at a salamander tank are not allowed to dry or are not disinfected before use at another tank.

Sonora tiger salamanders also contract chytridiomycosis, a fungal disease associated with global declines of frogs and toads (see the discussion in the Chiricahua leopard frog section) (Speare and Berger 2000, Loncore et al. 1999, Berger et al. 1998), but when compared to anurans, infected salamanders exhibit only minimal symptoms (Davidson et al. 2000). The effect of the disease on salamander populations needs further study.

With the exception of Bog Hole in the San Rafael Valley and a site on Fort Huachuca, livestock grazing occurs throughout the range of the Sonora tiger salamander. Livestock can degrade habitat at livestock tank breeding sites and overgrazing can cause loss of cover and erosion that can threaten the integrity of stock tanks used by the salamander. The salamander has coexisted for about 250 years with grazing, and because of its current use of livestock tanks for breeding, is now dependent upon maintenance of livestock waters by ranchers (USFWS 2000c). In regard to livestock management on the Forest, the final recovery plan calls for: 1) protection of vegetation communities and watershed values in the San Rafael Valley, 2) implementation of your guidelines for stock tank management and maintenance, 3) regular cleaning and maintenance of stock tanks, 4) enhancement of bankline and aquatic vegetation cover at stock ponds, 5) minimize establishment of, and implement control of, nonnative aquatic predators in the San Rafael Valley.

For further information on the ecology, taxonomy, range, and threats to this subspecies, refer to Collins (1996, 1981), Collins and Jones (1987), Collins et al. (1988), Gehlbach (1967), Jancovich et al. (1998), Jones et al. (1995, 1988), Lowe (1954), and Snyder et al. (1998, 1996), and USFWS 2000c (and the final recovery plan, to be released soon).

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of site-specific information provided in your BA and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria do not address this species.

You determined that livestock grazing on 16 allotments is likely to adversely affect this species. The allotments are:

Huachuca EMA: A Draw, Bender, Blacktail, Campini, Duquesne, Farrell, Harshaw, Hayfield, HQ, Lochiel, Lone Mountain/Parker, Lyle Canyon, San Rafael, Santa Cruz, Sawtelle, and U-D.

Effects of grazing activities on the salamander have been the subject of several previous consultations and a conference, including: (1) our August 14, 1995, letter to you, concurring that construction of 4.5 km (2.8 mi) of electric fence on the San Rafael allotment is not likely to jeopardize the continued existence of the Sonora tiger salamander (conference, file number 2-21-95-I-383); (2) our September 18, 1995, letter to you, concurring that issuance of livestock grazing permits on the Duquesne and Campini allotments are not likely to jeopardize the continued existence of the salamander (conference, file number 2-2-95-I-412); (3) our June 17, 1997, letter to you concurring that sediment removal from two tanks on the Lone Mountain allotment may affect, but is unlikely to adversely affect, the salamander (file number 2-21-97-I-296); (4) our December 19, 1997, biological opinion on land and resource management plans, as amended, for eleven national forests and national grasslands in the southwestern region, and (5) our July 29, 1999, biological opinion (2-21-98-F-399), that the short-term and on-going livestock grazing on the Coronado National Forest was not likely to jeopardize the continued existence of the salamander.

EFFECTS OF THE ACTION

Salamanders breed in livestock tanks; these tanks require periodic maintenance to remain viable as both salamander breeding sites and as functional livestock waters. The survival of the salamander is currently intertwined with your grazing program, and depends on periodic maintenance of livestock waters. Although the salamander requires the tanks for breeding, the livestock program may adversely affect the salamander. These adverse effects include: (1) trampling or ingestion of metamorphs, aquatic branchiates and larvae, and eggs; (2) trampling and browsing of vegetation at and near tanks, resulting in reduced salamander escape cover, and reduced cover and forage for invertebrates that the salamander preys on; (3) adverse effects to salamanders due to increased turbidity and reduction of aquatic cover and egg deposition sites at tanks due to livestock wading into the water; (4) increased likelihood of disease transmission; (5) watershed degradation and resulting increased runoff and sedimentation, requiring more frequent maintenance of tanks; (6) construction of range projects that may result in direct mortality of terrestrial salamanders or that facilitates access to tanks with subsequent increased chance of introduction of nonnative predators, collection or translocation of salamanders, and disease transmission; and (7) maintenance of livestock tanks, which, while these tanks are needed to remain as viable breeding habitats, can result in injury or mortality of salamanders.

1) Trampling or ingestion of metamorphs, aquatic branchiates and larvae, and eggs: This effect is reasonably certain to occur, especially in stock tanks with heavy livestock use and in situations where tanks are beginning to shrink and water is concentrated in smaller and shallower areas; livestock will have to enter the tank to access the water. While drinking, cattle are likely to ingest eggs or very small larval-life stage salamanders, which are not able to move rapidly. Small larvae and eggs are often deposited on aquatic vegetation, branches, or on the pond substrate, and it is reasonably certain that livestock will trample this vegetation and ingest these life stages. Brachiate and metamorphosed salamanders hide in emergent vegetation or in the shallows of stock tanks; they can be trampled as livestock wade into tanks to drink and graze around the edges of the tanks at any green vegetation that occurs. Larger larvae and adult salamanders are more mobile and most would escape trampling, but we anticipate that some adult salamanders will be trampled during the 10-year life of the action. Bartelt (1998) observed hundreds of boreal toads (*Bufo boreas*) trampled by sheep at a livestock tank in Colorado. Juvenile toads were especially vulnerable to trampling.

2) Trampling and browsing of vegetation at and near tanks, resulting in reduced salamander escape cover, and reduced cover and forage for invertebrates that the salamander preys upon: Many tanks where the salamander currently exists are devoid of bankline vegetation, and the land beside the tank is often denuded for several to many meters away from the water due to trampling and browsing by livestock. This demonstrates that salamanders can exist under these conditions, but populations could be more robust and resistant to threats if bankline cover were enhanced. This cover provides protection from predation for terrestrial salamanders and harbors insects and other invertebrates that the salamanders prey upon. Although shoreline cover may also harbor small predators that could feed on salamanders, the benefits of vegetative cover outweigh the chances of predation, which is a natural occurrence for the species under typical circumstances. The recovery plan calls for enhancing bankline cover at stock tanks.

3) Adverse effects to salamanders due to increased turbidity and reduction of aquatic cover and egg deposition sites at tanks due to cattle wading into the water: Tanks where salamanders breed are almost always very turbid. Cattle wading into the tanks, combined with erosion and runoff from denuded and trampled soils immediately next to the tanks, contribute strongly to these high turbidity levels. Lefcourt et al. (1997) examined the effects of silt on growth and metamorphosis of larval mole salamanders (*Ambystoma opaceum* and *A. tigrinum tigrinum*). Salamanders in silty water grew more slowly, metamorphosed sooner, and were more susceptible to infection by water mold (*Saprolegnia parasitica*) than salamanders in non-silty water.

4) Increased likelihood of disease transmission: About eight percent of aquatic populations experience die-offs each year; when this happens, most or all salamanders and larvae in the pond die (Snyder, pers. comm., 1999). *Ambystoma tigrinum* virus is thought to be primarily responsible (Jancovich et al. 1998). Cattle, humans, birds, invertebrates, or amphibians moving among tanks and carrying mud on them, infect "clean populations with the virus (Jancovich et al. 1998). Disease transmission via cattle is most likely among adjacent tanks within a pasture where cattle easily move between tanks. People, especially those who frequent tanks for livestock management activities, can carry the disease among tanks via muddy boots, gear, vehicles, or other equipment. While this disease can result in large mortality events, the effect on the survival of populations or the subspecies is less clear because when these populations die off, the tanks are typically recolonized by breeding terrestrial metamorphs or surviving aquatic metamorphs (Jancovich et al. 1998). In the longer term, these events of loss and recolonization will decrease the vigor and likelihood of population persistence, resulting in reduced genetic variation and subsequent reduced fitness for the species.

5) Watershed degradation and resulting increased runoff and sedimentation, requiring more frequent maintenance of tanks: Some allotments exhibit degraded range and soil conditions. Of particular concern is the San Rafael allotment (your July 30, 2002, BA). This allotment shows a downward range condition trend, all the allotment is in moderately low or low condition, and 85 percent of the soils are either impaired or unsatisfactory. Other allotments involving the Sonora tiger salamander show mixed combinations of range conditions, allotment conditions, and soils conditions.

Information upon which range and soil conditions is based is often qualitative and may have limited site-specific applicability (USFWS 1999a), but the relatively high percentages of rangelands in moderately low condition and impaired or unsatisfactory soil conditions on the allotments suggest degraded to very degraded conditions over much of the area inhabited by the Sonora tiger salamander (USFS 2002). Degraded vegetation and soil conditions may be caused by current grazing practices or may be an artifact of past grazing practices. Range vegetation and soil conditions may also be degraded by fire and subsequent erosion; changes in fire regimes; existence of roads, on and off-road vehicle travel, urban, and other surface-disturbing activities; grazing by wildlife species; drought; floods; climate change; introduced nonnative plants such as Lehman lovegrass; or combinations of factors (Humphrey 1958, Hastings and Turner 1965, Martin 1975, Brown and McDonald 1995, Wang et al. 1997). Periodic fire can dramatically change vegetation and soil conditions, recreation uses and Lehman lovegrass invasions have caused localized degraded range condition in parts of the San Rafael Valley, and climate change may be contributing to or exacerbating changes in vegetation communities and corresponding alteration of soil and range condition. Livestock grazing is the primary human activity in the San Rafael Valley, and it likely contributes to and may be the primary cause of current soil and range conditions within the range of the salamander (Hendrickson and Minckley 1984).

The most important immediate effects of degraded rangeland and soil condition on the Sonora tiger salamander include watershed degradation and subsequent effects on downstream stock tanks. Disturbance of soils (and existing cryptobiotic crusts) and removal of vegetation in the watershed by grazing combine to increase surface runoff and sediment transport, and decreased infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989a,b, Belnap 1992, Belsky and Blumenthal 1997). Effects are cumulative and interactive. Loss of vegetation cover and trampling of soils promote deterioration of soil structure, which in turn accelerates vegetation loss (Belsky and Blumenthal 1997). These changes in the watershed tend to increase peak flows and reduce low flows (DeBano and Schmidt 1989a,b), making stream courses more “flashy. Stock tank water levels depend on periodic runoff from the watershed. Mechanisms that increase runoff (such as watershed degradation) result in increased flows and more water in stock tanks, but increasing flows over conditions in which stock tanks have existed for decades may also lead to relatively high flows over the berms or spillways of such tanks, erosion, and breaching of tank dams. Sediment carried off degraded watersheds can result in increased turbidity and adverse effects to salamanders and can fill stock tanks and result in a loss of breeding habitat. Headcuts caused by grazing and watershed degradation can reduce the integrity of stock tanks. Headcuts threaten formerly-occupied salamander sites at the lower Peterson Ranch tank in Scotia Canyon, and at Grennan Tank on the west side of the San Rafael Valley. Headcuts threaten wetlands inhabited by salamanders (not confirmed as *stebbinsi*) at Los Fresnos, Sonora.

Over time, degraded vegetation and soil conditions inhibit and can prevent the restoration of cienega conditions and the natural pools and ponds in which the Sonora tiger salamander must have existed before extensive cattle grazing and development of stock tanks. Cienegas largely disappeared from the San Rafael Valley in the period from the 1860s to the mid-1890s (Hendrickson and Minckley

1984, Hadley and Sheridan 1995). Watershed degradation caused by overgrazing, particularly during the mid-1890s, followed by heavy precipitation, contributed to erosion and loss of wetlands at that time (Hendrickson and Minckley 1984). Extensive mining, timber harvest, and a large crown fire during this period (Hadley and Sheridan 1995, Danzer et al. 1997, General Wildlife Services 1999) caused severe watershed problems and loss of wetlands in and near the Huachuca Mountains. Construction of stock tanks probably also caused the loss or transformation of some cienegas because some tanks are actually impounded cienegas.

Increased maintenance of stock tanks can compensate for these negative. (Note: We do not advocate breaching the upper Peterson tank; this action could be contrary to reestablishing cienega conditions and eliminating nonnative organisms). Cienegas lost in the San Rafael Valley are not likely to return under conditions of continued degraded vegetation and soil conditions; however, efforts to successfully restore some cienega habitats, in addition to maintenance of current stock tank habitats, would enhance the viability of the salamander.

6) Construction of range projects and other operations that may result in direct mortality of terrestrial salamanders, or that facilitate access to tanks with subsequent increased chance of introduction of nonnative predators, collection or translocation of salamanders, and disease transmission: Construction of pipelines, fences, corrals, and other surface-disturbing construction activities can result in mortality or injury of salamanders. Terrestrial salamanders can be crushed by vehicles or equipment, trampled upon, or trapped in burrows if construction activities close burrow entrances. Mortality or injury of terrestrial salamanders hidden in debris, under logs, or in burrows is reasonably certain to occur.

Direct effects to terrestrial salamanders from construction projects or routine operations are likely to occur close to breeding sites where most terrestrial salamanders are encountered. Referring to conservation of the California tiger salamander (*A. californiense)*, Petranka (1998) found that, based on studies of movements of other *Ambystoma* species, conservation of a 200 to 500 m (650 to 1,650 ft) radius of natural vegetation around a breeding pond would protect the habitat of most of the adult terrestrial population.

Road construction, improvement, or maintenance may also facilitate public access to tanks where salamanders breed. If public access becomes easier, the likelihood of illegal collection of salamanders and stocking of nonnative salamanders, fish, bullfrogs, or crayfish increases. Recreationists have been observed driving their vehicles and motorcycles through tanks, which was a problem at a salamander breeding site on Fort Huachuca before rock barriers were installed. Salamanders can be killed or injured directly by such activity or adversely affected through increased siltation. People who use the areas for recreational uses (including, but not limited to, anglers, hikers, hunters, accompanying dogs, birders, off-road riders, and all vehicles), could also transmit disease if they pick up mud at an infected tank and then traveled to another occupied site. Movement of bait fish or salamanders among sites also spreads disease. Construction of a new tank that is located between salamander populations and populations of nonnative predators, particularly bullfrogs and crayfish, reduces the distance these nonnative predators have to travel to find another (wet) site, and this will result in an increase in invasion and subsequent reductions or extirpation of salamanders at breeding locales.

Water is sometimes moved by ranchers and their workers between tanks or troughs, especially during drought. If the water source contains fish, bullfrog tadpoles, or crayfish, nonnative predators will be unintentionally translocated and introduced to salamander breeding locales.

7) Maintenance of stock tanks: Livestock tank maintenance can offset some of the negative effects of degraded watersheds. Stock tank maintenance is needed to maintain the breeding habitats of the salamander, but maintenance activities can also result in direct or indirect effects to salamanders. If salamanders are present during maintenance, equipment can crush animals or they may dessicate if isolated in drying pools. Maintenance can eliminate bank and aquatic cover and egg deposition sites. Turbidity can be increased during operations (if water is present) or afterwards (if berms and banklines have no cover). Livestock tank maintenance is typically conducted when tanks are dry or nearly so. As tanks dry, many larval salamanders over two months of age and some branchiate salamanders metamorphose, then move temporarily into upland habitats. Salamander populations can be very small to nonexistent at the time livestock tank maintenance is conducted.

You have adopted the "Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander, which is a recommended action in the recovery plan for the species. This plan minimizes to the extent practicable, take of salamanders during stock tank maintenance and management, by reducing levels and forms of disturbance at and near tanks, limiting tank maintenance to the non-breeding season, capturing and temporarily holding off-site salamanders prior to cleaning out a tank, and other related measures.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Livestock grazing and associated activities, private land development and water use, and the presence and/or introduction of exotic fish and amphibians in the project area watersheds may have a bearing on the species or its habitat.

Federal agencies manage much of the land in the project area, particularly you, Fort Huachuca, and Coronado National Memorial. Few salamander localities are known to occur on lands outside the allotments under consultation, but some of these support occupied salamander breeding locations. Activities on private lands within the action area may or may not require Federal permits or funding; those that do not may pose cumulative effects to the species. These private lands are used primarily for grazing, but the potential exists for them to be bought and developed as housing or used for other purposes. Compliance with the Act for activities on private lands that may affect the Sonora tiger salamander, but are not addressed by section 7 consultation, could occur through section 10(a)(1)(B) of the Act.

CONCLUSION

After reviewing the current status of the Sonora tiger salamander, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonora tiger salamander. Critical habitat is not designated for this species; thus, none will be affected. We based our conclusion on the following:

1. The Sonora tiger salamander has coexisted with livestock grazing in the San Rafael Valley for over a century and a half, and while some effects of grazing are adverse to the species, the creation

and maintenance of livestock waters has allowed persistence of the species in the apparent absence of suitable natural habitats.

2. Although range and soil conditions are degraded in most of the allotments where the salamander occurs, these degraded conditions likely minimally affect salamander populations as a whole, and can be partially compensated for by careful methods of stock tank maintenance.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by you so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

The proposed action occurs over the majority of the species' range, and the majority of the known extant populations of the salamander occur on the allotments. Given the many opportunities for take to occur, both temporally (10-year project life) and spatially, we believe take is reasonably certain to occur, as described below and in the Effects of the Action section. Although we believe take will occur, the precise levels of anticipated take are not easily derived.

Levels of take at any one livestock tank are expected to be correlated with abundance of the salamander (the more salamanders, the greater the opportunity for a salamander to be taken). Abundance of salamanders at individual tanks is expected to vary seasonally and annually, but also will vary with drought cycles, disease outbreaks, and condition of the habitat. The levels provided below represent our best assessment based on the best scientific and commercial data available to us. As we develop more information about how grazing affects salamanders and as we continue to inventory salamanders on the allotments, these anticipated levels of take may be revisited. We include some discussion below for why we anticipate take of certain forms and levels. Refer to the Effects of the Proposed Action section for further supporting information.

We anticipate take to occur on the following allotments (that contain extant populations of salamanders): A Draw, Blacktail, Campini, Duquesne, Hayfield, HQ, Lochiel, Lone

Mountain/Parker, Lyle Canyon, San Rafael, Santa Cruz, Sawtelle, and U-D allotments (Huachuca EMA). We also expect the Farrell allotment (Huachuca EMA) to be occupied sometime wihtin the 10-year life of this plan due to its closeness to occupied salamander sites (T. Deecken, USFS, pers. comm., 2002), and the mobility demonstrated by the salamander makes this reasonably certain to occur.

We anticipate take per the following, for the life of the plan:

1. Capture of all salamanders in any occupied stock tank maintained by dredging, other forms of silt removal, or other maintenance actions that drain the tank. In accordance with the "Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander (part of your proposed action), harassment will be by the actions of capture, holding of, and re-release of salamanders back into the tank.

2. Direct mortality or injury of up to five salamanders due to construction and maintenance of range projects. Construction and maintenance activities, particularly at occupied stock tanks, are anticipated to result in terrestrial salamanders being crushed by vehicles or equipment, or trapped in burrows if construction activities closed burrow entrances. Mortality of salamanders is also anticipated during routine inspections and maintenance as permittees or workers drive roads through salamander habitat and may run over salamanders crossing a road. We anticipate incidental take of this form will occur infrequently, and be primarily due to work conducted around occupied stock tanks, but it will be minimized by the implementation of your use of the Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander; thus we believe incidental take of five salamanders over the 10-year life of the plan is reasonably certain to occur.

3. Harm through mortality of up to all salamanders at one tank because of disease transmission or introduction of nonnative organisms by livestock or personnel associated with the livestock grazing program. Iridovirus can be spread among tanks via water, muddy hooves, or equipment, causing mortality of aquatic life stages of salamanders. Maintenance of roads may improve access for the public, leading to introduction of nonnative predators or iridovirus.

4. Harm of salamanders through reduced survival or productivity as a result of removal of shoreline or aquatic cover and egg deposition sites, and increased turbidity at five stock tanks. Our anticipation of take at five tanks due to loss of cover and turbidity for the 10-year life of the plan is a reasonable estimate; based on our experience, although many tanks with salamanders occur on the allotments, relatively few have vegetation bankline cover that will be affected, and salamanders apparently coexist with this disturbance of their habitat.

5. Direct mortality or injury of up to 10 salamanders and 100 eggs annually at each tank grazed by livestock as a result of cattle wading into stock tanks and trampling or ingesting animals. We believe these to be reasonable estimates of the levels of take anticipated; each female salamander deposits between about 200 to 2,000 eggs annually (USFWS 2000c), which are susceptible to trampling or ingestion, but egg deposition occurs in the late winter to early spring, when cattle do not use tanks as intensively, and are less likely to wade into tanks and trample eggs; thus, we anticipate only some of the total number of egg masses will be taken. The smallest larval salamanders are the most likely to be trampled (or ingested).

This biological opinion does not exempt any form of take not incidental to implementation of the reinitiation of the livestock grazing program on the Forest. If the incidental take authorized by this opinion is exceeded, you must immediately reinitiate consultation with us to avoid a violation of section 9 of the Act. In the interim, you must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species, and provide to this office an explanation of the cause of the taking.

Direct take not incidental to the proposed action would include intentional killing or poaching of Sonora tiger salamander. Such take is not covered under this BO.

EFFECT OF THE TAKE

In this biological opinion, we find the anticipated level of take is not likely to result in jeopardy to the species. Tank populations extirpated by disease or drought are typically recolonized by terrestrial salamanders (Ziemba 1998). The salamander has coexisted with livestock grazing and occasional associated take in the San Rafael Valley for over a century and a half. The likelihood of aquatic populations being eliminated or individual salamanders being taken is reduced by your adoption of the Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

The following reasonable and prudent measures are necessary and appropriate to minimize take of Sonora tiger salamander. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with their accompanying terms and conditions in regard to the proposed action. These terms and conditions are nondiscretionary and implement the reasonable and prudent measures as described. These measures and terms and conditions apply to the following allotments known to be occupied by the species: A Draw, Blacktail, Campini, Duquesne, Farrell, Hayfield, HQ, Lochiel, Lone Mountain/Parker, Lyle Canyon, San Rafael, Santa Cruz, Sawtelle, and U-D allotments (Huachcua EMA).

1. Distribute written information to permittees and all other personnel who work on the allotments on the need to carry out these terms and conditions to minimize harm of salamanders resulting from disease transmission and of introduction of nonnative organisms.

The following term and condition implements reasonable and prudent measure number 1:

> A letter to the permittees shall contain the following information, and be delivered to them within 45 days of the date of this BO or included in their Annual Operating Plan, whichever comes sooner:
>
> a. The plan/letter shall contain a copy of these terms and conditions.
>
> b. The letter shall state that take of the Sonora tiger salamander is prohibited by the Endangered Species Act, but any take that occurs as a result of the grazing program is exempt from the section 9 prohibitions if grazing is carried out in a manner consistent with these terms and conditions.
>
> c. The letter shall state that the permittees are required to implement these terms and conditions on Forest lands within their allotments.
>
> d. The letter shall state, per State law, no person is to capture, transport, or transfer any aquatic wildlife or parts thereof, from one aquatic location to another, without being in possession of appropriate permits and/or licenses from the necessary agencies, State and Federal, and/or others. Aquatic wildlife includes all fish, amphibians (salamanders and frogs), mollusks, crustaceans, and soft-shelled turtles.

2. Clearly delineate and define construction areas and provide clearly defined, written operational procedures to minimize direct mortality or injury of salamanders from construction and operation of range projects and other routine activities.

The following terms and conditions implement reasonable and prudent measure number 2:

a. Within 500 m (1,650 ft; see Petranka 1998, and Environmental Baseline for the basis for selecting this distance) of occupied tanks, the following terms and conditions shall be carried out during surface-disturbing activities (such as construction of range projects):

i. Project features shall be located in areas of prior disturbance wherever possible.

ii. Project vehicle use shall be limited to existing routes wherever possible.

iii. Blading of work areas shall be minimized to the extent possible. Disturbance to shrubs shall be avoided whenever possible. If shrubs cannot be avoided during equipment operation or vehicle use, they shall be crushed rather than excavated or bladed, wherever possible.

b. If a salamander is found in any project construction area, regardless of the distance to a tank, as best as can be conducted, construction activities shall be modified to avoid injuring or harming it.

c. As a means to limit public access and the likelihood of nonnative or chytrid introduction, or collection of salamanders, no new roads shall be constructed that lead to stock tanks or pass within 90 m (300 ft) of stock tanks.

d. As another measure to limit public access and the likelihood of nonnative or chytrid introduction, or collection of salamanders, if existing roads that lead to stock tanks or within 90 m (300 ft) of stock tanks on Forest lands in the allotments under consultation are graded, improved, or otherwise maintained, the tank shall be clearly posted "No Off-Road Vehicles. If the Arizona Game and Fish Commission (AGFC) concurs, the tanks shall also be posted "No Fishing or Release of Any Aquatic Organisms. Signs shall be inspected, maintained, and replaced by you as needed and in a timely manner.

e. You shall use your authorities and funding sources, and seek additional funding and personnel aid, as needed, to post as many tanks as possible, each year, until all tanks in allotments (on Forest land) are posted with signs that read "No Off-Road Vehicles. If AGFC concurs, the tanks shall also be posted "No Fishing or Release of Any Aquatic Organisms. Tanks most easily accessible to the public shall be the highest priority for signing, until all allotment tanks (on Forest lands) are posted.

f. Construction of any new stock tanks shall be coordinated with us to ensure the project would not facilitate invasion of nonnative species or disease transmission. If we concur in writing that the new tank would not increase the risk of disease spread or invasion of nonnative predators or other subspecies of salamanders, no further consultation is necessary. If concurrence is not obtained, you shall, following 50 CFR 402.14(a), evaluate potential effects of the action and reinitiate consultation, if appropriate, and in a timely manner.

g. Existing stock tanks occupied by the salamander shall be maintained as needed to ensure their continued value as habitat for the salamander. Maintenance of tanks in the allotments that contain nonnative organisms (fish, bullfrogs, crayfish, or other subspecies of salamander) shall be coordinated with AGFD and us and carried out to eliminate nonnatives whenever possible.

h. Reduce the possibility of disease transmission by cleaning and treating any and all equipment (shovels, nets, buckets, fence posts, boots, etc.), used at an aquatic site with a 10 percent bleach solution, or allowing all equipment to dry thoroughly, before using the same equipment at another aquatic site on the allotments.

3. Implement measures aimed at reducing cattle wading into tanks, trampling aquatic salamanders and eggs, ingesting small salamander larvae and eggs, spreading disease, and destroying shoreline and aquatic cover.

The following terms and conditions implement reasonable and prudent measure number 3:

a. You shall use your authorities and funding sources, and seek additional funding and personnel aid, as needed, to fence as many occupied tanks or portions of tanks, to reduce potential mortality and injury to salamanders due to cattle wading into tanks or spreading disease to populations. If tanks are fenced completely, cattle could be watered by providing water lines from the tanks to troughs or drinkers; double tanks (one tank is fenced; the other is not) could also be used; tanks could also be partially fenced. Continue to work with AGFD and us to create other options.

b. You shall use your authorities and funding sources, and seek additional funding and personnel aid, to begin enhancement of aquatic cover and egg deposition sites in tanks grazed by cattle. Enhancement could take the form of placing logs, branches, or dead trees and shrubs into the tanks. We refer you to recovery actions 1.5 and 1.6, and the Participation Plan in the Sonora tiger salamander Recovery Plan for recommendations on how to enhance habitat at stock tanks. Continue to work with AGFD and us and document each year's accomplishments in your annual report.

4. Continue to monitor incidental take resulting from the proposed action and report to us the findings of that monitoring.

The following terms and conditions implement reasonable and prudent measure number 4:

a. You shall monitor take of Sonora tiger salamanders, including capture and holding or salamanders pursuant to the Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander, and other take noted that may be attributable to the livestock program, and document any disturbance of salamanders or salamander habitat. Take note of time requirements in the Disposition of Dead or Injured Listed Species section of this BO. A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

b. Results of this monitoring shall be reported in the annual report described in the general terms and conditions of this biological opinion. Other monitoring and reporting requirements for the Sonora tiger salamander are described in the general terms and conditions.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Fund and/or help fund studies of vectors of disease transmission, salamander metapopulation dynamics, distribution of the *mavortium* genome in the San Rafael Valley, the movements and habitat use of terrestrial salamanders, and other topics that may improve our understanding of the conservation and recovery needs of the Sonora tiger salamander.

2. Actively participate in the implementation of the Sonora tiger salamander recovery plan.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the Arizona Game and Fish Department).

<u>BIRDS</u>

Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (CFPO)

STATUS OF THE SPECIES

We listed the Arizona population of the cactus ferruginous pygmy-owl (CFPO) as a distinct population segment (DPS) on March 10, 1997, in Federal Register Notice 62 FR 10730. Past and present destruction, modification, or curtailment of habitat is the primary threat to the CFPO. We are working on the proposal for redesignation of critical habitat.

The CFPO is one of four subspecies of ferruginous pygmy-owl. CFPOs are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico.

CFPOs are small birds, averaging 6.75 inches in length, colored reddish-brown overall, with a cream-colored belly streaked with reddish-brown. The CFPO is crepuscular/diurnal, with a peak activity period for foraging and other activities at dawn and dusk. During the breeding season, they can often be heard calling throughout the day, but most activity is reported between one hour before sunrise to two hours after sunrise, and late afternoon/early evening from two hours before sunset to one hour after sunset (Collins and Corman 1995).

A variety of vegetation communities are used by CFPOs such as riparian woodlands, mesquite (*Prosopis* spp.) "bosques (Spanish for woodlands), Sonoran desertscrub, and semidesert grassland communities. While plant species composition differs among these communities, there are certain unifying characteristics such as the presence of vegetation in a fairly dense thicket or woodland, the presence of trees or saguaros large enough to support cavity nesting, and elevations below 4,000 feet. Historically, CFPOs were documented in association with riparian woodlands in central and southern Arizona. Plants present in these riparian communities include cottonwood, willow (*Salix* spp.) and hackberry (*Celtis* spp.). These large trees provide cavities suitable for CFPO nesting, while the density of mid- and lower-story vegetation provides necessary protection from predators and an abundance of prey items for the CFPO. Mesquite bosque communities are dominated by mesquite trees, and are described as mesquite forests due to the density and size of the trees.

Over the past several decades, CFPOs have been primarily found in the Arizona Upland Subdivision of the Sonoran desert, particularly Sonoran desertscrub (Brown 1994). This community in southern Arizona consists of paloverde, ironwood, mesquite, acacia, bursage (*Ambrosia spp.*), and columnar cacti (Phillips et al. 1964, Monson and Phillips 1981, Davis and Russell 1984, Johnson and Haight 1985a & b, Johnsgard 1988). Over the past several years, CFPOs have also been found in riparian and xeroriparian habitats and semidesert grasslands as classified by Brown (1994). Desertscrub communities are characterized by the presence of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites (*Prosopis velutina*) in uplands and linear woodlands of various tree species along bottoms and washes.

The density of trees and the amount of canopy cover preferred by CFPOs in Arizona is unclear; however, preliminary results from a habitat selection study indicate that nest sites tend to have a higher degree of canopy cover than random sites (Wilcox et al. 2000). For areas outside Arizona, CFPOs are most commonly characterized by semi-open or open woodlands, often in proximity to forests or patches of forests. Where they are found in forested areas, they are typically observed along edges or in openings, rather than deep in the forest itself (Binford 1989, Sick 1993), although this may be a bias of increased visibility. Overall, vegetation density may not be as important as patches of dense vegetation with a developed canopy layer interspersed with open areas. The physical settings and vegetation composition varies across *G. brasilianum's* range and, while vegetation structure may be more important than composition (Wilcox et al. 1999, Cartron et al. 2000a), higher vegetation diversity is found more often at nest sites than at random sites (Wilcox et al. 2000).

CFPOs typically hunt from perches in trees with dense foliage using a perch-and-wait strategy; therefore, sufficient cover must be present within their home range for them to successfully hunt and survive. Their diverse diet includes birds, lizards, insects, small mammals (Bendire 1888, Sutton 1951, Sprunt 1955, Earhart and Johnson 1970, Oberholser 1974), and frogs (Proudfoot et al. 1994a). The density of annuals and grasses, as well as shrubs, may be important to the CFPO's prey base. Shrubs and large trees also provide protection against aerial predation for juvenile and adult CFPOs and cover from which they may capture prey (Wilcox et al. 2000).

CFPOs are considered non-migratory throughout their range by most authors, and have been reported during the winter months in several locations, including Organ Pipe Cactus National Monument (OPCNM) (R. Johnson unpubl. data; T. Tibbitts, OPCNM, unpubl. data). CFPOs begin courtship and nesting activities in late winter to early spring. In Arizona, differences in nesting chronology among nest sites may vary by as much as two months (Abbate et al. 1996, Scott Richardson, AGFD unpubl. data). As with other avian species, this may be the result of a second brood or a second nesting attempt following an initial failure (Abbate et al. 1996).

In Texas, juveniles remained within about 165 feet of the adult birds until dispersal. Dispersal distances (straight line) of 20 juveniles monitored from their natal sites to nest sites the following year averaged five miles (which ranged from 0.75 to 19 mi [G. Proudfoot unpubl. data]). Telemetry studies of dispersing juveniles in Arizona during 1999 and 2000, ranged from 1.4 to 12.9 mi (straight line distance) (n=6, mean 6.2 mi) in 1999, and 1.6 to 11.7 mi (n=6, mean 5.8 mi) in 2000 (S. Richardson, AGFD, unpubl. data). CFPO telemetry studies have documented movement of owls between southern Pinal County and northwestern Tucson (S. Richardson and M. Ingraldi, AGFD unpubl. data). Typically, juveniles dispersed from natal areas in July, but did not appear to defend a territory until September. They may move up to one mile in a night; however, they typically fly short distances from tree to tree instead of long single flights (S. Richardson, AGFD unpubl. data). Subsequent surveys during the spring have found that locations of male CFPOs are in the same general location as last observed the preceding fall.

In Texas, Proudfoot (1996) noted, that while CFPOs used between three and 57 acres during the nesting period, they defend areas up to 279 acres in the winter. Based on this information, a conservative estimate of 280 acres for a home range is considered necessary for CFPOs. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 to 2,000 ft. Initial results from on-going studies in Texas indicate that the home range of CFPOs may also expand substantially during dry years (G. Proudfoot unpubl. data).

Genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

We are funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the CFPO there. Preliminary results indicate that CFPOs are present in northern and central Sonora (USFWS unpubl. data). Further studies are needed to determine their distribution in Mexico.

The range of the Arizona Distinct Population Segment (DPS) of the CFPO extends from the International Border with Mexico northward to central Arizona. The northernmost historical record for the CFPO is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the CFPO to be “quite common in thickets of intermixed mesquite and saguaro cactus. According to early surveys referenced in the literature, the CFPO, prior to the mid-1900s, was “not uncommon , “of common occurrence , and a “fairly numerous resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). CFPOs were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (S. Richardson, AGFD unpubl. data, Hunter 1988). Records from the eastern portion of the CFPO's range include a 1876 record from Camp Goodwin (near present day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also located on the Gila River. CFPOs have been found as far west as the Cabeza Prieta Tanks, Yuma County, Arizona, in 1955 (Monson 1998).

On the Forest, in 1989, a CFPO was documented near/in the Aqua Verde/Rincon allotment (Santa Catalina EMA). In 1999, a telemetered CFPO was located on the Jarillas allotment (Tumacacori EMA) by AGFD personnel. This individual was a dispersing juvenile bird and was last located in woodland habitat prior to the transmitter expiring.

In 1999, CFPO surveys were conducted on the Forest and included seven areas in the Samaniego allotment (Santa Catalina EMA) that contained all the habitat you believed with potential to support CFPO; CFPO were not located during these surveys. Neither were they located when you surveyed Canada del Oro, Cumero, Finley Springs, Happy Valley, Redington Pass, Last Chance, Fresnal, Cross S, Jarillas, and Proctor allotments.

You have conducted habitat assessments on Forest lands that contain potential CFPO habitat. Those assessments were conducted to help you prioritize your survey efforts for the species. Several areas on the Forest received scores of 26 or higher, indicating a higher priority for survey efforts, especially in Forest lands northwest of Tucson. Those allotments were surveyed, under contract, and the final report was received by you September 30, 2002, and a copy given to us October 1, 2002. CFPO were not located during these surveys.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for CFPO state:

No Effect (must meet one of the criteria):

1. No livestock grazing in pygmy-owl habitat will occur within the allotment.

2. No suitable pygmy-owl habitat is present within the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Livestock grazing will be at levels that maintain understory vegetation and provide for regeneration of any strata of desert scrub, xeroriparian, and riparian vegetation, and is limited to 30 percent forage utilization of all palatable species in desert scrub and xeroriparian areas.

2. Livestock gathering activities will not occur within 400 m (0.25 mi) of an occupied pygmy-owl site or unsurveyed suitable habitat between February 1 and July 31.

You determined that livestock grazing on 16 allotments may adversely affect this species. The allotments are:

Tumacacori EMA: Calabasas, Carrizo, Cross S, Fresnal, Jarillas, Marstellar, Murphy, Oro Blanco, Pena Blanca, Ramanote, Rock Corral, Sardina, and Sopori.

Santa Catalina EMA: Bellota, Redington Pass, and Samaniego.

On the Forest, in 1989, a CFPO was documented near/in the Aqua Verde/Rincon allotment (Santa Catalina EMA). In 1999, a telemetered CFPO was located on the Jarillas allotment (Tumacacori EMA) by AGFD personnel. This individual was a dispersing juvenile bird and was last located in woodland habitat prior to the transmitter expiring.

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The Forest boundary in the Santa Catalina EMA abuts the growing city of Tucson, and the desert lands in the northwestern portion of Tucson support one of the largest known CFPO populations remaining in southern Arizona. The Forest boundary in the Tumacacori EMA is adjacent to CFPO habitat in the Altar Valley and is close to the International Boundary the U.S. shares with Mexico. In both EMAs, suitable and potential CFPO habitat exists off-Forest and this habitat also lies adjacent or close to Forest boundaries. While a small amount of CFPO habitat occurs within Forest allotments, it also lies close enough to other suitable habitat that it could be used by CFPO.

EFFECTS OF THE ACTION

Livestock grazing and management actions can affect CFPO by altering vegetation types in ecosystem communities, trampling vegetation, compacting soils, and reducing vegetation cover, including grasses, that CFPO and their prey species require for their life cycles.

In riparian areas, livestock grazing can reduce species diversity and abundance, increase soil erosion, erode streambanks, reduce streamside cover, and reduce density of trees, shrubs, bushes, and grasses.

Range conditions are moderately low in 45 percent of the Bellota, low in 20 percent of the Samaniego, and moderately low in 15 percent of the Redington Pass allotments. This suggests that these allotments have been already adversely affected to some degree by past or current livestock grazing, although other factors such as long-term drought and proliferation of nonnative plants may have played a role in range condition. Nonnative perennial plants are less of a factor in Sonoran desertscrub than in desert grasslands, and Sonoran desert shrubs, trees, and cacti are adapted to surviving short-term drought.

The proposed grazing for these allotments is a maximum utilization level of 45 percent, above the 30 percent for CFPO habitat as recommended in the guidance criteria. Livestock gathering activities also occur in areas of unsurveyed habitat. We remain concerned about the potential adverse effects to CFPOs in these allotments which are all degraded to various degrees, particularly since they contain unsurveyed potential habitat near one of the highest known concentrations of CFPOs in Arizona (the northwestern Tucson area).

Livestock grazing can reduce the structure and composition of vegetation communities below a site's potential, and reduce the suitability of the site as pygmy-owl habitat. Although grazing in semidesert grassland and Chihuahuan Desert scrub can cause a decrease in grasses and an increase in shrubby species (Bahre 1995, Holecheck et al. 1994), this effect has not been documented in Sonoran Desert scrub. Grazing can result in reduced shrub cover (Webb and Stielstra 1979) and reduced “desirable shrubs (Orodho et al. 1990) in Mojave Desert scrub and Great Basin Desert scrub, respectively. Browsing of shrubs and young trees, trampling or browsing of saguaros and their nurse plants (Abouhalder 1992), and adverse effects to soils and cryptobiotic crusts can alter the structure and composition of Sonoran Desert scrub. Reduction in shrub, tree, and columnar cacti cover and regeneration would degrade pygmy-owl habitat.

Potential Effects of Livestock Grazing on Saguaros

Effects to saguaros and their nurse plants resulting from grazing have been studied by several authors in Sonoran Desert scrub in Arizona. Saguaros may be affected both directly and indirectly by grazing activities. Direct impacts may occur from trampling of young saguaros, grazing of nurse plants which results in reduction or removal of protective cover, or grazing of the young saguaros themselves (Abouhalder 1989). Abouhalder (1989) noted statistical differences in the age structure of saguaros between grazed and ungrazed areas of Saguaro National Monument, which he attributed to the Monument's grazing history. Nurse plants, which shade sensitive saguaro seedlings (Shreve 1931), may be reduced by grazing, and germination sites may be adversely altered due to soil compaction, erosion, and reduced infiltration. Benson (1982) noted that seedbeds of saguaros have been locally obliterated by grazing. Neiring et al. (1963) found that enhanced reproduction of saguaros on slopes was correlated with reduced localized levels of grazing.

Potential Effects of Livestock Grazing on Fire Frequency

Livestock grazing in desert scrub communities shows mixed effects on fire frequency and behavior. Weedy nonnative plants, split grass (*Schismus barbatus*), checker fiddleneck (*Amsinckia intermedia*), filaree (*Erodium cicutarium*), Sahara mustard *(Brassica tournefortii*), and cheatgrass (*Bromus rubens*) may benefit from grazing, while native perennial bunchgrasses,
which are highly palatable grazing forage, may become less abundant (Berry and Nicholson 1984, Kie and Loft 1990, Minnich 1994). When nonnative annual plants cure, they can form continuous stands of fine fuels that carry fire. These fine fuels have resulted in increased fire frequency in desert scrub (Rogers and Steele 1980, Minnich 1994). While livestock grazing has contributed to the spread of nonnative annuals into desert scrub communities, livestock grazing can also reduce fuel loads, making it less likely that fire will occur. The alteration of fire regimes may have either positive or negative effects to listed species, but it is generally deleterious to ecosystem functioning (Bahre 1991).

Many desert shrubs and cacti, including saguaro, are poorly adapted to fire and decline in burned areas. Any activity that has the potential to increase fire frequency or intensity may result in a reduction of pygmy-owl nesting structures.

Potential Effects of Livestock Grazing on Prey Species

Livestock grazing can affect densities of potential pygmy-owl prey. Jones (1981) found that grazing reduced lizard abundance and variety in a number of habitats in western Arizona. Pianka (1966) discussed the importance of vegetation structure, and found vegetation communities with increased plant structures supported more lizard species than those with less structure. In general, complex vegetation communities with a high degree of species diversity and structural heterogeneity provide habitat for many prey species including birds, insects, and mammals.

Pygmy-owls coexist with livestock grazing in Sonoran Desert scrub northwest of Tucson, in Altar Valley southwest of Tucson, and in Mexico. It appears that although adverse effects to the pygmy-owl and its habitat may occur from livestock grazing activities, the birds are at least somewhat tolerant of this type of disturbance.

Summary of Effects

Livestock grazing has the potential to adversely affect pygmy-owl habitat by changing the structure and/or composition of the vegetation community. Such alteration may include the trampling and browsing of vegetation cover, including saguaros and their nurse plants. Grazing may also lead to the reduction of cryptobiotic crusts and increase soil compaction, which may result in increased soil erosion, reduced water infiltration rates, increased runoff, and subsequently leave less water for plant production. Changes in the vegetation community can result in decreased pygmy-owl prey base, increased susceptibility of pygmy-owls to aerial predators, lack of suitable nesting structures, and habitat fragmentation.

The proposed project area encompasses a large portion of the historical range of this species, and includes areas historically occupied by CFPOs. You have indicated that allotments in the project area encompass potential habitat for this species; however, surveys completed to date have been limited and it is not possible to ascertain occupancy on the Forest. We believe the potential exists for CFPOs to occur on some of your allotments and that they could be adversely affected by the proposed action when grazing and associated activities exceed levels within the updated guidance criteria. Loss of vegetation essential for foraging and cover from aerial predators, as well as the potential decrease in nesting cavities due to the loss of saguaros and browsing on mesquite, and suppression of riparian tree regeneration, as documented by you, could adversely affect this species in those allotments exceeding guidance criteria levels.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Due to the extent of the lands in the project area administered by Federal agencies, particularly you and the BLM, many of the actions that are reasonably expected to occur in the action area would be subject to section 7 consultations; however, some activities are expected to occur on private and State lands that are not subject to the section 7 process.

Development of non-Federal lands in the northwest Tucson and Marana area is on-going and increasing in scope, presenting a significant threat to one of the highest known concentrations of CFPOs in Arizona. Other activities expected to occur on non-Federal lands in potential CFPO habitat include agricultural uses, continued grazing on private and State lands, and woodcutting. Large-scale habitat fragmentation and loss of CFPO habitat near the Forest are expected to continue into the next century and will further impact the owl. Lower elevation areas (below 1,200 m [4,200 ft]) within the Forest may become increasingly important habitat for this species and may provide vital linkages and connectivity as adjacent areas are developed and become unsuitable to CFPO needs. State lands and other areas that are currently suitable habitat may also be developed, further impacting this species. Recreational activities will undoubtably increase as more people move into the area and as the population of the region increases; these activities will further impact the CFPO and its habitat.

Cumulative effects for potential CFPO habitat in riparian areas (specifically) are similar to those as described in the Gila topminnow discussions.

CONCLUSION

After reviewing the current status of the cactus ferruginous pygmy-owl, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the cactus ferruginous pygmy-owl. Critical habitat is not designated; therefore, none will be affected. We based our conclusion on the following:

1. CFPO nesting is not known to occur on the Forest.

2. CFPO appear to co-exist with well-managed livestock grazing.

3. You have surveyed the majority of suitable CFPO habitat on the Forest and nesting CFPO have not been located.

4. The telemetered CFPO located on the Jarillas allotment was a dispersing juvenile. This is the one instance in which a CFPO has been known to use vegetation in areas above 4,000' in elevation; it is an unusual occurrence. This bird's continuing status is unknown, as the transmitter it was carrying quit functioning soon after the bird's detection on the allotment.

5. The CFPO detected on the Rincon/Aqua Verde allotment exhibited behavior consistent with a non-nesting, dispersing bird.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

We do not anticipate the proposed action will result in incidental take of the cactus ferruginous pygmy-owl because no nesting pygmy-owls are currently known to occur on the Forest.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Adopt average utilization rates of 35 to 40 percent year-long for areas that contain potential to support CFPO. This utilization standard could be used until further research or literature review reveals that a different level is appropriate to maintain or improve CFPO habitat conditions (food, cover, breeding, and space for population growth and normal behavior).

2. In cooperation with us and/or AGFD, conduct further CFPO surveys in Forest-administered, high-quality CFPO habitat areas, for the next two consecutive years (2003 and 2004), and then re-survey these areas every fourth year until 2012 (the life of this opinion). You could add this information and results to your annual report to us.

3. In cooperation with us, AGFD, BLM, and others, meet annually to revise as appropriate your CFPO habitat assessment methodology as new information is gathered and analyzed. You could narrow your focus to those vegetation communities found on the Forest in potentially suitable CFPO habitat where grazing and associated activities might take place. The range site guides from the Natural Resource Conservation Service may be useful in this assessment.

4. Aid, conduct, or help fund surveys annually in all suitable CFPO habitat on the Forest where grazing activities will take place. You could conduct all surveys using the protocol recommended by us at the time surveys are to be conducted. If a CFPO is found, you could reassess your proposed action with regard to adverse effects to the species.

5. In allotments supporting saguaro, consider using BLM's method for tracking saguaro recruitment (our BO 2-21-94-F-192-R2, dated July 30, 2002).

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species, we request notification of implementation of any conservation actions.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the Arizona Game and Fish Department).

Southwestern willow flycatcher (*Empidonax traillii extimus*)

STATUS OF THE SPECIES

We listed the southwestern willow flycatcher as endangered, without critical habitat, on February 27, 1995 (Service 1995). We are currently redesignating critical habitat for the species.

The southwestern willow flycatcher is a small grayish-green passerine bird (Family Tyrannidae) measuring approximately 5.75 inches in length. It has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark, and the lower is light yellow grading to black at the tip. The song is a sneezy fitz-bew or a fit-a-bew, and the call is a repeated whitt.

The southwestern willow flycatcher is one of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993). It is a neotropical migrant that breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical breeding range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (*Molothrus ater*) (Sogge et al. 1997). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton et al. 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge et al. 1997). Willow flycatcher nests are parasitized by brown-headed cowbirds which lay their eggs in the host's nest. Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. These feeding areas, when in close proximity to flycatcher breeding habitat, especially when coupled with habitat fragmentation, facilitate cowbird parasitism of flycatcher nests (Tibbitts et al. 1994).

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to around 8,000 feet in Arizona and southwestern Colorado. Historical egg/nest collections and species descriptions throughout its range describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987). Currently, southwestern willow flycatchers primarily use Geyer willow, Goodding's willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.), Russian olive (*Elaeagnus angustifolio*) and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* spp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al.1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests; flycatchers sometimes nest in areas where nesting substrates are in standing water (Maynard 1995, Sferra et al. 1995, 1997). Hydrologic conditions at a particular site can vary remarkably in the arid Southwest within a season and among years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). Total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996).

Tamarisk is an important component of the flycatchers's nesting and foraging habitat in Arizona. In 2000, 270 of the 303 known nests built were placed in a tamarisk tree (Paradzick et al. 2001). In 2001, 323 nests were built in tamarisk, 79 in willow, and 2 in cottonwood (Smith et al. 2001).

Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge et al. 1993, Sogge and Tibbitts 1992, Sogge and Tibbitts 1994, Muiznieks et al. 1994, Maynard 1995, Sferra et al. 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge et al. 1993, Muiznieks et al. 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs per clutch (range = 2 to 5). Eggs are laid at one-day intervals and are incubated by the female for approximately 12 days (Bent 1960, Walkinshaw 1966, McCabe 1991). Young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge et al. 1993, Sogge and Tibbitts 1994, Muiznieks et al. 1994, Whitfield 1994, Whitfield and Strong 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Brown 1988a,b, Whitfield 1990, Muiznieks et al. 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra et al. 1995, Sogge 1995b). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995a,c) or, at a minimum, resulted in reduced or complete nesting failure at a site for a particular year (Muiznieks et al. 1994, Whitfield 1994, Maynard 1995, Sferra et al. 1995, Sogge 1995a,c). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage (McGeen 1972, Mayfield 1977a,b, Brittingham and Temple 1983). Flycatchers can attempt to renest, but it often results in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994).

Southwestern willow flycatcher territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes are 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males at the Kern River (Whitfield and Enos 1996), 0.15 to 0.49 acres for birds in a 1.48 to 2.22 acre patch on the Colorado River (Sogge 1995c), and 0.49 to 1.24 acres in a 3.71 acre patch on the Verde River (Sogge 1995a). Territories are established within a larger patch of appropriate habitat sufficient to contain several nesting pairs of flycatchers. These birds appear to be semi-colonial nesters.

Unitt (1987) documented the loss of more than 70 southwestern willow flycatcher breeding locations rangewide (periphal and core drainages within its range) estimating the rangewide population at 500 to 1,000 pairs. In 1999, there were182 known southwestern willow flycatcher breeding sites in California, Nevada Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 1999 where a resident flycatcher has been detected) holding approximately 915 territories. Sampling errors may bias population estimates positively or negatively (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology, natural population fluctuation, and random events) and it is likely that the total breeding population of southwestern willow flycatchers fluctuates. Numbers have increased over the last few years; however, they are consistent with the 1987 estimate that 500 to 1,000 pairs probably exist. About 50 percent of the 915 territories found throughout the subspecies range were located at three locations (U-Bar Ranch - NM, Roosevelt Lake - AZ, and San Pedro/Gila confluence - AZ).

The distribution of breeding groups is highly fragmented, with groups often separated by considerable distances (e.g. in Arizona, approximately 55 miles straight-line distance between breeding flycatchers at Roosevelt Lake, Gila Co., and the next closest breeding groups known on either the San Pedro River, Pinal Co. or Verde River, Yavapai Co.). To date, survey results reveal a consistent pattern rangewide--the southwestern willow flycatcher population is comprised of extremely small, widely-separated breeding groups including unmated individuals.

The largest concentrations of willow flycatchers in Arizona in 2000 were near the confluence of the Gila and San Pedro rivers (219 flycatchers, 119 territories); at the inflows of Roosevelt Lake (207 flycatchers, 115 territories); Gila River, Safford area (30 flycatchers, 15 territories); Topock Marsh on the Lower Colorado River (25 flycatchers, 15 territories); Verde River at Camp Verde (9 flycatchers, 5 territories); Alpine/Greer on the San Francisco River/Little Colorado River (7 flycatchers, 5 territories); Alamo Lake on the Bill Williams River (includes lower Santa Maria and Big Sandy river sites) (44 flycatchers, 24 territories); Big Sandy River, Wikieup (23 flycatchers, 16 territories) and Lower Grand Canyon on the Colorado River (14 flycatchers, 8 territories) (Paradzick et al. 2001).

Unitt (1987) concluded that "...probably the steepest decline in the population level of *E. t. extimus* has occurred in Arizona... Historical records for Arizona indicate the former range of the southwestern willow flycatcher included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and White River.

In 2001, 635 resident flycatchers were detected within 346 territories at 42 sites along 11 drainages statewide (Smith et al. 2001). The lowest elevation where territorial pairs were detected was Topock Marsh on the Lower Colorado River (459 feet) and the highest elevation was at the Greer River Reservoir (8,203 feet).

Just after listing in 1996, 145 territories were known to exist in AZ. In 2001, 346 territories were detected. The majority of this increase has occurred at Roosevelt Lake and at San Pedro/Gila River confluence. Survey effort was a larger factor in detecting more birds at San Pedro/Gila confluence, but the Roosevelt population has grown as habitat has developed in conservation pool of the reservoir. While numbers have increased, distribution has not changed dramatically.

In 2001, a total of 426 nesting attempts were documented in Arizona at 40 sites (Smith et al. 2001). Of the 329 attempts that were monitored, 191 fledged young, 114 failed, and 24 had unknown outcomes. Causes of nest failure included predation (n=82), nest abandonment (n=10), brood parasitism (n=6), infertile clutches (n=12), weather (n=2), and other causes (n=1). Cowbirds may have contributed to other abandoned nests, but no direct evidence was detected.

Intensive nest monitoring efforts in California, Arizona, and New Mexico have shown that cowbird parasitism and/or predation can often result in failure of the nest; reduced fecundity in subsequent nesting attempts; delayed fledging; and reduced survivorship of late-fledged young. Cowbirds have been documented at more than 90 percent of sites surveyed (Sogge et al. 1993, Camp Pendleton 1994, Muiznieks et al. 1994, Sogge and Tibbitts 1994, Whitfield 1994, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald et al. 1995, Sferra et al. 1995, Sogge 1995a,b, San Diego Natural History Museum 1995, Stransky 1995, Griffith and Griffith 1996, Skaggs 1996, Spencer et al. 1996, Whitfield and Enos 1996, Sferra et al. 1997, McCarthey et al.1998). The probability of a southwestern willow flycatcher successfully fledging its own young from a cowbird-parasitized nest is low (i.e. less than5 percent). Also, nest loss due to predation appears consistent from year to year and across sites, generally in the range of 30 to 50 percent. Documented predators of southwestern willow flycatcher nests identified to date include common king snake (*Lampropeltis getulus*), gopher snake (*Pituophis melanoleucos affinis*), and Cooper's hawk (*Accipiter cooperii*) (Paxton et al. 1997, McCarthey et al. 1998, Paradzick et al. 2000).

Cowbird trapping has been demonstrated to be an effective management strategy for increasing reproductive success for the southwestern willow flycatcher as well as for other endangered passerines (e.g., least Bell's vireo [*Vireo bellii pusillus*], black-capped vireo [*V. atricapillus*], golden-cheeked warbler [*Dendroica chrysoparia*]). It may also benefit juvenile survivorship by increasing the probability that parents fledge birds early in the season. Expansion of cowbird management programs may have the potential to not only increase reproductive output and juvenile survivorship at source populations, but also to potentially convert small, sink populations into breeding groups that contribute to population growth and expansion.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for southwestern willow flycatcher states:

No Effect:

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into southwestern willow flycatcher habitat.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria):

1. Livestock use will not occur within 5 miles of occupied habitat during the breeding season, or will not occur within 2 miles if cowbird trapping and monitoring or an approved cowbird research program is in place.

2. Livestock grazing in unoccupied suitable habitat will not reduce the suitability, nor reduce the likelihood of suitable habitat to expand to the site's potential.

3. No livestock grazing will occur in potential habitat.

4. Subwatershed condition in the presence of livestock grazing will be maintained or improved and indicators of watershed health and threatened and endangered species habitat demonstrate that effects will be insignificant or discountable.

You determined that livestock grazing in the Happy Valley allotment, in the Santa Catalina EMA, may adversely affect this species, because livestock grazing occurs in potential southwestern willow flycatcher habitat.

Paige Creek is the only drainage on the Forest with limited potential to develop suitable habitat for this species; it is currently not suitable habitat. Paige Creek lies within the Happy Valley allotment; you note that most of the allotment is in moderately-high or high range condition. At least half of the riparian area is excluded from livestock grazing. Riparian thickets of approximately 0.4 to 0.8 ha (one to two acres) are developing. Cottonwood comprises the majority species and a willow component is developing.

EFFECTS OF THE ACTION

Livestock grazing can cause degradation of all riparian habitat components. Livestock overgrazing is a leading cause of deterioration and loss of southwestern willow flycatcher habitat (USFWS 1993, Tibbitts et al. 1994). Because more than half of Paige Creek's riparian areas are excluded from livestock grazing, these areas are assumed to possess the ability to develop into mature vegetation, and this vegetation may or may not become suitable habitat for southwestern willow flycatcher. We remain concerned about the riparian areas not presently excluded from livestock.

Other effects from livestock grazing may include disturbance or other livestock-associated activities. Brown-headed cowbirds are attracted to livestock and their associated facilities (corrals, barns, stockyards, bare ground). Cowbirds negatively impact the flycatcher's breeding and reproductive success and are one reason this species was listed. Currently, the southwestern willow flycatcher does not occur on the Happy Valley allotment. Should southwestern willow flycatcher begin to use

Paige Creek, the presence of cowbirds will become an important concern. Positive factors of the Happy Valley allotment are its moderately-high to high range condition and livestock grazing-excluded riparian areas.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

CONCLUSION

After reviewing the current status of the southwestern willow flycatcher, the environmental baseline for the project area, the effects of the proposed action, and cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the southwestern willow flycatcher. Critical habitat has not been redesignated for this species; thus, none will be affected. We based our conclusion on the following:

1. Southwestern willow flycatchers are not currently known to occur on the Forest.

2. Paige Creek (Happy Valley allotment) supports potential southwestern willow flycatcher habitat, especially in areas excluded from livestock grazing and associated streamside effects. Range condition on this allotment is moderately high to high. Over time, Paige Creek could develop suitable habitat and may be occupied by southwestern willow flycatcher in the future.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by us to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by us as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

We do not anticipate that the proposed action will result in incidental take of the southwestern willow flycatcher for the following reasons:

1. More than half of the riparian area in the Happy Valley allotment is fenced from livestock use.

2. Southwestern willow flycatcher habitat is still developing and may or may not become occupied as it matures.

3. Southwestern willow flycatchers are not known to occur on the Forest.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Work with us and AGFD to conduct or help fund surveys in potential southwestern willow flycatcher habitat on the Forest annually to detect presence, especially in Paige Creek on the Happy Valley allotment.

2. Work with us and AGFD to exclude the remainder of the riparian areas (especially on Paige Creek) from livestock grazing.

3. Work with us and AGFD, and others, toward riparian restoration of Forest riparian areas in the Santa Rita, Tumacacori, and Santa Catalina EMAs.

4. Work with us and others in implementing the southwestern willow flycatcher recovery plan, when issued.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of the implementation of any conservation recommendation.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

FISH

Gila chub (*Gila intermedia*) with critical habitat - Conference for Proposed Species

STATUS OF THE SPECIES AND CRITICAL HABITAT

We proposed the Gila chub (*Gila intermedia*) as endangered with critical habitat on August 9, 2002 (USFWS 2002). Historically, Gila chub have been recorded in approximately 30 rivers, streams, and spring-fed tributaries throughout the Gila River basin in southwestern New Mexico, central and southeastern Arizona, and northern Sonora, Mexico (Miller and Lowe 1967; Rinne and Minckley 1970; Minckley 1973; Rinne 1976; DeMarais 1986; Bestgen and Propst 1989). Today the Gila chub has been restricted to small isolated populations scattered throughout its historical range.

The Gila chub is a member of the minnow family Cyprinidae. The Gila chub is small-finned, deep-bodied, chubby (chunky), and darkly colored (sometimes lighter on belly; diffuse lateral band(s) are rarely present). Adult males average about 150 millimeters (6 in) in total length; females can exceed 200 mm (8 in). Scales are course, large, thick, and broadly overlapped, and radiate out from the base. Lateral-line scales usually number greater than 61 and less than 80. There are usually eight (rarely seven or nine) dorsal and anal fin-rays; pelvic fin-rays typically number eight, but sometimes nine. Gila chub commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in small artificial impoundments (Miller 1946; Minckley 1973; Rinne 1975).

Baird and Girard (1854:28) published a description of the Gila chub, as (*Gila gibbosa)* based on the type specimen collected in 1851 from the Santa Cruz River. For nomenclature reasons, the name was changed by Girard to *(Tigoma intermedia)* in 1856, working with specimens from the San Pedro River. Despite that and other name changes, the Gila chub as been recognized as a distinct species since the 1850s, with the exception of a short period in the mid-1900's when it was placed as a subspecies of *Gila robusta* (Miller 1945). For the past 30 years, *(Gila intermedia)* has been recognized as a full monotypic species, separate from the polytypic species *(Gila robusta),* both currently accepted as valid (Robins 1991, Mayden et al. 1992).

Gila chub can survive in larger stream habitat such as the San Carlos River, and artificial habitats, like the Buckeye Canal (Stout et al. 1970; Rinne 1976). The Gila chub interact with spring and small stream fishes regularly (Meffe 1985), but are usually restricted to deeper waters (Minckley 1973). Adults often are found in deep pools and eddies below areas with swift current, as in the Gila chub habitats found in Bass Canyon and Hot Springs in the Muleshoe Preserve area. Young-of-the-year inhabit shallow water among plants or eddies, while older juveniles use higher velocity stream areas (Minckley 1973, 1991).

The reason for the decline of this fish is due to habitat loss and invasion of nonnative fish species which includes; past and current dewatering of rivers, springs, and cienegas, diversion of water channels, impoundments, regulation of flow, and land management practices. All of these activities have promoted erosion and arroyo formation and the introduction of predacious and competing nonnative fish species (Miller 1961, Minckley 1985). Life history information can be found in the status review (Weedman 1996), the proposed rule (USFWS 2002), and references cited there.

Riparian and aquatic communities across the southwest have been degraded or destroyed by human activities (Hastings 1959; Hastings and Turner 1965; Henderickson and Minckley 1984). Humans have affected southwestern riparian systems over a period of several hundred years.

Eighty-five to 90 percent of the Gila chub's habitat has been degraded or destroyed, and much of it is unrecoverable. Only 29 extant populations of Gila chub remain; all but one are small, isolated, and threatened. The current status of the Gila chub is poor and declining.

In New Mexico, the only drainage where the Gila chub occurs is Turkey Creek. They were last documented in the summer of 2001. In Arizona, small remnant populations remain in several tributaries of the upper Verde River, San Pedro River, San Carlos River, Blue River, San Francisco River, Agua Fria, and the Gila River.

In the Verde River Basin, Walker and Spring Creek populations (Yavapai County) are considered as stable-threatened populations, and the status of the Williamson Valley Wash population is unknown. The Santa Cruz River has three tributaries with extant populations of Gila chub: Sabino Canyon (Pima County) and Sheehy Spring (Santa Cruz County) have unstable-threatened populations, and Cienega Creek (Pima and Santa Cruz counties) has the only known stable-secure population of Gila chub in existence. The San Pedro River Basin has three extant, stable-threatened populations in Redfield Canyon (Graham and Pima counties), O'Donnell Creek (Santa Cruz County), and Bass Canyon (Graham and Cochise counties). The status of the Gila chub in the Babocomari River, (Santa Cruz and Cochise counties), is unknown. The San Carlos River and the Blue River, (Gila and Graham counties), are on the San Carlos Apache Indian Reservation and are tributaries to the Gila River. They are believed to have extant populations of Gila chub but information is not available to us on the status of Gila chub in those drainages.

The San Francisco River has two tributaries with extant populations; Harden Cienega Creek and Dix Creek in Greenlee County. The status of these two populations is unknown, but both are thought to be small. The Agua Fria River has two tributaries with stable-threatened populations, Silver and Sycamore creeks, (Yavapai County), as well as two unstable-threatened populations in Little Sycamore Creek and Indian Creek (Yavapai County). In addition, there are two populations in the Agua Fria River, Larry Creek and Lousy Canyon (Yavapai County), for which the population status is unknown. Two tributaries of the Gila River in Arizona have extant populations of Gila chub. Eagle Creek (Graham and Greenlee counties) has an unstable-threatened population and Bonita Creek (Graham County) has a stable-threatened population.

Reestablishment of Gila chub has been attempted in three Arizona sites; two are believed to be extant. Lousy Canyon and Larry Creek (Yavapai County) are tributaries to the Agua Fria River and were stocked with 200 Gila chub from Silver Creek in July 6, 1995. Both sites will require monitoring to document success of the stockings. The third site,Turkey Creek (Santa Cruz County), was stocked from Gardner Canyon (Cochise County) with 150 Gila chub in July 1988. In May 1995, no Gila chub or any other fish were captured during sampling surveys.

In Mexico, the current known distribution of Gila chub has been reduced to two small spring areas, Cienega los Fresnos and Cienega la Cienegita, adjacent to the Arroyo los Fresnos (tributary to the San Pedro River), within 2 km (mi) of the Arizona-Mexico border (Varela-Romero et al. 1992). No Gila chub remain in the Mexican portion of the Santa Cruz River (Weedman et al. 1996).

The constituent elements of critical habitat are generalized descriptions and ranges of selected habitat factors that are critical for the survival and recovery of Gila chub. The appropriate and desirable level of these factors may vary seasonally and is highly influenced by site-specific circumstances. Assessment of the presence/absence, level, or value of the constituent elements must include consideration of the season of concern and the characteristics of the specific location. The constituent elements are not independent of each other and must be assessed holistically, as a functioning system, rather than individually. In addition, the constituent elements need to be assessed in relation to larger habitat factors, such as watershed, floodplain, and streambank conditions, stream channel morphology, riparian vegetation, hydrologic patterns, and overall aquatic faunal community structure.

The primary constituent elements determined necessary for survival and recovery of the Gila chub include, but are not limited to:

1. Perennial water found in small segments of headwaters, springs, or cienegas of smaller tributaries.

2. Water temperature ranging from cool to warm, 13 to 24 degrees C (55 to 75 degrees F) with sufficient dissolved oxygen, nutrients, and any other water related characteristics needed.

3. Water quality with lack of contaminants or any water quality characteristics adverse to Gila chub health.

4. Food base consisting of invertebrates, filamentous (threadlike) algae, and insects.

5. Sufficient cover consisting of downed logs in the water channel, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, large rocks and boulders with overhangs.

6. Habitat devoid of nonnative aquatic species detrimental to Gila chub or habitat in which detrimental nonnatives are kept at a level which allows Gila chub to continue to survive and reproduce. For example, the Muleshoe Preserve and the Sabino Canyon Gila chub populations are devoid of nonnative aquatic species. The O'Donnell Creek Gila chub population has continued to survive and reproduce despite the current level of nonnative aquatic species present.

7. Streams should maintain a natural, unregulated hydrograph that includes periodic natural flooding. If flows are modified, then the stream should retain a hydrograph that demonstrates an ability to support Gila chub.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications from species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for the Gila chub state:

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by year-long exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

You determined that livestock grazing on 25 allotments may adversely affect this species. The allotments are:

Santa Rita EMA: Apache Springs, Debaud, Gardner, Rosemont, Oak Tree I & II, Thurber, and Greaterville.

Huachuca EMA: Canelo, O'Donnell, Papago/Z-Triangle,, Post Canyon, Sawtelle, and Wakefield.

Whetstone: Coal Mine, Knear, and Mescal.

Galiuro EMA: Bass Canyon, Bayless, Deer Creek, and San Pedro.

Winchester EMA: Rockhouse and Polecat.

Santa Catalina EMA: Cumero, Rincon/Aqua Verde, and Rockpile.

Within the proposed action area, the Gila chub currently occupies Sabino Canyon and O'Donnell Creek. Within the proposed action area there is a total of 13.4 stream miles proposed for designation of critical habitat.

Sabino Canyon has 11.0 miles of proposed critical habitat. Sabino Canyon is within the Santa Catalina EMA and flows onto private property. Sabino Canyon currently supports one of the last remaining stable Gila chub populations. In June 1999, Sabino Canyon's aquatic habitat was restored with the cooperation of the Arizona Game and Fish Department. This restoration effort involved removing all the nonnative green sunfish above the Sabino Canyon dam. Since the completion of the restoration project Sabino Canyon has been monitored annually and thus far there have been no collection of green sunfish. Currently, there is no authorized livestock grazing in Sabino Canyon.

O'Donnell Creek has 2.4 miles of proposed critical habitat. Portions of O'Donnell Creek are owned by The Nature Conservancy and the remaining is on the Coronado National Forest. O'Donnell Creek is within the Huachuca EMA. O'Donnell Creek lies within the Z Triangle allotment and is currently excluded from livestock grazing through the 2003 season. O'Donnell Creek was restored in July 2002, in a cooperative joint effort between The Nature Conservancy, Arizona Game and Fish Department, and us. This restoration effort also involved removing nonnative green sunfish within the designated critical habitat. In the summer of 2001, a wildland fire occurred in the O'Donnell Creek watershed and some of the fencing on the Coronado National Forest land on O'Donnell Creek was destroyed. This fencing was implemented to keep livestock out of O'Donnell Creek riparian areas.

Redfield Canyon's headwaters begin in the Galiuro Mountains and flows in a southwesternly direction to the lower San Pedro River. Redfield Canyon is within the Galiuro EMA. The Redfield Canyon allotment is now closed and there is no authorized livestock grazing. Redfield Canyon has 2.2 miles of proposed critical habitat which is one mile below the Coronado National Forest boundary. Redfield Canyon does have all the necessary constituent elements to support the extant Gila chub population. Annual monitoring of Redfield Canyon has occurred since 1988 and Gila chub have been documented every year (Weedman 1996).

Cienega Creek's headwaters originates in the Canelo Hills and drains in a northern direction with the majority on Bureau of Land Management land. The only proposed critical habitat for Gila chub is on BLM land which is six miles downstream from the nearest grazing allotment. The last documented occurrence of Gila chub was in the summer of 2002.

EFFECTS OF THE ACTION

A general discussion of grazing within the various watersheds is provided in the Effects of the Proposed Action Forestwide section and is incorporated here by reference. Adverse effects of livestock grazing on native fishes of the Southwest, and of Gila chub in particular, have long been recognized (Chamberlain 1904, Miller 1961, Henderickson and Minckley 1984, Minckley 1985, Williams et al. 1985, Service 1989b, Clarkson and Wilson 1995). While some of the most serious of those effects took place in the late 1800s, ongoing livestock grazing continues to exert adverse effects on the remaining native fish species. Effects of ongoing grazing inhibit recovery from, and are exacerbated by, the underlying habitat alteration and destruction that occurred as a result of serious overgrazing of the late 1800s and early 1900s.

Effects of the livestock grazing program on Gila chub can be segregated into direct effects to fish and effects to Gila chub habitat that result in indirect impacts to the species. Direct effects of livestock grazing in the aquatic habitats of the above-mentioned drainages include trampling (Roberts and White 1992) of Gila chub, particularly eggs and larval fish in the shallow margins of the creeks. Eggs and larval fish may also be ingested by livestock drinking from the creek. Direct effects could also occur to Gila chub as a result of range improvement project construction or vegetation management projects in all of the occupied drainages.

Indirect effects include impacts from livestock grazing and associated activities that alter Gila chub habitat quality or quantity. Indirect effects could occur in aquatic habitats where Gila chub occur or in the watershed of such habitats. Post Canyon, O'Donnell Creek, Cienega Creek, Turkey Creek, Bass Springs, and Double R Creek are all within watersheds with riparian areas located upstream of currently occupied Gila chub habitat where livestock grazing does occur.

Riparian areas in the action area experience specific effects from livestock grazing. Livestock presence affects streambanks through chiseling, sloughing, compaction, and collapse and results in wider and shallower stream channels (Armour 1977, Platts and Nelson 1985b, Platts 1990, Meehan 1991). This causes progressive adjustments in other variables of hydraulic geometry and results in changes to the configuration of pools, runs, riffles, and backwaters; levels of fine sediments and substrate embeddedness; availability of instream cover; and other fish habitat factors (Bovee 1982, Rosgen 1994). It also changes the way in which flood flows interact with the stream channel and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation. These effects occur at all levels of cattle presence, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Damage begins to occur almost immediately upon entry of the cattle onto the streambanks and use of riparian zones may be highest immediately following entry of cattle into a pasture (Goodman et al. 1989, Platts and Nelson 1985a). Vegetation and streambank recovery from long rest periods may be lost within a short period following grazing reentry (Duff 1979). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being most vulnerable to damage (Marlow and Pogacnik 1985, Platts 1990). Cattle presence on streambanks retards rehabilitation of previous damage as well as causing additional alteration (Platts and Nelson 1985a). Channel erosion in the form of downcutting or lateral expansion may result (Heede and Rinne 1990, Bureau 1990).

Cattle grazing in and on riparian vegetation may cause changes in the structure, function, and composition of the riparian community (Szaro and Pase 1983, Warren and Anderson 1987, Platts 1990, Schulz and Leininger 1990, Schulz and Leininger 1991, Stromberg 1993a). Species diversity and structural diversity may be substantially reduced and nonnative plant species may be introduced and spread in cattle feces. Reduction in riparian vegetation quantity and health, and shifts from deep rooted to shallow rooted vegetation contribute to bank destabilization and collapse and production of fine sediment (Meehan 1991).

Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Karr and Schlosser 1977, Platts and Nelson 1989). Increased water temperature fluctuations may adversely affect larval Gila chub. Larvae have a much more limited thermal range than do adults and exhibit subtle habitat shifts to accomplish thermal regulation. Increasing temperature fluctuations in shallow edgewater areas may cause direct mortality of larvae through thermal shock or may cause larvae to move out into deeper, faster water where they are more vulnerable to predation or to being swept downstream.

Increases in nutrients in streams have been documented to result from livestock grazing (Kauffman and Krueger 1984). Increased nutrients may beneficially affect Gila chub through increased food production. Given the habitat used by Gila chub, the species apparently requires a high level of dissolved oxygen. Excessive nutrient input and resulting algal growth may result in temporary conditions of oxygen depletion with resulting stress or death to individual Gila chub.

Litter is reduced by trampling and churning into the soil, reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). The capacity of the riparian vegetation to filter sediment and pollutants to prevent their entry into the river and to build streambanks is reduced (Lowrance et al. 1984, Elmore 1992).

Increased sediment production and transport is probably the most commonly acknowledged effect of livestock grazing (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994). Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy et al. 1981, Wood et al. 1990, Newcombe and MacDonald 1991, Barrett 1992, Megahan et al. 1992). Adult and juvenile Gila chub are not inordinately sensitive to moderate amounts of sediment; however, excessive sedimentation may cause channel changes that are adverse to the species. Excessive sediment may fill backwaters that provide larval and juvenile Gila chub habitat. Excessive sediment may smother invertebrates, reducing Gila chub food production and availability, and related turbidity may reduce Gila chub ability to see and capture food.

Reduction in aquatic habitat complexity due to livestock grazing effects is probably the most important adverse effect to Gila chub. Habitat complexity allows partitioning of habitat among the various fish species and their life stages. Reduction of habitat complexity increases inter-species and inter-lifestage conflicts. It also exacerbates the adverse effects of generalistic nonnative species on native species (Bestgen 1986, Rinne and Minckley 1991, Baltz and Moyle 1993, Douglas et al. 1994). Most nonnative species in the proposed action area are predatory, and decreased habitat complexity results in decreased hiding cover, making predator-naive native species more vulnerable to predation (Minckley 1983, Fraser et al. 1987). Cover is an important factor in the ability of fish species to avoid adverse effects from flooding (Bulkley and Pimentel 1983, Meffe 1984). Livestock grazing and its attendant reduction in habitat complexity make Gila chub more vulnerable to death and displacement from flooding, at the same time that livestock effects on the watershed and streambanks contribute to increased flood volume, velocity, and abrasive power.

Physical damage to streambanks and channels in conjunction with loss or reduction of riparian vegetation may change the timing and magnitude of streamflow (Stabler 1985, Meehan 1991). Flood flows may increase in volume and decrease in duration, and low flows may decrease in volume and increase in duration. Cattle trampling and grazing of the riparian corridor makes banks and vegetation more susceptible to severe damage during catastrophic flooding (Platts et al. 1985).

The proposed action also includes range improvement projects, such as fence maintenance and construction and water developments. These projects are primarily designed to distribute cattle and allow greater management capability. They can result in improved range condition and watershed condition if stocking rates are not increased. Localized temporary disturbance from construction of pipelines, fences, and other projects would cause negligible and localized increases in erosion and runoff. Of greater concern are development and maintenance of stock tanks, which may support populations of nonnative fishes, or may provide habitat into which nonnative fishes may be introduced as sport fish or for other purposes. These fish may subsequently be introduced into occupied Gila chub habitat or may traverse drainages between stock tanks and the creek during storm events. Of particular concern would be introduction of a nonnative species into areas where Gila chub currently occur. Any new construction or reconstruction of roads to stock tanks would facilitate public access and increase the chance that nonnative fish may be introduced or moved among tanks.

The population of Gila chub in O'Donnell Creek is protected by a fenced exclosure. Some of the exclosure fence on O'Donnell Creek burned during a 2002 wildfire. No grazing occurs in Sabino Canyon, which is also occupied y Gila chub.

ANALYSIS OF EFFECTS TO CRITICAL HABITAT

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

Changes in the watershed resulting from grazing can cause increased sedimentation, higher peak flows and channel incisement, and lower base flows within the drainages with occupied Gila chub habitat, and changes in riparian vegetation and channel morphology may cause injury and mortality of Gila chub and adversely alter its habitat. Most precipitation falls at the higher elevations in the various watersheds; however, watershed effects on the allotments should not be disregarded because of the proximity of the allotments to occupied Gila chub habitat. Flows from higher elevations traverse drainages in the allotments, which if degraded by grazing, may contribute elevated levels of sediment and exhibit other characteristics of degraded watershed described above. This can effect riparian function with occupied Gila chub habitat in the proposed action areas.

The direct effects of livestock grazing on critical habitat are (1) increased water temperatures as a result of stream channels becoming wider and shallower, (2) loss of nutrients within in the stream channel due to reduction of pools in number, size, and depth, (3) reduction in cover as a result of livestock grazing on riparian vegetation which helps to increase water temperatures, and (4) reduction of cover by banks sloughing off due to livestock trampling.

Critical habitat on O'Donnell Creek is fenced to exclude livestock. Although O'Donnell Creek provides the necessary habitat for Gila chub and is currently protected from livestock grazing, upland watersheds and their effects from livestock grazing should not be disregarded. These upland watershed effects can indirectly effect occupied Gila chub habitat downstream. It has been observed that the upper portion of O'Donnell Creek is severely degraded. This portion of O'Donnell Creek is privately owned and there is no quantitative data on streambank and channel condition; however, the effects from livestock grazing in this upper portion could indirectly impact the Gila chub critical habitat downstream.

Sabino Canyon and its upper watershed are excluded from livestock grazing. Due to its canyon-like topography, it is inadequate for livestock grazing. There have been no nonnative aquatic species documented in the upper watershed of Sabino Canyon, and the riparian habitat currently has all the necessary constituent elements to support Gila chub. In addition, due to its remoteness in the upper watershed, it provides additional habitat protection for the Gila chub by preventing livestock access due to its rugged terrain.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future non-Federal (State, Tribal, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act; therefore, are not considered cumulative to the proposed project. Effects of past Federal and private actions are considered in the Environmental Baseline.

Cumulative effects to Gila chub include ongoing activities in the watershed such as livestock grazing and associated activities outside of the allotments addressed herein, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, and recreation. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute substantially to cumulative long-term adverse effects to the Gila chub.

Other activities, such as recreation are increasing. Increasing recreational, residential, or commercial use of the private lands near the riparian areas will likely result in increased cumulative adverse effects to occupied Gila chub habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the American Fisheries Society adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). That statement concludes that accumulation of localized or small impacts, often from unrelated human actions, pose a serious threat to fisheries. It also points out that some improvement efforts to fish habitat may not result in cumulative increases in status of the species but instead may simply mitigate cumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of Gila chub, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our conference opinion that the action, as proposed, is not likely to jeopardize the continued existence of the proposed endangered Gila chub and is not likely to destroy or adversely modify proposed critical habitat. We based our conclusion on the following:

1. Grazing does not occur in Sabino Canyon, which is occupied by Gila chub and proposed as critical habitat.

2. O'Donnell Creek, which is occupied by Gila chub and proposed as critical habitat, is fenced to exclude livestock grazing on Forest lands.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

If this conference opinion is adopted as a biological opinion following listing, these measures, with their implementing terms and conditions, will be nondiscretionary, and must be undertaken by you so that they become binding conditions of any grant or permit issued to any applicants, as appropriate, for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to assume and implement the terms and conditions or (2) fails to require any applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, you must report the progress of the action and its impact on the species to us as specified in the incidental take statement [50 CFR §402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE

The anticipated level of take cannot be quantified as numbers of individual fish. Gila chub are a short-lived, highly fecund species whose natural cycle includes large, rapid fluctuations that make population estimates difficult to obtain and that mask changes due to take from human actions. In addition, dead fish are seldom found due to their small size and rapid consumption by scavengers. In cases where the extent of anticipated take cannot be quantified in terms of number of individuals, we may anticipate take in terms of loss of food, cover, or other essential elements, such as water quality or quantity (USFWS 1999). Increased water temperature will result from direct impacts from livestock drinking stream water, widening of the stream channel due to movement of livestock and associated grazing, and trampling and breakdown of streambanks, which all result in the water column becoming shallow rather than deep.

1. Gila chub within the exclosure may be taken through harm if livestock enter the exclosure; take will be considered to be exceeded if the following conditions occur:

   a. Livestock grazing occurs within the exclosure at a level resulting in more than five percent utilization of woody riparian species (measured as percentage of apical meristems within 2 m (6 ft) of the ground grazed) and trampling, chiseling, or other physical impact by livestock on more than 10 percent of the alterable streambanks by length. Exceeding these levels of utilization and trampling will result in unacceptable impacts to occupied habitat and individual Gila chub; or

   b. The exclosure fence is cut, down, open, or non-functional for more than two weeks while permitted livestock are in any adjacent pasture next to the exclosure, or for more than two months in any given year if livestock are in a pasture that is not adjacent to the exclosure. The concern here is that there still exists a potential for take by trespass cattle, because fences are not inviolate. Exceeding these levels will result in unacceptable impacts to occupied habitat and individual Gila chub.

2. For construction, development, or maintenance projects (e.g., reconstruction or maintenance of existing fences across the stream channel or existing road and water development or maintenance in connection with grazing activities) we anticipate that direct take of Gila chub will occur at a level that will result in no more than 20 dead or dying fish of any species being observed near the activity, or within 0.5 km (600 yards) downstream of the activity, during implementation or within three hours of completion. If this level of mortality is exceeded, work shall be halted and consultation reinitiated.

EFFECT OF INCIDENTAL TAKE

In this BO, we find the anticipated level of take is not likely to result in jeopardy nor adverse modification of critical habitat for the Gila chub.

The prohibitions against taking Gila chub found in section 9 of the Act do not apply until the species is listed; however, we recommend you implement the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following listing or critical habitat designation, these measures, with their implementing terms and conditions, will be non-discretionary.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

The following reasonable and prudent measures are necessary and appropriate to minimize take of the Gila chub. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with their accompanying terms and conditions in regard to the proposed action. These terms and conditions are nondiscretionary and implement the reasonable and prudent measures as described. These measures shall apply to the Papago/Z-Triangle allotment.

1. Minimize direct mortality of Gila chub.

The following terms and conditions implement reasonable and prudent measure number 1:

a. The exclosure fence on O'Donnell Creek will be repaired by March 31, 2003.

b. Inspect and maintain the exclosure three times a year. Inspection reports from the permittees may be used to accomplish this term and condition. The permittees will report their inspection and maintenance work to the appropriate district annually. Livestock will be removed from any exclosure immediately upon the permittee learning of such an event. Notify us of your knowledge of any exclosure fence damage and any livestock intrusion into the exclosures within 48 hours of your knowledge of such an event. Notification may be by telephone, electronic transmission, facsimile, or letter. Include a brief summary of such events in your annual reports to us.

2. Minimize the loss and alteration of occupied Gila chub habitat.

The following term and condition implements reasonable and prudent measure number 2:

All reasonable effort shall be made to minimize channel and floodplain alteration during any repairs of the existing riparian fence in O'Donnell Creek. A brief, written report shall be submitted to us within 60 days of completion of project activity. The report shall include photographs of the project area before and after project implementation.

3. Continue to monitor Gila chub and its occupied habitat to document the level of take.

The following terms and conditions implement reasonable and prudent measure number 3:

a. During fence construction and maintenance and upon completion of these projects, you shall monitor for and document the presence of dead fish or dying fish in and for 0.75 mile downstream of the activity area. You will notify us immediately upon detection of any dying fish of any species.

b. Records will be maintained of downed or damaged exclosure fencing along O'Donnell Creek and incidents of livestock intrusion within the riparian areas. Reports should include dates of observations, sightings of any livestock use, number of livestock, area of use, and any other pertinent information. Copies of these reports will be sent annually to us. A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Coordinate with us in development and implementation of a recovery plan for the Gila chub.

2. Coordinate with us and the AGFD to translocate or introduce Gila chub into suitable habitat of O'Donnell Creek watershed and Redfield Canyon watershed, enhancing the metapopulation that exists in and around these drainages.

3. Conduct, or fund, or otherwise support comprehensive surveys for the Gila chub in all potential or suitable habitats on the Forest.

4. Coordinate with us and AGFD to begin an aggressive program to control nonnative aquatic species on the Forest.

5. Consider and use information on upland conditions in watersheds associated with native fish during project planning to minimize potential effects of the proposed action to listed species.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed or proposed species, we request notification of implementation of any conservation actions.

This concludes the conference for the effects of proposed grazing on Gila chub on the Forest. You may ask us to confirm the conference opinion as a biological opinion issued through formal consultation if the proposed species is listed or critical habitat is designated. The request must be in writing. If we review the proposed action and find there have been no significant changes in the action as planned or in the information used during the conference, we will confirm the conference opinion as the biological opinion for he project and no further section 7 consultation will be necessary.

After listing or designation of critical habitat, or any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: 1) the amount or extent of incidental take is exceeded, 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference opinion, 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion, or 4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the proposed action will be reviewed to determine whether any take of the proposed species has occurred. Modifications of the opinion and the incidental take statement may be appropriate. No take of this species may occur between the listing of the species and the adoption of this conference opinion as a biological opinion, or the completion of a subsequent formal consultation.

(Note: If the species is listed, surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

Gila topminnow (*Poeciliopsis occidentalis occidentalis*)

STATUS OF THE SPECIES

We listed Gila topminnow as endangered in 1967 without critical habitat (USFWS 1967); it was named *Poeciliopsis occidentalis* at that time. The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969a, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, is collectively known as the Sonoran topminnow. Both subspecies are protected under the Act. Only Gila topminnow populations in the United States, not those in Mexico, are listed under the Act.

Gila topminnow belong to a group of live-bearing fishes within the family Poeciliidae that includes the familiar guppy (*Poecilia reticulata*), which is not native to the Gila basin. Males are smaller than females, rarely greater than 25 mm (1 in), while females are larger, reaching 51 mm (2 in). Body coloration is tan to olivaceous, darker above, lighter below, often white on the belly. Breeding males are usually blackened, with some golden coloration of the midline, and with orange or yellow at base of the dorsal fin.

Fertilization is internal, and sperm packets are stored which may fertilize subsequent broods. Brood development ranges from 24 to 28 days. Two to three broods in different stages develop simultaneously in a process known as superfetation. Gila topminnow give birth to one to 31 young per brood (Schoenherr 1974). Larger females produce more offspring (Minckley 1973). Gila topminnow mature from a few weeks to many months after birth, depending on when they are born. They breed primarily from March to August, annually, but some pregnant females occur throughout the year (Schoenherr 1974). Some young are produced in the winter months. Minckley (1973) and Constantz (1980) reported that Gila topminnow are opportunistic feeders which eat bottom debris, vegetation, amphipods, and insect larvae when available.

Gila topminnow and many other Poeciliids can tolerate a variety of physical and chemical conditions. They are good colonizers in part because of this tolerance and in part because a single gravid female can start a population (Meffe and Snelson 1989). Minckley (1969a, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists. Simms and Simms (1991) found the densities of Gila topminnow in Cienega Creek, Pima County, Arizona, to be greater in pool, glide, and backwater habitats and less dense in marsh, riffle, chute, cascade, and fall habitats. They occurred more frequently over sand substrates than over other categories of substrates. Although Gila topminnow may occupy pools and ponds that are up to 2 m (6 ft) deep, they are normally found in the upper one-third of the water column (Forrest 1992).

Gila topminnow are known to occur in streams fluctuating from 6 to 37ºC (51-99º F), from 6.6 to 8.9 pH, dissolved oxygen levels from 2.2 to 11 mg/l (2.2-11 ppm), and can tolerate salinities approaching those of sea water (Meffe et al. 1983). Topminnow can burrow under mud or aquatic vegetation when water levels decline (Deacon and Minckley 1974, Meffe et al. 1983). Sonoran topminnow (including both Gila and Yaqui subspecies) regularly inhabit springheads with high loads of dissolved carbonates and low pH (Minckley et al. 1977, Meffe 1983, Meffe and Snelson 1989). This factor has helped protect small populations of topminnow from western mosquito-fish (*Gambusia affinis*) that are usually rare or absent under these conditions (Meffe 1983).

The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes (Miller 1961, Minckley 1985). Other listed fish suffer from the same impacts (Moyle and Williams 1990).

Gila topminnow are highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from nonnative fishes have been a major factor in their decline and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). The native fish fauna of the Gila basin, and the Colorado basin in general, was naturally depauperate and contained few fish that were predatory on or competitive with Gila topminnow (Carlson and Muth 1989). In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Thus Gila topminnow did not evolve mechanisms for protection against predation or competition and are predator- and competitor-naive. With the introduction of large numbers of predatory and competitive nonnative fish, frogs, crayfish, and other species, Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been lost to human alteration. Both large (Bestgen and Propst 1989) and small (Meffe et al. 1983) nonnative fish cause problems for Gila topminnow as do nonnative crayfish (Fernandez and Rosen 1996) and bullfrogs.

Historically, Gila topminnow were abundant in the Gila River drainage and were one of the most common fishes of the Colorado River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). This was reduced to only 15 naturally occurring populations. Presently, only 12 of the 15 recent natural Gila topminnow populations are considered extant (Weedman and Young 1997). Only three (Cienega Creek, Monkey Spring, Cottonwood Spring) have no nonnative fish present and are therefore considered relatively secure from nonnative fish threats. There have been at least 175 wild sites stocked with Gila topminnow; however, topminnow persist at only 18 of these localities. Of the 18, one site is outside topminnow historical range and four now contain nonnative fish (Weedman and Young 1997). The Sonoran Topminnow Recovery Plan (USFWS 1984a) established criteria for down- and de-listing. Criteria for down-listing were met for a short period. Due to concerns regarding the status of several populations, down-listing was delayed; thus, the number of reintroduced populations dropped below the level required for down-listing, where it has remained. The Yaqui topminnow was included within the Yaqui Fishes Recovery Plan (USFWS 1995). The revised recovery plan has been drafted and a final plan is expected to be published in 2003.

The status of the species is poor and declining. Gila topminnow have gone from being one of the most common fishes of the Gila basin to one that exists at no more than 30 localities (12 natural and 18 stocked). Many of these localities are small and highly threatened. The theory of island biogeography can be applied to these isolated habitat remnants, as they function similarly (Meffe 1983, Laurenson and Hocutt 1985). Species on islands are more prone to extinctions than continental areas that are similar in size (MacArthur and Wilson 1967). Meffe (1983) considered extinction of Gila topminnow populations almost as critical as recognized species extinctions and Moyle and Williams (1990) noted that fish in California that are in trouble tend to be endemic, restricted to a small area, part of fish communities with fewer than five species, and found in isolated springs or streams. Gila topminnow have most of these characteristics.

ENVIRONMENTAL BASELINE

The highest priority actions in the draft revised Gila topminnow recovery plan are essential to preventing its extinction in the foreseeable future (Weedman 1998). Federal actions have contributed to the degraded status of the Gila topminnow. Federal actions requiring section 7 consultations affecting Redrock Canyon, Cienega Creek, Sonoita, the Santa Cruz River, and others in the Gila River basin have contributed to the lowered baseline. An indication of the poor environmental baseline of the Gila topminnow is that two previous formal consultations have resulted in jeopardy opinions. Although the reasonable and prudent alternatives remove jeopardy, not all adverse effects are removed by implementation of the reasonable and prudent alternatives. Other Federal actions, as well as non-Federal actions that have not undergone section 7 consultation, also have unmitigated adverse effects that contribute to the degraded baseline.

Gila topminnow currently occupy locations only in the Huachuca EMA. The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

Additionally submitted information contained in your October 7, 2002, biological assessment for Gila topminnow (Appendix C - Addendum), analyzed effects of the proposed action on Gila topminnow and their habitat where livestock grazing occurs within those allotments contained in the same subwatershed that drains into Gila topminnow occupied habitat. This situation occurs for the Cienega Creek, Sonoita Creek, Lower Santa Cruz, and Middle Santa Cruz watersheds.

Table 1 of the addendum notes the number of Forest allotments, per watershed, where livestock grazing may have impacts to occupied Gila topminnow habitat downstream. Table 2 lists the three primary areas on the Forest where this could occur: Upper Cienega Creek, Sonoita Creek, and Lower Santa Cruz River. Table 3 names the allotments, per watershed, the stream miles from the allotment (s) to occupied Gila topminnow habitat, and the effect determination for the allotments addressed in the addendum. Stream miles were estimated and varied between two and 15 miles from allotment boundaries to occupied Gila topminnow habitat. Other details such as watershed condition by EMA, general effects of watershed or discharge alterations on aquatic species, guidance criteria, and effects determination per allotment are contained in tables 4, 5, 6, and 7 in the addendum.

Gila topminnow populations in Sonoita and Cienega creeks appear to be stable this season according to the annual AGFD survey results for native fish. In the lower Santa Cruz River, some sedimentation is occurring, but this is just one of several factors (groundwater pumping, drought, reduced water clarity and quality, increased turbidity, degradation and loss of topminnow habitat, among others) that negatively affect the species; it is difficult to say to what degree the sedimentation is a result of livestock grazing or other means (J. Voeltz, pers. comm. 2002).

The following criteria are to be used by a fisheries biologist to determine the effects that the proposed livestock grazing and management activities will have on the previously described fish species.

No Effect (must meet one of the criteria):

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into threatened and endangered species habitat.

2. Livestock grazing on the allotment will be excluded from threatened and endangered species habitat, in order to sustain all life stages of threatened and endangered species, the subwatershed is in satisfactory condition, and there will not be effects such as:

a. Sedimentation (sediment traps occur between the allotment and threatened and endangered species habitat), and

b. Evidence of active erosion caused by livestock or livestock management activities.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by year-long exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

You determined that livestock grazing on 39 allotments may adversely affect this species. The allotments are:

Santa Rita EMA: Alto, Apache Springs, Aqua Caliente, Debaud, Fort, Gardner Canyon, Greaterville, Oak Tree I, Oak Tree II, Rosemont, Squaw Gulch, Temporal, and Thurber.

Tumacacori EMA: Calabasas, Marstellar, Mariposa, Murphy, Pena Blanca, Ramanote, Rock Corral, and Sopori.

Whetstone EMA: Coal Mine, Mescal, and Wakefield.

Huachuca EMA: Alisos/Tordilla, Bender, Crittenden, Harshaw, Kunde, Ferrell, Oak Bar, Lewis, MacFarland, Papago/Z-Triangle, Red Mountain, San Rafael, Santa Cruz, Seibold, and Weiland.

In addition to the general environmental baseline described earlier in this biological opinion, the environmental baseline in the Santa Cruz River, Redrock Canyon, and Sonoita and Cienega creeks is important in considering the effects of the proposed livestock grazing on Gila topminnow.

The portion of the proposed action that may affect Gila topminnow the most is the continued authorization of livestock grazing and management activities, at present levels and under existing systems, for the Crittenden, Kunde, Papago/Z Triangle, San Rafael, and Seibold allotments. These allotments encompass all of Redrock Canyon and parts of the watersheds of Sonoita Creek and Cienega Creek, all of which support remnant natural populations of Gila topminnow.

Cienega Creek is a tributary of the Santa Cruz River, entering it through the Pantano Wash complex at the City of Tucson in Pima County. A large portion of Cienega Creek is located within the BLM's Las Cienegas National Conservation Area; this area contains most of the Gila topminnow within the Cienega Creek basin. The BLM acquired this area from private ownership in 1988. The "headwaters of perennial flow in Cienega Creek begin on the Conservation Area, about 16 km (10 mi) downstream from where the channel leaves the Papago allotment. A number of human activities are allowed along this portion of Cienega Creek, including livestock grazing, recreation, and roads. Prior to BLM acquisition of the area, it was primarily used for grazing, but there were also fields along the creek. These fields were irrigated by a system of canals and dams that locally destroyed Gila topminnow habitat and created severe erosion. The BLM is gradually removing these developments and has reconstructed a portion of the creek to restore more natural geomorphic and hydrologic conditions.

Above BLM land on Cienega Creek, the valley is mostly used for livestock grazing. A growing, extensive proliferation of ranchette development in the area surrounding the town of Sonoita exists and is based on groundwater use, which may threaten the water supply for Cienega Creek.

Implementation of the Redrock Action Plan began in 1990 and is on-going. Although a complete history of the grazing intensity and management on the five allotments being considered here would be useful in fully understanding the environmental baseline, complete information is not available. It is important to recognize that although historical grazing practices may have had significant adverse impacts to the stream channel of Redrock Canyon and contributed to the present deteriorated environmental baseline, current stocking numbers are substantially lower and grazing practices are more intense and controlled.

There are a number of accounts of human activities in the Sonoita Creek drainage area pre-1900. These early accounts indicate that substantial historical and prehistorical human use of the Sonoita Creek and Redrock Canyon area occurred and resulted in significant changes in the watershed and stream channel and degradation of the environmental baseline.

Livestock grazing in southern Arizona, including the Cienega and Sonoita watersheds, reached its peak about 1891 (Bahre 1991). Severe drought between 1891 and 1893 led to decimation of the herds and the ranges. Accelerated downcutting of stream channels began in southern Arizona (Bryan 1925, Antevs 1952) and downcutting in Sonoita Creek probably occurred around 1890 (Minckley 1969b). A substantial flood in Sonoita Creek in the summer of 1886 followed by serious flooding in 1887 and 1890 appear to have been triggering events for the downcutting in upper Sonoita Creek and lower Redrock Canyon shown in 1895 photos in Hastings and Turner (1980). Later droughts in the 1920s and 1930s were also associated with severe overgrazing in Sonoita Creek, Redrock Canyon, and the San Rafael Valley (Hadley and Sheridan 1995).

Vegetation changes within the Sonoita Creek watershed are documented by a number of different studies and included declines in grass, increases in woody xerophytes, expansion of exotic species, and decline in riparian wetlands (Hastings and Turner 1980, Hendrickson and Minckley 1984, Bahre 1991). Changes are variously attributed to human activities such as livestock grazing, fuelwood harvest, fire suppression, mining, and groundwater pumping, and climatic change. Hastings and Turner (1980) show two photograph pairs from 1895 and 1965 of lower Redrock Canyon that show extensive change of grassland to mesquite in that period. This may represent a change away from prehistorical conditions or a regrowth of woody vegetation depleted by mining and other human activities.

The Sonoita Creek Valley is now extensively modified for human use. Most of the valley bottom is occupied by towns, residences, or fields. Urban and suburban development is increasing. Several subdivisions have been developed, including Rail X Ranch Estates, at the mouth of Corral Canyon. An exception to this urban development is The Nature Conservancy Patagonia Preserve, located just downstream from the town of Patagonia.

At present, Redrock Canyon is subject to a number of human uses. Livestock grazing, roads, mining, fuelwood gathering, recreation, hunting, residential use, and water development have all influenced the character and condition of the watershed and stream channel.

Since establishment of the Coronado National Forest in the early 1900s, there have been a number of efforts to control and manage livestock grazing within the Redrock and nearby watersheds and livestock numbers have been significantly reduced (see Hadley and Sheridan for a history of post-1900 ranching in the area). Within Redrock Canyon efforts have also been made to protect key riparian areas from adverse effects of livestock use. In the early 1980s, you constructed an exclosure around a small perennial area of stream surrounding the natural falls in the lower part of Redrock Canyon, but by 1988 that exclosure was in disrepair and did not exclude livestock. By 1990, range condition and trend on the allotments within Redrock Canyon was poor to very poor and riparian conditions were unsatisfactory (USFS 1998).

In 1990, you began a management program called the Redrock Canyon Action Plan which resulted in three large and one small exclosures of perennial stream areas, winter grazing in the unexclosed portions of the channel of Redrock Canyon proper, and more carefully controlled grazing under deferred rotation. Pastures were added on three of the allotments and water developments were added. The purpose of these favorable changes was to "improve the vegetation conditions within the canyon, increase species and age class diversity of streamside vegetation, control erosion, and improve habitat for the Gila topminnow (USFS 1998). These changes have been gradually applied over the past nine years so that the results are not yet fully realized; but significant change in riparian vegetation and some stream channel improvement within the exclosures has already occurred. Range conditions on the allotments in Redrock Canyon remain poor to fair (low to moderately low, see revised tables in 1998 BA). Your information shows trends are mostly static on the Crittenden, Kunde, and Seibold allotments, and are overwhelmingly down on the Papago/Z Triangle and San Rafael allotments. Soil conditions are mostly unsatisfactory or impaired.

Winter grazing on the unexclosed portions of the Redrock stream channel does not appear to have achieved the results predicted by the Action Plan. While a small amount of vegetation and transect data have been collected within the exclosures, as well as an annual series of photopoint monitoring (Wade 1995, Stefferud and Stefferud unpub. data), there are no data available outside the exclosures. Observations by our staff during annual sampling of Gila topminnow populations in October and November indicated little or no change in riparian vegetation and stream bank and channel conditions and morphology outside the exclosures on the San Rafael and Kunde allotments over the nine years since the initiation of the Redrock Action Plan. Limited riparian vegetation improvement on the Seibold allotment has been noted. Additional information provided by you as a result of your comments on the draft biological opinion at that time indicate that a survey from Red Bank Well to Down Under Tank in March 1997 found improving riparian conditions, based primarily on the presence of large numbers of seedlings and saplings of woody riparian species (Deecken 1997), most of which apparently did not survive, based on our staff observations in October 1998. Utilization levels on woody riparian ranged from 15 to 35 percent, compared to the 20 percent standard. Use on herbaceous riparian was 35 to 55 percent and adjacent uplands 25 to 60 percent, compared to the 45 percent standard.

A December 1999 range inspection by you also reported "the improvement in resource conditions is noteworthy but provides no specific information, except to note that "use in the Redrock Cany on bottom near Redbank Well was "less than 20 percent and "herbivory on r iparian trees near Down Under Tank was 12 percent (midway through the scheduled grazing period with a standard of no more than 20 percent use) (Edwards 1999). On June 2, 1999, observations by our biologist from the bend below the site of the Old Silver Tank well upstream to the Cott Tank exclosure found one patch of localized sapling willows, a few scattered sapling willow and cottonwood, grasses on the streambanks cropped short, extensive cattle trailing on the stream channel and banks, and actively eroding banks in the non-bedrock areas (J. Stefferud 1999; S. Stefferud 1999). There was extensive utilization of current growth of willow and cottonwood. Cattle had been removed from the area in

February, although unpermitted use had occurred more recently, with the out-of-season cattle removed upon discovery (USFWS 1999a).

Without detailed information on actual use by both permitted and unpermitted livestock, it is not possible to accurately interpret the information on change, or lack of change, in stream channel and riparian vegetation conditions since initiation of the Redrock Action Plan. You stated that previous permittees on the Seibold and Kunde allotments did not conform to permit specifications, the Action Plan changes were done gradually and some fences and grazing systems were only put in place as recently as 1998, and water availability was overestimated in some places. Although these factors may legitimately explain why the purpose of the Action Plan is not being achieved, the fact remains that after 12 years of effort to stabilize and improve their status, the Gila topminnow in Redrock Canyon continue to be in serious condition.

Because the major human influence on the watershed condition, hydrology, and stream channel of Redrock Canyon is livestock grazing and its management, continuation of essentially the same permitted livestock grazing and management, as proposed here, would not seem to promise sufficient and rapid enough improvement in the overall degraded range, riparian, and watershed conditions in Redrock Canyon to avoid on-going adverse effects to Gila topminnow which inhibit their recovery and may compromise their survival. Comments by the AGFD on the 1999 biological opinion agreed that, "In spite of considerable dollars that have been spent by the Forest to manage the area with consideration for the species, management is still inadequate to provide the necessary habitat attributes for long-term maintenance of the species (AGFD 1999).

Although generally successful, in the past, the four exclosures have been breached several times and light to extensive grazing has occurred within them. The Cott Tank exclosure was completed in 1992 and was lightly grazed in 1995 and 1996. The Gate Spring exclosure was completed in 1994 and heavily grazed in 1994, 1996, and 1997; it was breached but not heavily grazed in 1995. The Falls exclosure was completed in 1995 and breached but not grazed in 1996 and heavily grazed in 1997. The Pig Camp Spring exclosure was completed in 1994 and moderately grazed in 1996. Despite these grazing incursions, substantial development of riparian vegetation and some streambank rebuilding has occurred within the exclosures and the trend is generally upward, with setbacks when grazing occurs within the exclosures (Stefferud and Stefferud unpub. data). In addition to removal or change in livestock use, riparian development, both inside and outside the exclosures, has been influenced by the lack of significant flooding since 1990. Outside the exclosures, little riparian vegetation improvement has occurred and no streambank or channel improvement have been noted. Substantial reaches of stream and springs continue to be heavily trampled by livestock.

There are a large number of water development projects throughout Redrock Canyon. While most of these were constructed for livestock use, some were installed for wildlife purposes. There are 11 earthen stock ponds or tanks within the drainage, several of which serve as source populations for disseminating nonnative fish. There were at least four wells along the banks of the mainstem (on Redrock Ranch; Redrock Well T 22 S, R 17 E, NW¼ Sec. 7; Redbank Well T 22S, R 17 E, NW¼ Sec. 17; and Silver Tank Well T 22 S, R 17 E, NE¼ Sec. 16) which pump alluvial water. Of those, Silver Tank Well is now defunct. A well on the bank of Oak Grove Canyon (T 22 S, R 16 E, NE¼ Sec. 2) which formerly pumped alluvial water was replaced in 1998 with a 400-foot well (Collins 1999). Three other wells on unnamed tributaries and upper Lampshire Canyon may use shallow alluvial water. Others in the uplands are deep wells. There are also assorted troughs, pipelines, trick tanks, and guzzlers and a number of defunct and decaying troughs, sills, and pipelines. The effect of these developments individually and cumulatively on the hydrograph of Redrock Canyon are unknown and cumulatively may adversely affect the size and duration of perennial flows.

There has been sporadic mining throughout the canyon, with a large concentration in the area of Candelerio Peak. Numerous mining claims and inactive mines are located throughout the watershed. These activities have probably had serious adverse effects due to increased erosion and sediment, introduction of contaminants into the stream, water use, and roads. Presently there does not seem to be any significant mining activity in the watershed.

In some areas in Redrock Canyon there are serious problems with streambank and stream channel destruction and erosion because of the roads. Terrace loss has been accelerated by the roads which ascend and descend floodplain terraces in many places, leaving erosion paths. In 1990, you closed the road leading down to the Cott Tank drainage and from Redrock Well to Gate Spring. The Cott Tank drainage closure has been highly effective, and the road is rapidly disappearing under vegetation.

The property owners at the Redrock Ranch inholding have closed the road where it crosses their property; this stops public access from there to Gate Spring and up into lower Lampshire Canyon. A road from the south into the canyon at Red Bank Well also exists, although you mentioned you were unsure if it is still passable. In October 1988, recent vehicle tracks were present on that road near Red Bank Well, but did not come from up or down the canyon showing the vehicle had come in from the south road. Several other roads continue to receive light to moderate use. In particular, the roads in lower Redrock Canyon appear to have increasing use, and Forest Road 4609 up lower Oak Grove Spring Canyon and its unnamed tributary appears to receive substantial use. A track was cut up the unnamed tributary (T 22 S, R 16 E, E ½ Sec. 26, 35) to access Corral Canyon for the purposes of water development for livestock. In the January 28, 1998 BA and evaluation (BAE) for this road opening, you based your determination of no effect to Gila topminnow on assurance that this track would not be opened for any use other than servicing the water development. Locked gates were installed at both ends.

Recreation in Redrock Canyon is increasing. Most current use is dispersed camping, hiking, hunting and general outdoor recreation. Fall hunting is probably the highest use time and is generally associated with 4-wheel and off-road vehicle use along many of the roads and tracks, but use of the roads as well as the stream channel and off-road tracks by vehicles occurs year-round. In 1995, a vehicle had driven upstream to Gate Spring and through the length of the exclosure. The Arizona Trail enters the Canyon near Down Under Tank in the upper end of Redrock Canyon proper and then runs along the Redrock Canyon bottom to just above the Falls where it exits the canyon over the south ridge into Harshaw Canyon. This trail is open to use by hikers, mountain bikers, and horses. Use at present appears to be light to moderate, although information provided by the Kunde allotment permittee indicated "bicycle rallies, hiking trips, professional horse back trail rides, and hunters use the trail regularly (Peterson 1999). Trail counters to monitor use were a part of the original project proposal. This information was to be provided to us under the terms of the incidental take statement of the December 1992 biological opinion on trail construction and routing. The information has not yet been furnished. We believe recreation will not remain static or decrease here; with Sierra Vista's rapidly expanding perimeters and the increasing numbers of people entering the area, many to stay, we anticipate increased uses every year.

There is one private inholding of 64 ha (160 ac) near the falls in Redrock Canyon. The road accessing the property is the main canyon road. The landowners have irregularly maintained the road from the Forest boundary to Redrock Ranch, bringing in heavy equipment occasionally, particularly after floods, to remove gravel buildups and fill washouts. Although this maintenance work has been relatively low-key, it has contributed to channel destabilization and sediment production.

Because of the 1990 Redrock Canyon Action Plan, many rock gabion, reseeding, and other watershed stabilization and restoration projects were installed throughout the drainage. They appear to be mostly successful (M. van Gilder, USFS, pers. comm. 2002).

In addition to physical alterations of the Sonoita and Redrock watershed and stream channels, a number of nonnative aquatic species were introduced. Nonnatives adversely affect the native fish community through competition and predation (Courtenay and Stauffer 1984, Meffe 1985, Marsh and Brooks 1989, Propst et al. 1992, Blinn et al. 1993, Douglas et al. 1994) and Gila topminnow are particularly vulnerable to adverse effects from nonnative species (Miller 1961, Meffe et al. 1983, Meffe 1985). Nonnative aquatic animal species recorded in Redrock Canyon include western mosquitofish, largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) (Rinne et al. 1980, Brooks 1985, Stefferud and Stefferud 1994). Several other nonnatives have been found in Sonoita Creek including red shiner (*Cyprinella lutrensis*) and yellow bullhead (*Ameiurus natalis*) (Gori 1995). There are also a number of nonnative riparian and aquatic plants now present in Sonoita Creek and Redrock Canyon which are believed to have detrimental effects on the stream channels and fish habitat (Stromberg and Chew 1997). These include salt cedar, water cress, bermuda grass, rabbit's foot grass (*Polypogon monspeliensis*), and fountain grass (*Pennisetum* spp.).

Personnel from the Sierra Vista Ranger District expressed concern that the Redrock Action Plan consultation had already covered livestock grazing and that the only purpose of the present consultation was to obtain an incidental take statement for non-range project portions of the grazing program. Although the biological opinion on the Redrock Action Plan did not specify a time-period to which the opinion applied, each biological opinion contains a "reinitiation notice (entitled Closing Statement in this opinion) which discusses the four criteria from the section 7 regulations (50 CFR 402.16) under which reinitiation of consultation on an action is required. The livestock grazing, road, and water development portions of the Redrock Action Plan meet two of those criteria. There is substantial new information on the Gila topminnow, its habitat, effects of the livestock grazing, success or lack of success of various management efforts, road use, and other parameters that would reveal effects to Gila topminnow not previously considered and thereby trigger criterion 2 (see Closing Statement). There are also substantial modifications to the project proposed in the Redrock Action Plan, both already implemented and planned, that would individually and cumulatively change the effects to Gila topminnow and trigger criteria 3. In addition to the new information and effects considered in this biological opinion, those concerned with range projects will require additional consultation beyond this one.

The Redrock Canyon Action Plan, Arizona Trail, and 11 Forest Plan biological opinions gave you reasonable and prudent measures and terms and conditions of incidental take statements for Gila topminnow. The San Rafael allotment grazing permit concurrence was conditional on certain changes to the plan.

There are accumulating levels of both adverse and beneficial actions for Gila topminnow in Redrock Canyon, Sonoita Creek, and Cienega Creek. Although data are provided only for Redrock Canyon, Table 23 illustrates that implementation of measures designed to minimize and mitigate the adverse effects is less than complete. It appears there is an accumulating burden of adverse effects that must be considered as the baseline for the present consultation.

The 1986 Forest Plan sets up standards and guidelines which apply to management of Gila topminnow and its habitat and to management of livestock grazing. The following are the primary Forestwide standards and guidelines which are applicable to this consultation:

- Maintain or improve occupied habitat of . . . listed . . . species through mitigation of Forest activities.

- Reintroduce extirpated native species into historical habitats in accordance with cooperative interagency plans.

- Leave drainage strips of existing vegetation in drainages and around waters.

- Fence riparian areas where prescribed by approved allotment management plans.

- Best management practices will be used to minimize the time of recovery to a satisfactory erosion level, minimize soil productivity loss, improve water quality, and minimize channel damage.

- Manage riparian areas to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect, and where applicable, improve dependent resources.

- Give preferential consideration to resources dependent on riparian areas over other resources. Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian-dependent resources.

- Improve all riparian areas to satisfactory or better conditions by the end of Period 5 (by 2036).

- Twenty-five percent of all riparian areas must be in satisfactory condition by Period 2 (by 1996).

- Maintain at least 80 percent of natural shade over water surfaces in fish bearing streams.

- Maintain at least 80 percent of natural bank protection.

- Maintain the composition of sand, silt, and clay within 10 percent of natural levels in fish bearing streams.

- Maintain at least 60 percent of the woody plant composition in three or more riparian species.

- Maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species.

- On a site-specific basis, identify riparian-dependent resources and develop action plans and programs to bring about conditions essential to supporting those dependent resources.

- Identify key ungulate forage monitoring areas. These key areas will normally be 0.25 to 1.0 mile from water, located on productive soils on level to intermediate slopes, and be readily accessible for grazing. Within key forage monitoring areas, select appropriate key species to monitor average allowable use.

- In consultation with us, develop site-specific forage use levels. In the event that site-specific information is not available, average key species forage utilization in key forage monitoring areas by domestic livestock and wildlife should not exceed levels in the above table during the forage growing season. (Table values for the Seibold, Kunde, and Papago/Z Triangle are 20 percent; for Crittenden, 10 to 35 percent; for San Rafael, 15 to 20 percent).

- Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.

Redrock Canyon and its watershed contains three management area designations in the Forest Plan. Standards and guidelines for management area 1, which includes steeper slopes along the higher elevations of Redrock and Corral Canyons, call for no livestock grazing. Although these areas are not fenced off from other areas of the allotments under consideration here, they are thought to receive little or no grazing use because of the steepness of the terrain. The management emphasis is for visual resources and semi-primitive dispersed recreation.

For management area 4, which includes most of the uplands of Redrock Canyon and almost the entire Crittenden and Papago/Z Triangle allotments, standards and guidelines call for livestock grazing at several levels of intensity and grazing management. Chaparral in management area 4 is to be managed at level B, which calls for 25 percent utilization levels, at 60 percent of full capacity. There are 108 ha (271 ac) of chaparral in the Crittenden and Papago/Z Triangle allotments, probably all outside Redrock Canyon. Grasslands in management area 4 are to be managed at level C, which calls for 30 to 35 percent utilization levels, at 90 percent of full capacity. There are 1,434 ha (3,589 ac) of desert grassland and 4,998 ha (12,494 ac) of plains grassland in the five allotments, although the bulk of the plains grassland lies in the non-Redrock portion of the San Rafael allotment. Woodlands in management area 4 are to be managed at grazing level D at 35 to 55 percent utilization levels, at 100 percent of full capacity with intensive management. This comprises the bulk of the Redrock Canyon allotments, with 14,762 ha (36,906 ac). Objectives for management area 4 include maintaining and improving habitat for listed species, including Gila topminnow and for achieving reoccupation of historical habitat. It is a high priority in this area to restore watershed to a satisfactory condition. Management emphasis is on sustained livestock forage and fuelwood while maintaining and improving game animal habitat.

The bottom of Redrock Canyon, including the Cott Tank drainage bottom and the bottomland along upper Cienega Creek, is in management area 7. Livestock grazing in this area is to be managed at level D (see above) or if objectives cannot be achieved using level D, then the area should revert to management at level A, which calls for no grazing. Management emphasis is to maintain unique wildlife and vegetation and produce livestock forage and fuelwood. Standards and guidelines are to maintain and improve habitat for listed species including Gila topminnow and for achieving reoccupation of historical habitat. Watershed treatment is a high priority.

Although many of the Forestwide standards and guidelines are being met on the five allotments under consideration here, there are a number that are not or are being only partially met. For example, they call for maintenance of at least 80 percent of natural bank protection. Although substantial progress toward this standard has been made through the construction of four exclosures in Redrock Canyon, the natural bank protection of the majority of streambanks in the canyon is moderately to highly degraded.

The Region-wide guidelines for range utilization from the 1996 Forest Plan amendment are not being met. This is presumably because the guidelines allow for substitution of other utilization levels using "site specific information. Given that the five allotments being considered here are in moderately low range condition and on a static or downward trend with unsatisfactory soil conditions, we are concerned that the utilization standards based on site specific information are about double that of the amended plan guidelines.

Seven of the twelve extant natural populations of Gila topminnow may be within the proposed action area. The middle Santa Cruz River and lower Sonoita Creek appear sufficiently isolated from watershed effects of the proposed action by the presence of Patagonia Lake, which virtually eliminates any hydrologic, geomorphologic, and sediment effects of the action on those downstream populations. Two others, Cottonwood Spring and Monkey Spring, are only marginally able to experience downstream effects from the proposed grazing. Only a very tiny amount of the upper Sonoita Creek drainage above Cottonwood Spring is within the Crittenden pasture of the Crittenden allotment and no downstream effects are expected. Although Monkey Wash also drains off the Crittenden pasture, the spring itself is outside the allotment and is not within the floodplain of the wash and is not subject to watershed effects from that drainage. The other three populations, Sonoita Creek above Patagonia Lake, Cienega Creek, and Redrock Canyon are expected to experience adverse effects because of the proposed action.

Cienega Creek supports the largest existing Gila topminnow population, is one of only three populations uncontaminated by nonnative fish, and is one of only two natural populations on public lands (the other being Redrock Canyon). There are approximately 10.5 km (6.5 mi) of perennial habitat in Cienega Creek itself, 1.7 km (1.1 mi) in Mattie Canyon, and 1.5 km (0.9 mi) in Empire Gulch, both tributaries to Cienega Creek (Simms and Simms 1991). Areas of warmer groundwater discharge have been found to hold extremely high densities of Gila topminnow at certain times (566/square meter) (Simms and Simms 1991).

A fish inventory was conducted in the fall, annually, from 1989 to 1994 in Cienega Creek (Young and Lopez 1995). Besides Gila topminnow, the only fish in the creek are the native longfin dace and Gila chub. Gila topminnow are common to abundant throughout all years from the beginning of perennial flow above the confluence with Gardner Canyon downstream to the Narrows.

The Cienega Creek watershed was closed to fishing by the AGFD commission in 1996. This action was taken to help protect Cienega Creek from invasion by nonnative fish, which are often imported during fishing activities. The BLM has taken many actions to improve conditions along Cienega Creek for Gila topminnow and other native aquatic and riparian species.

Exclosure fencing now restricts livestock grazing along large portions of the creek and some revegetation of some riparian areas is underway.

Along with Cienega Creek, Redrock Canyon supports the only two relict natural populations of Gila topminnow existing on public lands. Gila topminnow in Redrock Canyon were discovered in the late 1960s (Rinne et al. 1980). Gila topminnow occupy the perennial stretches in Redrock Canyon and experiences rapid population expansion into available intermittent waters during wet periods (Simons 1987, Stefferud and Stefferud 1994, USFS unpub. data). The three main population centers are in the Cott Tank drainage, at Gate Spring, and at the falls. The length of stream occupied by each of these populations varies from year to year. Not only does the area of stream occupied vary, but the populations themselves fluctuate substantially over time. This bellows-like expansion and contraction of populations is a basic part of the life history of the species, the bulk of whose original habitat was backwaters, sloughs, and other fluctuating environments along major rivers and streams (Deacon and Minckley 1991). The small streams and springs in which we find Gila topminnow today represent only a minor, and marginal part of what was originally the habitat of the species.

At Gate Spring, the watered reach and Gila topminnow populations vary substantially. In the wetter years of the late 1980s and early 1990s, water often extended from the Gate Spring location shown on the USGS 7.5 minute topographic maps about 0.75 km (0.5 mi) downstream. But, in June of 1996, there existed only one small pool at Gate Spring (Stefferud 1996). A little over half the 0.75 km of flow that is sometimes present is within the exclosure. When water is present, it is primarily shallow runs and riffles with a few pools. In 1982, three small concrete deflectors were constructed in an attempt to introduce localized sinuosity and velocity into the channel, thereby causing pool formation. Only the lowermost of these structures have succeeded in creating a pool. The Gate Spring Gila topminnow population ranges from none to abundant. In 1988, Gila topminnow were found throughout the 0.75 km of water present. No Gila topminnow were found at Gate Spring since November of 1995, probably due to the dry 1996 conditions. No substantial flooding has occurred since then to allow fish to move through the long dry stretches of channel from Cott Tank drainage or elsewhere to repopulate Gate Spring. Longfin dace are often abundant at Gate Spring and throughout all water present, but have not been found there since 1995. Mosquitofish are rare at Gate Spring, having only been found there in three of 17 samples since 1979, all of which were before 1995. A late December 1998 report by your range conservationist of "fish at Gate Spring (Edwards 1999) has not been confirmed and no fish were present during sampling in late October 1998. Fish reports by non-fish specialists are often mistaken, such as the late May report of "weird fish in pools near Silver Tank Well, where our agencies' fish biologists found no fish a week later (J. Stefferud 1999; S. Stefferud 1999).

At the falls area, surface flow varies from a few small pooled areas in June 1989 (Stefferud 1989) to about 1.5 km (about 1 mi) in May 1988 (Stefferud 1988). Gila topminnow are generally rare to abundant below the falls and have not been taken in the stretch just above the falls since 1993. Only in October 1991, have topminnow not been found in this area in the 20 samples since 1979. Longfin dace are common to abundant at this site except in 1996 and 1997, when they were rare. Another native fish, the desert sucker, was found just below the falls in 1987, but not since. The only nonnative fish species here is mosquitofish which are rare, having been found there only in 1992. Both topminnow and longfin dace expand their populations during years of increased surface flow and in 1988 occupied the entire 1.5 km. During dry years, populations of both species may crash, and may appear to disappear entirely, as Gila topminnow did in 1991.

In addition to these three main centers of Gila topminnow in Redrock Canyon, there are several other areas where the species occurs. Gila topminnow, along with longfin dace, are sporadically found in Pig Camp Spring, a small spring just off the Redrock Canyon channel in T 22 S, R 16 E., SW¼ of the NW¼ Sec. 2. They are also occasionally found just downstream from that point in small pools in the Redrock Canyon channel. In 1998, Gila topminnow were also found in the Redrock channel in T 22 S, R 16 E, NE¼ of the NW¼ Sec. 3 about 1.2 km (0.75 mi) upstream from your boundary. Longfin dace were also present and in 1990 mosquitofish were also found here. Even in the relatively dry year of 1989, surface water was present and longfin dace were found, but the site was dry in June 1996.

In April 1987, the AGFD found Gila topminnow and longfin dace at two places in the Oak Grove Spring drainage (Simons 1987). Although the main Oak Grove Spring Canyon and two of its tributaries were resurveyed in July 1987, October 1990, and October 1998; no other Gila topminnow were found. Mosquitofish were found in a small, isolated pool about halfway up Oak Grove Spring Canyon in October 1990. These infrequent surveys and scanty data indicate that the three species of fish all use portions of Oak Grove Spring drainage during periods when surface water is available, but that these periods may be relatively rare given the conditions during the 1987-98 period.

In 1987, mosquitofish were found in Lampshire Canyon near the dam in the south half of T 22 S, R 17 E, Sec. 6 (Simons 1987). In May 1987, Gila topminnow and longfin dace were found in the same area, and again, in 1992, longfin dace were found there (Simons 1987, Stefferud 1992). No fish surveys have been done in Lampshire Canyon since 1992. It appears that Lampshire Canyon is colonized by all three species during periods of available surface water but that upstream movement is prevented by the dam. In 2002, AGFD conducted fish surveys in Lampshire Canyon with negative results.

Less is known of the Sonoita Creek population of Gila topminnow than for Redrock Canyon. The only ongoing fish monitoring above Patagonia Lake is on The Nature Conservancy Patagonia Preserve. Gila topminnow have not been found at the Preserve since 1990 (Simons 1987, Brown and Abarca 1992, Gori 1995 and 1997, Weedman and Young 1997). The only recent records of Gila topminnow from the area are observations in 1994 by our personnel at the highway rest area 5.6 km (3.5 mi) downstream from the town of Patagonia (Stefferud 1994), and four specimens taken from just above Patagonia Lake in T 22 S, R 15 E, Sec. 28 and deposited at the Arizona State University Collection of Fishes (Spiller 1995). This population is considered tenuous and prone to extinction from small or cumulative adverse actions to its habitat.

EFFECTS OF THE ACTION

Effects to Gila topminnow from the proposed action differ in Cienega Creek, Sonoita Creek, and Redrock Canyon, but are additive to each other when they are viewed for the species as a whole. The seriously imperiled status of Gila topminnow, together with the degraded environmental baseline for Sonoita Creek and Redrock Canyon, make even small adverse effects to the species and these habitats of serious concern. Status of this species is so dire, and the habitat loss so severe, that recovery is only a long-term vision, and the short-term goal is simply to prevent the extinction of the species within the Gila basin (Weedman 1998).

General effects of livestock grazing on watershed functions and stream channels were discussed earlier in this opinion. That discussion is applicable to the five allotments being considered here. Analysis of the effects of livestock grazing on fish and fish habitat requires looking at subtle, long-term gradual changes in watershed functions, riparian and aquatic communities, and stream channel morphology. The long-term cumulative aspect of grazing impacts, combined with the short-term limited data available on range condition and fish and fish habitat make a purely empirical analysis of the effects of grazing and grazing management difficult and often misleading. Extrapolations of hydrologic and biologic principles and site-specific research data provide a large body of evidence linking degradation of watersheds, stream channels, aquatic and riparian communities, and fish habitat and populations in western North America to grazing and grazing management (Leopold 1924, Leopold 1951, York and Dick-Peddie 1969, Hastings and Turner 1980, Dobyns 1981, Kauffman and Krueger 1984, Skovlin 1984, Kinch 1989, Chaney et al. 1990, Platts 1990, Armour et al. 1991, Bahre 1991, Meehan 1991, Fleischner 1994, Ohmart 1996, Sidle and Sharma 1996, Cain et al. 1997, Fitch and Adams 1998, Belsky et al. 1999).

For Cienega Creek, the effects from the proposed action result from livestock grazing on the Cave, Papago, and West Mountain pastures of the Papago allotment. Much less than half of the Papago allotment lies within the Cienega Creek drainage and, although the upper end of Cienega Creek [about 4 km (2.5 mi)] and several of its small feeder streams are in the allotment, that portion of the creek is intermittent except near Papago Spring. The moderately low range condition of the allotment combined with the 99 percent downward trend and the 82 percent unsatisfactory soil conditions show that the portion of the allotment in the Cienega Creek watershed is contributing excess sediment and declining channel conditions downstream. The small portion of the watershed involved; the 16-kilometer (10 mi) distance between the allotment and the Gila topminnow population; the short-term nature of the proposed action; the above average condition of much of the riparian vegetation on Cienega Creek; and the excellent condition of the Gila topminnow population combine to lessen the adverse impact created by the poor condition of this portion of the watershed and continuation of an action that prevents or delays recovery of the area. The burgeoning ranchette development on the headwaters of Cienega Creek intensifies the downstream adverse effects from the unstable conditions on the Papago allotment. Erosional problems, such as the headcut on Cienega Creek, may partially result from upper watershed problems, such as those occurring on the Papago/Z Triangle allotment. This particular headcut is on BLM land, in the Las Cienegas conservation land below Gardner Canyon. While headcutting is primarily an erosional process from downstream to upstream, the overall disturbance of stream channel stability due to upstream actions may be the ultimate cause of the more proximate erosion represented by the headcut.

The effects to Gila topminnow in Sonoita Creek are similar in mechanism and type to those for Cienega Creek, but are at a much higher level. Sonoita Creek will experience adverse effects from the proposed livestock grazing on all five of the allotments. All five contain portions of the Redrock Canyon watershed which contribute to the hydrologic and sediment regimes of Sonoita Creek. Gila topminnow is rare and might not be doing well in Sonoita Creek above Patagonia Lake. The presence of such a large area of the watershed with relatively high levels of unsatisfactory soil conditions and moderately-low range conditions with part of them in a downward trend, means that Sonoita Creek will experience the altered sediment and runoff patterns that such conditions create. Increased soil compaction and erosion, loss of cryptobiotic crusts, decreases in vegetative cover, and decreased infiltration, create poor watershed conditions which will result in "flashier and more erosive streams, defined by prolonged low flows with decreased volumes and shortened flood events with higher volumes (Gifford and Hawkins 1978, Weltz and Wood 1986, Harper and Marble 1988, Orodho et al. 1990, Schlesinger et al 1990, Elmore 1992, Johnson 1992, Waters 1995, MacAuliffe 1997).

Effects to Gila topminnow in Redrock Canyon from the proposed action are direct and immediate as well as long-term and cumulative. Effects would generally occur through five mechanisms: 1) watershed and hydrologic alteration, 2) physical destruction and alteration of streambanks, channels, and the water column, 3) alteration of the riparian vegetation community, 4) alteration of the faunal community, and 5) effects from non-grazing and structural elements (those already existing projects are not included in this consultation).

Because there have been earlier consultations on livestock grazing in Redrock Canyon, much of this analysis will focus not on the basic effects of livestock grazing on Gila topminnow and their habitat, which has already been discussed, but on the change achieved or not achieved during the past 12 years of implementing the action considered in the 1990 biological opinion. In 1990, the management approaches included substantial changes from the earlier grazing practices intended to improve range, riparian, and aquatic conditions in Redrock Canyon. For Gila topminnow these changes resulted in several improved conditions. The exclusion of four perennial water areas from any grazing was to allow riparian vegetation and channel stabilization and recovery. The prescription for winter grazing only in the remainder of the channel of Redrock Canyon proper was to provide for a more limited recovery of riparian vegetation and channel stability in the non-excluded reaches. No consideration was given to stream channel migratory corridors in other pastures. Construction of additional livestock waters was intended to achieve a more even distribution of cattle and reduce the tendency to congregate in the stream channels. The type of waters developed were intended to limit the amount of open ponded water and confine it to nonnatural substrates, such as troughs, to minimize the creation of habitat for nonnative fish and other aquatic species. In addition, there were other actions in the 1990 plan for roads and watershed restoration that are not part of the action currently being consulted on.

The following discussion is based primarily on personal observations and repeat photopoints during annual Fall Fish Count monitoring by Sally Stefferud (Service, retired) and Jerome Stefferud (Forest Service, retired) and on repeat monitoring and photopoints of channel condition throughout the length of Redrock Canyon and Cott Tank drainage by Jerome Stefferud in 1989 and 1996.

The exclosures were successful. The Cott Tank exclosure achieved substantial gains in riparian vegetation and streambank structure. The bottom of the valley has changed from an open area where the grasses and other herbaceous vegetation were short with bare ground between and walking was easy, to a heavily vegetated area with few open spaces or bare ground and through which walking is difficult. A primary component is deergrass which has become dense and tall. Before the exclosure, this area had few riparian trees. Willow and cottonwood saplings and seedlings scattered throughout the area now exist, although some of these are the result of plantings by you at the time of exclosure construction. In the stream channel, little has changed with the trench pools; however, the areas between the pools have changed from open shallow riffles, to marshy seepage through vegetation or deep runs. There has been a reduction in surface water during the period in which the exclosure has been in place. This is most likely a result of the reduced precipitation experienced during that period. It may also be exacerbated by the increased vegetation. As the vegetative and litter cover builds, surface flow is expected to be first reduced as the bank storage is built up and then increased as surface flows increase and become less variable due to the increased storage. Despite the lower precipitation, the surface flow in Redrock Canyon proper below the Cott Tank exclosure appears to have increased in duration and length, presumably as a result of exclosure effects.

The Gate Spring exclosure has been less successful during the five years it has been in operation. Despite heavy grazing within the exclosure in 1994, 1996, and 1997, there have been substantial gains in woody riparian vegetation. There has been some response in the stream channel with some marshy area replacing the open gravel channel in the lower portion of the exclosure. The Falls exclosure has only been in place since 1995 and was heavily grazed in 1997; but there has been substantial increase in density and size of riparian vegetation within the exclosure. These observations must be viewed with the caveat that no significant flooding has occurred since exclosure construction. Short-term setbacks in riparian vegetation and channel morphology would be expected when flooding occurs, followed by long-term increases in riparian vegetation and channel and bank rebuilding.

As of 1999, limiting livestock use to winter grazing in the remainder of the Redrock channel does not seem to have been successful. The deferred rotation grazing practiced in Oak Grove Spring and Lampshire Canyons also does not appear to have resulted in any significant gains in riparian or channel conditions. The meadow areas at Oak Grove Spring were as trampled in October 1998 as they were in October 1990 (Stefferud and Stefferud unpub. data). These moist stringer meadows are above a short bedrock canyon known as Oak Grove Spring. Surface water is present, although it may be confined to the bedrock canyon during very dry periods. The Oak Grove Spring complex has the potential to form small cienega-like aquatic habitats like those found in upper Cott Tank drainage, however at present the Oak Grove Spring complex consists of open, trampled areas with little surface water. Once protected from livestock use and trampling, they would be expected to develop significantly more riparian vegetation and increased surface water, including trench pools, similar to those in upper Cott Tank drainage where Gila topminnow are found. Increased surface water in areas of subsurface flow can result from removal of livestock impacts (Elmore 1992), and although perennial surface water is very limited now in the Oak Grove Spring complex, it would likely increase substantially as bank storage improved following removal of livestock impact.

The precarious status of Gila topminnow dictates that we must find ways not just to minimize adverse impacts on the few remaining natural populations, but to also find ways to drive those populations in an upward direction. As one of only two natural populations on Federal lands, Redrock Canyon is very important in the survival and recovery of the species. The population of Gila topminnow in Redrock Canyon has declined in recent years. This may be an artifact of the lower precipitation and therefore lower surface flows. It is likely that Gate Spring dried completely in 1996 and eliminated both Gila topminnow and longfin dace there. In addition to the loss of topminnow at Gate Spring, the population at the falls has been relatively low in many of the past years, and no topminnow have been found above the falls since 1993. The proportion of mosquitofish to topminnow is increasing in the Cott Tank drainage.

To stabilize and increase the Gila topminnow metapopulation in Redrock Canyon, there are several basic goals. We need to:

1. increase the amount of flowing surface water in both length and duration,

2. increase the stability and complexity of the habitats in areas now or formerly occupied by Gila topminnow,

3. implement methods to allow development of suitable habitat and presently unoccupied sites,

4. improve channel conditions to enhance the ability for Gila topminnow to migrate between subpopulations during periods of flow, and

5. reduce or eliminate nonnative aquatic species that are detrimental to Gila topminnow.

Achievement of all these goals is related to management of livestock grazing within the watershed. The proposed action will restrict or prevent achievement of those goals. While the four exclosures and other livestock management measures over the past nine years have accomplished movement toward those goals, utilization and trampling of riparian vegetation and stream channels will continue to occur at occupied Gila topminnow sites below Cott Tank drainage, below Gate Spring once reoccupation of that site occurs, just below Pig Camp Spring, and at the site about 1.2 km (0.75 mi) above your boundary. These adverse effects will reduce the capability of the habitat to support larger and healthier Gila topminnow populations outside of exclosures with an increased ability to coexist with nonnative species, such as mosquitofish.

The continued grazing of potential habitat such as Cottonwood Spring in Lampshire Canyon will prevent these sites from developing aquatic habitat capable of supporting Gila topminnow. The lack of sufficient improvement of these sites in the past nine years under the existing grazing management has not shown that continuation of that management will achieve any different results.

Given that the range conditions throughout the drainage are only moderately low and that soil conditions are unsatisfactory, the rotational management proposed for the upland pastures is not likely to result in near-term increases in watershed condition that would restore channel conditions in the intermittent and ephemeral channels that form the migratory corridors between the subpopulations of Gila topminnow. Restoration of these areas will take a long time, and the existing grazing management has shown little ability to achieve restoration at all, let alone in a short time.

Loss of Gila topminnow from its large historical range is believed to have resulted from, among other things, watershed and stream channel alterations caused by livestock grazing (Weedman 1998). The distinction between proximate and ultimate causes of extirpation events is often difficult, particularly when limited information is available. Loss of a Gila topminnow population to flooding may be ultimately the result of watershed alteration by a century of livestock grazing perpetuated by continued livestock use. In addition, causes of failure of reintroduced populations is biased due to use of unnatural habitat, such as stock ponds, wells, etc., which are subject to a whole suite of factors not affecting natural habitats.

Oak Grove Spring is now fenced and excluded from livestock grazing. This greatly reduces the effects of livestock grazing in this area. The possibility exists that Oak Grove Spring may never recover to the point where it will provide sufficient quality and quantity of habitat to support Gila topminnow, but given its similarities to the upper Cott Tank drainage and given the known potential for immigration from the mainstem, we believe it is likely that amelioration of livestock impacts at Oak Grove Spring will result in creation of sufficient habitat that would be able to support an important population of Gila topminnow.

Water development for, and use by, livestock within the Redrock drainage may be adversely affecting surface flows. You were asked to address this question by conducting a cumulative and aggregative analysis of water usage in Redrock Canyon. In your 2000 report, entitled Redrock Creek Water Balance, you determined that the stockponds within the watershed are not contributing to base flow. Therefore, stockpond removal will not increase base flow in the watershed. The diversion of springs into developed waters represents less than 1 percent of the water produced annually in oak woodland watersheds. This is water that could contribute to base flow. Average surface flow was determined to be 990 acre-feet/year; half of which occurs as overland flow during a few summer thunderstorms. Overland flow does not contribute to base flow. You also found that wells, which tap into groundwater, extract less than 1 percent of potential base flow.

The existing livestock management has made strides forward in curtailing the spread of nonnative fish. All recent water developments have been made with great sensitivity toward not providing habitat or dissemination opportunities for nonnative fish; however, there are many existing earthen tanks within the drainage. Continuation of the existing livestock management program means the continuation of the existence of those tanks, some of which are known to contain and disseminate nonnative fish.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

In the Cienega Creek watershed between the Papago allotment and the stream portion occupied by Gila topminnow are many non-Federal activities that contribute cumulative adverse effects. The town of Sonoita and the ranchette development to the east contribute destabilizing effects to the watershed, including increased sediment, pollution, and alteration of the hydrologic cycle. These developments also increase the opportunity for the introduction of nonnative aquatic and riparian species that may adversely affect Cienega Creek and the Gila topminnow. The increasing human population creates greater recreation use along Cienega Creek with many attendant problems. Probably most seriously, the growing use of groundwater in the upper Cienega Creek watershed creates a potential threat to the flow of Cienega Creek. Roads, livestock grazing, and other activities within the upper Cienega Creek watershed also contribute their share of cumulative adverse effects.

Within Redrock Canyon there are few activities that are non-Federal. The only non-Federal land is at Redrock Ranch. It is not known what activities can be expected on the property. We understand that a new well has been drilled on the property, but we have no data on the aquifer from which this well draws, therefore we cannot assess the potential for adverse impact on surface flows in the Canyon. The potential exists for residential use, livestock grazing, and small-scale farming on the inholding. The flat portion of the property is directly on the bank of the stream channel and any disturbance that further destabilizes or erodes the remnant terrace would be adverse to the functioning of the stream.

The Sonoita Creek Valley supports a growing human population. Refer to the environmental baseline for further discussion on that issue. The adverse impacts to streams and their geomorphology and hydrology from urban and suburban development are well known (Dunne and Leopold 1978, Horak 1989, Matthews and Gelwick 1990, Medina 1990, Tellman et al. 1997). In addition, substantial alteration of the Sonoita Creek channel has occurred and will continue to occur within and above Patagonia to protect homes and human property within the floodplain from the effects of high water. Highway 82, other roads, agriculture, and recreation, all contribute adverse effects to Sonoita Creek, altering the habitat and contributing to the very rare and apparently declining status of the Gila topminnow in Sonoita Creek above Patagonia Lake. Patagonia Lake is a major source of nonnative fish and other noxious aquatic species into Gila topminnow habitat. Countering some of these adverse cumulative impacts are the increasing stability and riparian and aquatic conditions on The Nature Conservancy Patagonia Preserve. The Preserve will also help to improve the adverse effects of the livestock grazing in Redrock, Corral, Dark, Monkey, and Alamo canyons by providing a filter for sediment and a complex channel with abundant vegetation to slow and dissipate the flashiness of the flows from upstream.

The American Fisheries Society has adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). That statement concludes that accrual of localized or small impacts, often from unrelated human actions, pose a serious threat to fisheries. It also points out that some improvement efforts to fish habitat may not result in cumulative increases in status of the species, but instead may simply mitigate cumulative habitat alterations from other activities. Because of the increasing amount of non-Federal actions in the Sonoita and Cienega watersheds, any improvement efforts applied to the five allotments under consideration here, may only result in offsetting the adverse effects of the cumulative non-Federal actions.

CONCLUSION

After reviewing the current status of the Gila topminnow, the environmental baseline for the action area, and the anticipated effects of the reinitation of your livestock grazing program, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow. We based our conclusion on the following:

1. With your commitment to the full implementation of the Redrock Action Plan, we anticipate continued improvements to occupied and potential Gila topminnow habitat.

2. Exclosures have been constructed to exclude cattle from occupied habitat in Redrock Canyon.

3. Only one Gila topminnow site will be directly affected by the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by you so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

Incidental take from the proposed livestock grazing on the Crittenden, Kunde, Papago/Z-Triangle, San Rafael, and Seibold allotments is expected to occur both as direct mortality of individual Gila topminnow and as indirect loss resulting from habitat modification and destruction (harm) in Redrock Canyon and Sonoita Creek. Incidental take is not anticipated in Cienega Creek as a result of the proposed action. Direct mortality may occur during reconstruction or maintenance of existing cross-channel fences from activities in occupied habitat, during trampling of stream channels by livestock, grazing within the exclosures when fences are periodically washed out, cut or damaged and are not quickly replaced; dissemination of predatory and competitive nonnative aquatic species through livestock waters; and maintenance of degraded conditions in intermittent or ephemerally flowing migration areas between subpopulations of Gila topminnow; harm may result from reduction in surface flows due to water development and watershed degradation; alterations in the hydrograph that result in flashier streamflows; and maintenance of watershed conditions that result in an unstable stream channel in Redrock, Lampshire, or Oak Grove Spring canyons.

The level of anticipated take will be quantified differently depending upon the action; 1) for construction, development, or maintenance actions, and 2) for general on-going livestock grazing and its management.

1. For construction, development, or maintenance projects (e.g., reconstruction or maintenance of existing fences across the stream channel or existing road and water development or maintenance in connection with grazing activities) we anticipate that direct take of Gila topminnow will occur at a level that will result in no more than 20 dead or dying fish of any species being observed near the activity, or within 0.5 km (600 yards) downstream of the activity, during implementation or within three hours of completion. If this level of mortality is exceeded, work shall be halted and consultation reinitiated.

2. For the general on-going livestock grazing and its management, all Gila topminnow within the exclosures may be taken through harm if livestock enter exclosures, take will be considered to have been exceeded if the following conditions occur:

a. Livestock grazing occurs within an exclosure at a level resulting in more than five percent utilization of woody riparian species (measured as percentage of apical meristems within 2 m (6 ft) of the ground grazed) and trampling, chiseling, or other physical impact by livestock on more than 10 percent of the alterable streambanks by length. Exceeding these levels of utilization and trampling will result in unacceptable impacts to occupied habitat and individual Gila topminnow; or

b. An exclosure fence is cut, down, open, or non-functional for more than two weeks while permitted livestock are in any adjacent pasture next to the exclosure, or for more than two months in any given year if livestock are in a pasture that is not adjacent to the exclosure. The concern here is that there still exists a potential for take by trespass cattle, because fences are not inviolate. Exceeding these levels will result in unacceptable impacts to occupied habitat and individual Gila topminnow.

3. For the general on-going livestock grazing and its management, all Gila topminnow outside of exclosures in periodically occupied habitat may be taken through harm from livestock grazing. In addition, direct take of Gila topminnow will occur when livestock are on occupied habitat. take will be considered to have been exceeded if the following conditions occur:

a. Livestock grazing occurs within a pasture with occupied or periodically occupied habitat resulting in more than 55 percent utilization. Exceeding these levels of utilization will result in unacceptable impacts to occupied habitat and individual Gila topminnow.

If, during the course of the action, the amount or extent of the incidental take anticipated is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. You must immediately provide an explanation of the causes of the taking and review with us the need for possible modification of the reasonable and prudent measures.

EFFECT OF THE TAKE

We find the anticipated level of incidental take is not likely to result in jeopardy to Gila topminnow because of the exclosures for protection of the species and your following the Redrock Action Plan for Gila topminnow.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

We believe the following reasonable and prudent measures are necessary and appropriate to minimize take of Gila topminnow. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with their accompanying terms and conditions in regard to the proposed action. The terms and conditions are nondiscretionary and implement the reasonable and prudent measure as described. These measures apply to the Crittenden, Kunde, Papago/Z-Triangle, San Rafael, and Seibold allotments.

1. Conduct all proposed actions in a way that will minimize direct mortality of, or harm to, Gila topminnow.

The following terms and conditions will implement reasonable and prudent measure 1:

a. Continue to minimize use by livestock in the perennial/semi-perennial stretch of Redrock Canyon found about 1.2 km (0.75 mi) upstream from your boundary in T 22 S, R 16 E, NE¼ of the NW¼ Sec. 3 because Gila topminnow have been documented here and livestock can trample or ingest Gila topminnow. This reach is approximately 0.75 to 1.2 km (0.5-0.75 mi) long. You have incorporated grazing guidelines to achieve this objective in the Annual Operating Plan of the grazing permit. Methods to be used can include, but are not limited to, temporary drift fences, gap fences, herding cattle along the road rather than through the riparian area, and restrictions on season of use. Annual monitoring of utilization of woody riparian vegetation and physical impacts on streambanks will be done before, during, and after cattle have been in the pasture. A fenced riparian exclosure will be constructed if utilization in the area exceeds 15 percent of woody riparian species (measured as a percentage of apical meristems within 2 m (6 ft) of the ground grazed) or trampling, chiseling, or other physical impact by livestock on more than 10 percent of the alterable streambanks by length in any two of the first three years following the date of this biological opinion. If an exclosure becomes necessary under these terms, it shall be designed in cooperation with us and AGFD.

b. In a meeting with us, your and our biologists agreed you will monitor the habitat and stream downstream from the Oak Grove Spring exclosure for three more years and reevaluate the need to move the fenceline at that time. The exclosure was built and hiking pass-throughs were installed. It is anticipated that within three years of the date of this BO (no later than 2005), sufficient Gila topminnow habitat (judged sufficient for Gila topminnow survival by our, your, and AGFD fish biologists) will have developed at Oak Grove Spring. When this habitat is created, even if it occurs later than anticipated, propose a plan, to be coordinated through AGFD process and us, to establish a sufficient amount of Gila topminnow from the falls area or below, into the habitat created at Oak Grove Spring. Note that a proposal is not an authorization; it is an idea that can be suggested to AGFD by any person or agency. In this case, it could be a plan or an outline, to be coordinated through the AGFD and their processes and through us, for the improvement of Gila topminnow populations in created habitat.

c. Add results from all contracts with AGFD to your annual report to us.

d. Complete your evaluation of dam(s) removal located on Lampshire Canyon (T 22 S, R 17 E, Sec. 6) to allow for expansion of periodically occupied habitat and remove harm. Identify legal and hydrological implications as soon as feasible and send us a brief summary of your results.

   i. <u>If</u> it is determined this can be done legally, without detriment to the hydrology of the canyon and Gila topminnow, and that removal of stored sediment is feasible, accomplish complete removal by 2008.

   ii. <u>Whether or not the dam can be removed</u>, propose and coordinate with AGFD and us, a plan to establish a population of Gila topminnow in suitable habitat in Lampshire Canyon (using fish from the Redrock Canyon subpopulation determined to be most biologically appropriate). Include modifications that would help Gila topminnow in this site.

e. Your updated information (via comments to the Draft BO, 10/1/02) on the feasibility of breaching the Down Under tank indicates 1) you will not be breaching the tank due to legal water rights issues, and 2) an alternative water source developed at this location will most likely be a well. Coordinate with AGFD and us in exploring ways to keep nonnative aquatic species from re-inhabiting Down Under tank, perhaps incorporating a non-earthen tank in addition to the Down Under tank, and propose a plan to establish a Gila topminnow population in Down Under tank, another tank situation on site, or both. Nonnative aquatic species are known to cause harm and to kill Gila topminnow

f. Verify with AGFD presence or absence of nonnative aquatics on all Forest lands in the Redrock Canyon watershed by December 2005. If nonnative aquatic species are found, with us and with and through AGFD, propose a plan or outline to remove nonnatives in the Forest lands in the Redrock Canyon watershed. Propose the plan or outline by December 2006. Nonnative aquatic species are known to cause harm and to kill Gila topminnow.

g. Continue inspection and maintenance on the four existing exclosures three times a year. Gila topminnow have been documented here and livestock can trample or ingest eggs or newly hatched Gila topminnow. Inspect and maintain all new exclosures a minimum of three times a year; inspection reports from the permittees may be used to accomplish this term and condition. The permittees will report their inspection and maintenance work to the appropriate district annually. Livestock will be removed from any exclosure immediately upon the permittee learning of such an event. Notify us of your knowledge of any exclosure fence damage and any livestock intrusion into the exclosures within 48 hours of your knowledge of such an event. Notification may be by telephone, electronic transmission, facsimile, or letter. Include a brief summary of such events in your annual reports to us.

h. During any activities that involve work in the stream channel (fence, road, or water development activities), continue all reasonable efforts to minimize activities within the channel to minimize mortality and harm to Gila topminnow. No heavy equipment shall be used within wetted areas or channels. All reasonable efforts shall be made to ensure that no pollutants enter surface waters during any activities.

2. Conduct all proposed actions to minimize harm (loss and alteration) to occupied Gila topminnow habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

a. Continue to implement your drought policy to reduce livestock grazing impacts in Redrock, Alamo, Corral, Dark, and Monkey canyons during dry years. Grazing in drought years can impact watershed function and hydrological regimes, and can also degrade occupied and periodically occupied habitat.

b. To control cumulative adverse effects of roads in Redrock Canyon, any road or track which is constructed, or otherwise opened after January 1997 for use in managing livestock or creating or servicing livestock infrastructure, such as fences and water supplies, will continue to be closed immediately after use. All use shall be proscribed, except that minimally necessary for livestock management maintenance. Wherever possible, the road or track should be ripped and revegetated. The extension of Forest Road 4609, which was created in 1998 to allow for drilling of a well for livestock water on the Crittenden allotment, is included in these provisions, except that it is recognized that the road extension will not be ripped and revegetated. Roads can negatively affect watershed function and hydrological processes and also allow human access. Human access and proximity to roads is a factor in the spread of nonnative aquatic species.

3. Continue to monitor and document dates and levels of incidental take by mortality to fish and adverse effects to occupied and periodically occupied habitat, adding it to your annual report.

The following terms and conditions will implement reasonable and prudent measure 3:

a. Spot monitoring by a biological monitor is acceptable for long-duration projects outside the channel of water (such as fence construction, road work, or water development or improvements) in the Redrock Canyon stream channel or tributaries. The biological monitor shall monitor for the presence of dead or dying fish within the surface waters downstream of the project activity. We and AGFD shall be notified immediately by telephone or e-mail upon detection of more than 20 dead or dying fish of any species. This will be a clear indicator something is wrong and does not require specialized biological knowledge, as opposed to the skills needed to identify (specifically) Gila topminnow. This does not apply to activities associated with routine fence maintenance. For work of any amount of time conducted in water, a biological monitor will always be present during project operations.

b. For the life of this plan (10 years), at no longer than five year intervals, repeat the stream channel and fish habitat survey conducted in 1989 and 1996 (Stefferud 1989 and 1996). A copy of the report shall be included with the annual report.

c. The channel cross-section and vegetation transect monitoring begun after the Arizona Trail biological opinion in 1992, shall be conducted every five years. It will be done in conjunction with the stream channel and fish habitat survey addressed in 3b (above). This monitoring shall be part of the annual report.

4. Maintain a complete and accurate record of actions which may result in take through mortality to fish and adverse effects to occupied and periodically occupied Gila topminnow habitat.

The following terms and conditions will implement reasonable and prudent measure 4:

a. Records of exclosure and gap fence monitoring and maintenance shall be maintained. A brief summary on exclosure maintenance, repair, livestock intrusion, and other relevant information will be furnished in the annual report.

b. In the annual report, briefly summarize for the previous calendar year; 1) implementation and effectiveness of the terms and conditions, 2) documentation of take, if any, and 3) actual livestock use (head, animal months, dates of pasture use, utilization measurements, etc.) with a description of any variations from the proposed action. If other monitoring or research is completed pertaining to Gila topminnow or conditions of rangeland, riparian areas, or soil, a copy of the relevant reports shall be included. A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. When the Seibold, Kunde, Crittenden, and Papago allotments undergo allotment management plan revision and NEPA, consider the four allotments as a unit for their effects to Redrock Canyon and to Gila topminnow. In addition, the effects from the on-going livestock use on the San Rafael allotment in Redrock Canyon and Gila topminnow should be considered in the analysis of effects for the four allotments under consideration (Recovery Plan Task 1.4, Weedman 1998).

2. Due to the importance of the Redrock Canyon drainage to Gila topminnow and 15 other rare or sensitive species and to the degraded conditions and demonstrated difficulty in improving those conditions with continued livestock grazing, consider removing the entire watershed of Redrock Canyon (excluding Harshaw Canyon) from livestock grazing. This would allow more latitude in dealing with impacts from the expected increases in recreational use due to the removal of cumulative impacts (Recovery Plan Task 1.4, Weedman 1998).

3. Work toward acquiring or consolidating private lands in the watershed of Redrock Canyon, especially Cott Tank, either through purchase, land exchange, or donation (Recovery Plan Task 1.4, Weedman 1998).

4. Cooperate and assist us, AGFD, and the Bureau of Reclamation in the planning and construction of a barrier on Redrock Canyon, near the Forest Boundary, if a decision is made to build the barrier (Recovery Plan Task 1.4, Weedman 1998).

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, we request notification of implementation of any conservation actions.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the Arizona Game and Fish Department).

Sonora chub (*Gila ditaenia*)

STATUS OF THE SPECIES

We listed the Sonora chub in the United States and Mexico as threatened on April 30, 1986 (51 FR 16042) with critical habitat. The species is also listed by the State of Arizona as a "species of special concern (AGFD 1996), as a threatened species by the Republic of Mexico (Secretaria de Desarrollo Social 1994), and is included on the Regional Forester's list of sensitive species (USFS 1999b). Critical habitat was designated at the time of Federal listing to include Sycamore Creek, extending downstream from and including Yank Spring (= Hank and Yank Spring), to the International border. Also designated was the lower 2.0 km (1.2 mi) of Penasco Creek, and the lower 0.4 km (1/4 mi) of an unnamed stream entering Sycamore Creek from the west, about 2.4 km (1.5 mi) downstream from Yank Spring. In addition to the aquatic environment, critical habitat includes a 12 m (39.3 ft)-wide riparian area along each side of Sycamore and Penasco Creeks. This riparian zone is believed essential to maintaining the creek ecosystem and stream channels, and to conservation of the species (USFWS 1986). Sonora chub is locally abundant in Sycamore Creek, although the habitat is limited in areal extent (Minckley and Deacon 1968). In Mexico, it is found in the rios Magdalena and Altar where it is considered relatively secure (Henderickson and Juarez-Romero 1990). In 1995, Sonora chub were found in California Gulch by the Arizona Game and Fish Department (AGFD 1995).

Sonora chub is a stream-dwelling member of the minnow family, Cyprinidae, and can achieve total lengths of 200mm (7.8 in) (Hendrickson and Juarez-Romero 1990). In the United States, it typically does not exceed 125 mm (5.0 in) (Minckley 1973), although specimens up to 150 mm (6.0 in) have been measured (J. Carpenter, FWS, pers.com). The Sonora chub has 63 to 75 scales in the lateral line, and the scales bear radii in all fields. The mouth is inferior and almost horizontal. There typically are eight rays in the dorsal, anal, and pelvic fins, although the dorsal fin can have nine (Miller 1945), and the anal and pelvic fins seven (Rinne 1976). The body is moderately chubby and dark-colored, with two prominent, black, lateral bands above the lateral line (whence the specific epithet, ditaenia) and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

Sonora chub spawn at multiple times during spring through summer, most likely in response to flood or freshets during the spring and summer rains (Henderickson and Juarez-Romero 1990). Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic waters in Mexico, Henderickson and Juarez-Romero (1990) found it commonly in pools less than 0.60 m (2 ft) deep, adjacent to or near areas with a fairly swift current, over sand and gravel substrates. It was less common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept in exploiting small marginal habitats, and can survive under severe environmental conditions. It is also apparent that they can maneuver upstream past small waterfalls and other obstructions to colonize newly-wetted habitats (Carpenter and Maughan 1993).

Based on collection dates of young-of-the-year (YOY), spawning occurs in early spring (Minckley 1973). Larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November, however, which indicated breeding was apparently not limited by season. Adults with breeding coloration were also taken during these periods (Hendrickson and Juarez-Romero 1990). In Sycamore Creek, adults with breeding colors were seen from April through September in 1990 and 1991. Larvae and juveniles 15 to 18 mm (0.6 to 0.7 in) were seen in April, May, and September (Carpenter 1992) suggesting that spawning occurred after the spring and summer rains. Bell (1984) also noted young after heavy flooding, and suggested that post-flood spawning is a survival mechanism evolved by this species. During spawning, Sonora chub apparently broadcast their eggs onto fine gravel substrates in slowly flowing water, where the eggs develop and hatch. There are no nests built nor parental care given. Larvae likely use shallow habitats at pool margins where they feed on microscopic organisms and algae. As adults they can exploit shallow to deep pools, and runs and riffles as available. In 2000, apparent multiple spawning in California Gulch was documented (USFS 2000).

The overall estimated current chub habitat is 16.1 km (10 mi) stream miles in Sycamore Creek and California Gulch including a 12m wide riparian area along each side of Sycamore and Penasco creeks. A recovery plan was written in October 1992, for the Sonora chub. One of the conservation efforts provided deals with all the waters occupied by the Sonora chub in the United States that are within the Coronado National Forest and about one-half of the drainage is within the Pajarita Wilderness and Goodding Research NaturalArea (RNA). These special designations were placed on the area because it had a biological community characterized by Mexican floral and faunal elements that did not otherwise occur, or where elsewhere rare, in the United States (Goodding 1961, Curran 1973, Smith 1984, USFS 1988b). Management direction for these special units is to maintain the area in climax vegetation. Removal of minerals, livestock grazing, use of motorized vehicles, and harvest of timber or fuelwood is not permitted, and recreation is limited to non-developed and dispersed use. Livestock grazing is permitted within Pajarita Wilderness outside of Goodding Research Natural Area (RNA). This management direction is applicable to Sycamore Canyon portions of habitat within the Gooding RNA and /or wilderness. The remainder of Sycamore drainage and California Gulch is open to multiple uses (USFS 1988a).

Potential threats to Sonora chub are related to additional watershed development. Continued and increased grazing and mining operations in upstream watersheds could result in increased siltation and runoff, increased water demand and withdrawal, and introduced pollutants to the stream. Livestock grazing in riparian areas is usually detrimental to fish habitat. Predation by nonnative vertebrates is also a threat to populations of Sonora chub. Green sunfish is a known predator on native fish in Arizona (Minckley 1973), and has been implicated in population changes in other lotic fish communities (AGFD 1988). Hendrickson and Juarez-Romero (1990) noted smaller populations of Sonora chub in areas where nonnative fishes were present. Sonora chub were absent when nonnative predators were abundant in reservoirs and highly modified stream habitats. Bullfrogs, common in the California Gulch watershed, have also been implicated in the disappearance of native frogs and fishes in other western aquatic habitats (AGFD 1988).

Known primary constituent elements of critical habitat include clean, permanent water with pools, and intermediate riffle areas and/or intermittent pools maintained by bedrock or by subsurface flow, in areas shaded by canyon walls.

ENVIRONMENTAL BASELINE

The Sonora chub only occurs within the Tumacacori EMA, on the Bear Valley and Montana allotments. The following determination was based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications with local fish experts. On June 5, 2001, we issued a biological opinion on the Montana Allotment, which addressed effects to Sonora chub in California Gulch; therefore, this allotment is not addressed in this BO. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations. The only allotment that may adversely affect Sonora chub is the Bear Valley Allotment.

The guidance criteria for the Sonora chub state:

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by year-long exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

The Bear Valley Allotment is located in the Atascosa and Pajarito mountains west of Nogales, Arizona in Santa Cruz, County and within the Nogales Ranger District of the Coronado National Forest. Elevation ranges from 1067m (3,500 ft.) at the Mexican border to 1637m (5,376 ft.) at the summit of Montana Peak. The allotment covers 9190 ha (22,710 ac.). The allotment abuts with the Republic of Mexico on its extreme southern boundary. The Bear Valley Allotment includes lands within the Rio Altar watershed.

The Bear Valley Allotment is an area of undeveloped lands that has been identified as supporting floral and faunal associations that are unique enough to require special management practices, including identified riparian ecotypes and known essential habitats for threatened and endangered plants and animals. The climate is steppe (hot). Mean annual air temperatures ranges from about 13 to 17 C (56 to 64 degrees F). Mean annual precipitation ranges from about 30 to 56 cm (12 to 22 in.) which comes from gentle rains in winter and high intensity localized thunderstorms in summer (Coronado Forest Plan 1988). The riparian zone whose native vegetation includes Fremont cottonwood, Arizona sycamore, a few emory oak and Arizona walnut, wolfberry, and Texas mulberry and includes ash is a major deciduous riparian tree species of the area and deergrass is an important herbaceous riparian species.

Present grazing management on the Bear Valley allotment has resulted in a satisfactory allotment condition overall. In 1997, range condition data indicated that most of the allotment was in good condition. In September 2000, Sycamore Canyon watershed assessment indicated that soil quality condition was 75 percent satisfactory, 16 percent impaired, 8 percent unsatisfactory, and 1 percent unsuitable. A trespass livestock problem has existed in the past, but 1998, you rebuilt the border fence which has reduced the number of trespass cattle. The Bear Valley allotment permittee is very attentive to this problem and has reacted quickly when trespass cattle from Mexico were found in the allotment. The permitted number of livestock for this allotment is 350 animals on a deferred/rest rotation cycle.

Sonora chub have been able to survive in this watershed due to the nature of this species in response to these wet and dry cycles by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. On a individual basis, a substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survived the dry period. This species has an amazing capacity for reproduction and recruitment as its habitat expands; it can seemingly explode from a small number of individuals occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of its habitat, which has allowed the Sonora chub to survive to the present (Bell 1984).

Sonora chub still occupy Sycamore Canyon and Penasco Canyon on the Bear Valley Allotment as stated above. More recently Sonora chub have been detected in three new locations on the Bear Valley Allotment however; these recent sightings counted very small numbers.

The first location is in the Montana Pasture. About five adult Sonora chub were observed in a side drainage west of Sycamore Canyon in June 2002. These Sonora chub were occupying a 15 feet by 12 feet pool about 2 feet deep and an additional 5 feet by 4 feet pool just upstream of the first pool. The second location is in the Casita Pasture where a few small Sonora chub were observed in Sycamore Canyon about a mile upstream from the Ruby Road crossing. These Sonora chub were first observed in late June, early July of 2002. The third location is in the Horse Pasture located in Atascosa Canyon downstream from the Bear Valley Ranch. Sonora chub were observed in a deep pool in a boggy drainage area, and two bedrock pools; both of these pools were well vegetated with overhanging banks.

Critical habitat is designated on Sycamore Creek, from Yanks Spring to the Mexican border, on about 1.25 mi. of Penasco Canyon, and about 0.25 mi. on an unnamed tributary to Sycamore Creek.

EFFECTS OF THE ACTION

Because riparian zones often follow the gradual elevational changes of a watershed, they are often desirable for road and pipeline construction leading to greater impacts to riparian ecosystems. Native riparian ecosystems, especially in the arid Southwest, are disappearing rapidly. Riparian areas are widely recognized as crucial to the overall ecological health of rangelands in the western U.S.; however, many are in degraded condition, largely as a result of poorly managed livestock grazing (U.S. General Accounting Office 1988). Riparian areas, however, have ecological importance far beyond their relatively small acreage because they have a greater quantity and diversity of plant species than adjoining land. Riparian areas in arid and semiarid regions are composed of complex and edaphic and vegetation mosaics because of high variability in landforms, soil types, and location of surface and subsurface water. Livestock tend to congregate in riparian areas for extended periods, eat much of the vegetation, and trample streambanks, often eliminating other benefits of riparian habitat (e.g., fish and wildlife habitat, erosion control, floodwater dissipation).

Effects of livestock grazing on the Sonora chub can be segregated into direct effects to fish and effects to Sonora chub habitat that result in indirect impacts to the species. Direct effects of livestock grazing in the aquatic habitats of the above mentioned drainages include trampling (Roberts and White 1992) of Sonora chub, particularly eggs and larval fish in the shallow margins of the creeks. Eggs and larval fish may also be ingested by livestock drinking from the creek. Direct effects could also occur to Sonora chub as a result of range improvement project construction or vegetation management projects in all of the occupied drainages. There are no such projects proposed near Sonora chub locations.

Livestock presence affects streambanks through chiseling, sloughing, compaction, and collapse and results in wider and shallower stream channels (Armour 1977, Platts and Nelson 1985b, Platts 1990, Meehan 1991). This causes progressive adjustments in other variables of hydraulic geometry and results in changes to the configuration of pools, runs, riffles, and backwaters; levels of fine sediments and substrate embeddedness; availability of instream cover; and other fish habitat factors (Bovee 1982, Rosgen 1994). It also changes the way in which flood flows interact with the stream channel and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation. These effects occur at all levels of cattle presence, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Damage begins to occur almost immediately upon entry of the cattle onto the streambanks and use of riparian zones may be highest immediately following entry of cattle into a pasture (Goodman et al. 1989, Platts and Nelson 1985a). Vegetation and streambank recovery from long rest periods may be lost within a short period following grazing reentry (Duff 1979). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being most vulnerable to damage (Marlow and Pogacnik 1985, Platts 1990). Cattle presence on streambanks retards rehabilitation of previous damage as well as causing additional alteration (Platts and Nelson 1985a). Channel erosion in the form of downcutting or lateral expansion may result (Heede and Rinne 1990, Bureau 1990).

Livestock grazing in and on riparian vegetation may cause changes in the structure, function, and composition of the riparian community (Szaro and Pase 1983, Warren and Anderson 1987, Platts 1990, Schulz and Leininger 1990, Schulz and Leininger 1991, Stromberg 1993a). Species diversity and structural diversity may be substantially reduced and nonnative plant species may be introduced and spread in cattle feces. Reduction in riparian vegetation quantity and health, and shifts from deep rooted to shallow rooted vegetation contribute to bank destabilization and collapse and production of fine sediment (Meehan 1991).

Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Karr and Schlosser 1977, Platts and Nelson 1989). Increased water temperature fluctuations may also adversely affect larvae. Larvae have a much more limited thermal range than do adults and exhibit subtle habitat shifts to accomplish thermal regulation. Increasing temperature fluctuations in shallow edgewater areas may cause direct mortality of larvae through thermal shock or may cause larvae to move out into deeper, faster water where they are more vulnerable to predation or to being swept downstream.

Increases in nutrients in streams have been documented to result from livestock grazing (Kauffman and Krueger 1984). Excessive nutrient input and resulting algal growth may result in temporary conditions of oxygen depletion with resulting stress or death to individual Sonora chub.

Surface litter is reduced by trampling and churning into the soil, reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). The capacity of the riparian vegetation to filter sediment and pollutants to prevent their entry into the river and to build streambanks is reduced (Lowrance et al. 1984, Elmore 1992).

Increased sediment production and transport is probably the most commonly acknowledged effect of livestock grazing (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994). Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy et al. 1981, Wood et al. 1990, Newcombe and MacDonald 1991, Barrett 1992, Megahan et al. 1992). However, excessive sedimentation may cause channel changes that are adverse to the species. Excessive sediment may fill backwaters that provide larval and juvenile Sonora chub habitat. Excessive sediment may smother invertebrates, reducing Sonora chub food production and availability and related turbidity may reduce Sonora chub's ability to see and capture food. Reduction in aquatic habitat complexity due to livestock grazing effects is probably the most important adverse effect to Sonora chub. Habitat complexity allows partitioning of habitat among the various fish species and their life stages. Reduction of habitat complexity increases inter-species and inter-lifestage conflicts. It also exacerbates the adverse effects of generalistic nonnative species on native species (Bestgen 1986, Rinne and Minckley 1991, Baltz and Moyle 1993, Douglas et al. 1994). Most nonnative species in the proposed action area are predatory and decreased habitat complexity results in decreased hiding cover, thus making predator-naive native species more vulnerable to predation (Minckley 1983, Fraser et al. 1987). Cover is an important factor in the ability of fish species to avoid adverse effects from flooding (Bulkley and Pimentel 1983, Meffe 1984). Livestock grazing and its attendant reduction in habitat complexity make Sonora chub more vulnerable to death and displacement from flooding, at the same time that livestock effects on the watershed and streambanks contribute to increased flood volume, velocity, and abrasive power.

Physical damage to streambanks and channels in conjunction with loss or reduction of riparian vegetation may change the timing and magnitude of streamflow (Stabler 1985, Meehan 1991). Flood flows may increase in volume and decrease in duration, and low flows may decrease in volume and increase in duration. Cattle trampling and grazing of the riparian corridor makes banks and vegetation more susceptible to severe damage during catastrophic flooding (Platts et al. 1985).

Livestock do have access to the side drainage of Sycamore creek in the Montana pasture, but only during the winter months, outside of the growing season. At the time of the Sonora chub sighting there were no signs of livestock use near the pools and the riparian areas were in fair condition with abundant grass species along the stream banks. This would indicate that livestock use is minimal at this site.

The Sonora chub in the upper part of Sycamore creek were detected in a reach classified as intermittent and it routinely dries up. It is believed that Sonora chub reach this section of the stream during summer monsoons and then became trapped in isolated pools as the stream drys up. The condition of the riparian area was poor, riparian vegetation was sparse, the channel bottom was mostly gravel without exposed bedrock. Other pools downstream with exposed bedrock have year-round water. Downstream of this site is the boundary of the exclosure that was built to protect occupied Sonora chub habitat near the Ruby Road crossing. This site is located in the Casita pasture and the proposed action will allow for grazing in winter months.

Sonora chub located in the Horse pasture were documented in deep pools with well vegetated overhanging banks; this pasture is used as a horse pasture only. Livestock do not use this pasture except for the occasional sick or injured cow. The site is inaccessible to livestock due to its steep and rocky topography.

Livestock grazing in the action area will result in minimal effects to Sonora chub and its habitat because of limited access and winter use.

EFFECTS OF THE ACTION IN CRITICAL HABITAT

The proposed action occurs outside of designated critical habitat. At the time the final rule was written, the following was discussed for the constituent elements; the area provides all of the ecological, behavioral, and physiological requirements necessary for the survival of this species.

Changes in the watershed resulting from grazing can cause increased sedimentation, higher peak flows and channel incisement, and lower base flows within the drainages with occupied Sonora chub habitat, and changes in riparian vegetation and channel morphology may cause injury and mortality of Sonora chub and adversely alter its habitat. Most precipitation falls at the higher elevations in the various watersheds; however, watershed effects on the allotments should not be disregarded because of the proximity of the allotments to occupied Sonora chub habitat. Flows from higher elevations traverse drainages in the allotments, which if degraded by grazing, may contribute elevated levels of sediment and exhibit other characteristics of degraded watershed described above. This can effect riparian function with occupied Sonora chub habitat in the proposed action areas.

The direct effects of livestock grazing on critical habitat are (1) increased water temperatures as a result of stream channels becoming wider and shallower, (2) loss of nutrients within in the stream channel due to reduction of pools in number, size, and depth, (3) reduction in cover as a result of livestock grazing on riparian vegetation which helps to increase water temperatures, and (4) reduction of cover by banks sloughing off due to livestock trampling.

The proposed action also includes development of range improvement projects, such as fence maintenance and construction and water developments. These projects are primarily designed to distribute cattle and allow greater management capability. They can result in improved range condition and watershed condition, if stocking rates are not increased. Localized temporary disturbance from construction of pipelines, fences, and other projects would cause negligible and localized increases in erosion and runoff. Of greater concern are development and maintenance of stock tanks, which may support populations of nonnative fishes, or may provide habitat into which nonnative fishes may be introduced as sport fish or for other purposes. These fish may subsequently be introduced into occupied Sonora chub habitat or may traverse drainages between stock tanks and the creek during storm events. Any new construction or reconstruction of roads to stock tanks would facilitate public access and increase the chance that nonnative fish may be introduced or moved among tanks.

There is no authorized livestock grazing in designated critical habitat, which is all within fenced exclosures. This proposed action will therefore have no direct effects on critical habitat. Indirect effects are minimal due to overall improved range conditions in the upper watershed.

CUMULATIVE EFFECTS

Cumulative effects to Sonora chub include ongoing activities in the watershed such as livestock grazing and associated activities outside of the allotments addressed herein, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, and recreation. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute substantially to cumulative long-term adverse effects to Sonora chub.

Other activities, such as recreation are increasing. Increasing recreational, residential, or commercial use of the private lands near the riparian areas would likely result in increased cumulative adverse effects to occupied Sonora chub habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

CONCLUSION

After reviewing the current status of Sonora chub, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Sonora chub. We based our conclusion on the following:

1. The majority of Sonora chub occupied habitat is fenced off from livestock access. All of designated critical habitat is protected from livestock grazing.

2. The recently discovered (October 2002) pools found to contain Sonora chub are 1) topographically protected from livestock access and 2) livestock use is restricted to the winter months at the other Sonora chub locations.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. “Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

We do not anticipate take for the Sonora chub in the proposed action area because the likelihood of livestock harming, killing, injuring or harming Sonora chub is greatly reduced due to limited access. Access is limited by fencing, topography, and seasonal restrictions.

CONSERVATION RECOMMENDATIONS

1. Coordinate with AGFD and assess the existing condition of the natural Sonora chub population in Sycamore Canyon and its tributaries to determine if an implementation plan for stocking Sonora chub is needed.

2. Continue to implement the Sonora chub recovery plan as appropriate.

3. Work with us and AGFD to control nonnative aquatic organisms on the Forest, particularly bullfrogs, fish, and crayfish.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed or proposed species, we request notification of implementation of any conservation actions.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

Yaqui chub (*Gila purpurea*) with critical habitat

STATUS OF THE SPECIES

We listed the Yaqui chub as endangered on August 31, 1984. Critical habitat was designated for this species for "all aquatic habitat on the San Bernardino NWR (USFWS 1984b). This occurred prior to the acquisition of Leslie Canyon; Leslie Canyon is not designated critical habitat.

The Yaqui chub is a medium sized fish of the family Cyprinidae (Minckley 1973). Until recently, *Gila purpurea* was thought to occur in the basins of the Ríos Sonora, Matape, and Yaqui in Arizona and Sonora, México (Hendrickson et al. 1980). In 1991, it was recognized that the chub in the Ríos Sonora and Matape and the Río Yaqui system downstream from San Bernardino Creek is a different species, *Gila eremica* (DeMarais 1991). *Gila purpurea* is endemic to San Bernardino Creek in Arizona and México and probably the Willcox Playa basin in Arizona (Varela-Romero et al. 1990, DeMarais 1991). It currently occurs in Bathhouse Spring, Black Draw, House Pond, Mesquite Pond, North Pond, Oasis Pond, Robertson Ciénega, Twin Pond, and Two PhD Ponds on the San Bernardino National Wildlife Refuge (SBNWR memorandum May 26, 1994). Only a few individual chubs were caught in Robertson Ciénega during the 1994 monitoring effort. Some of those populations have been stocked into enhanced or artificially created habitats as part of the recovery program. The population in Leslie Creek was stocked in 1969 with individuals taken from Astin Spring (Minckley and Brooks 1985). A population in Turkey Creek in the Chiricahua Mountains was stocked in 1986 and 1991 from Astin Spring (via Leslie Creek) stock raised at Dexter National Fish Hatchery.

Habitat preferences for Yaqui chub vary by life stage. Young fishes prefer marginal habitats and the lower ends of riffles. Adults prefer the deepest, most permanent pools, undercut banks next to large boulders, debris piles, and roots of large riparian trees (Hendrickson et al. 1980). Diet consists mostly of algae, insects, and detrital material (Galat and Gerhardt 1987).

Breeding males are a bluish-grey color while females are straw-yellow to light brown color (Minckley 1973). Spawning is protracted throughout the warmer months, with greater activity in spring. Reproductive potential is high and large populations develop quickly from a few adults (DeMarais and Minckley 1993). Growth to maturity is rapid, often within the first summer of life.

Decline of the Yaqui chub probably began with regional arroyo cutting in the late 1800s. Rio San Bernardino incised its floodplain more than 8 m (25 ft), and streamside marshlands (cienegas) were drained, except where locally maintained by springs or artesian wells. Cienegas and wetlands were impacted by livestock grazing. This contributed to watershed deterioration. The Yaqui chub approached extinction in the late 1960s due to habitat loss, but survived largely due to human intervention, including transplantation; hatchery production; habitat acquisition, renovation, and creation; and successful reintroduction. Catastrophic drought in the mid-1970s further depleted Yaqui chub populations (DeMarais and Minckley 1993).

Actions taken at San Bernardino National Wildlife Refuge help maintain populations of the species in the United States. Yaqui chub populations in West Turkey Creek occur largely on the private El Coronado Ranch. Conservation, ranch management, and recovery actions for the Yaqui chub, Yaqui catfish (*Ictalurus pricei*), and longfin dace are detailed in the Habitat Conservation Plan which is to be intact for 25 years. Management for this species in Mexico is minimal, at best.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, field observations from your district biologists, habitat surveys, and communications from species experts.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The following criteria are to be used by a fisheries biologist to determine the effects that the proposed livestock grazing and management activities will have on the previously described fish species.

The guidance criteria for the Yaqui chub state:

No Effect (must meet one of the criteria):

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into threatened and endangered species habitat.

2. Livestock grazing on the allotment will be excluded from threatened and endangered species habitat, in order to sustain all life stages of threatened and endangered species, the subwatershed is in satisfactory condition, and there will not be effects such as:

   a. Sedimentation (sediment traps occur between the allotment and threatened and endangered species habitat, and

   b. Evidence of active erosion caused by livestock or livestock management activities.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by year-long exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

You determined that livestock grazing on the Turkey Creek allotment, in the Chiricahua EMA, may adversely affect this species.

Historically, Yaqui chub were determined to exist in West Turkey Creek (Rutter 1896); but the specimens' identity cannot be confirmed because they were lost in the San Francisco earthquake (Miller and Lowe 1964). After that collection, the species was not collected there again. Although the Yaqui chub occurs in West Turkey Creek and is considered a native, the species had disappeared from that creek sometime early in this century from either natural conditions (drought, floods, wildfire, watershed degradation) or elimination due to competition with introduced nonnative fishes (rainbow trout, green sunfish).

In 1986, Yaqui chub from stocks at the Dexter National Fish Hatchery were transplanted to ponds on the University of Arizona's Coronado Ranch. The stock of these fish was originally from Astin Spring via Leslie Creek. The chub eventually dispersed from the El Coronado Ranch ponds into West Turkey Creek. The El Coronado Ranch ponds function as a refugium and a source of chub for West Turkey Creek. Nonnative species are one of the biggest threats to the West Turkey Creek native fishes. Illegal release of nonnative aquatic species will probably be a continual problem.

Electrofishing surveys conducted by us and you in 1996, 1997, and 1998, within the upper reaches of West Turkey Creek, found Yaqui chub in low numbers (two to 19 individuals), but surviving and reproducing. Since Yaqui chub fry and young of the year were found during these surveys, suitable habitat conditions must exist.

During the 1996-1998 surveys, nonnative species were also found on the Forest, but their distribution and composition have been variable. The 1996 surveys found rainbow trout along with longfin dace and Yaqui chub. The 1997 results reflected a significant presence of fathead minnow along with Yaqui chub, but no trout nor dace. No nonnative species nor longfin dace were found in 1998. Surveys were confined to pool habitat within the upper 1.6 km (1.0 mi) of West Turkey Creek.

West Turkey Creek is one of two "perennial streams on the western side of the Chiricahua Mountains in the Forest that drain into the Sulphur Springs Valley. Rucker Canyon also contains perennial water. It is thought that these drainages were once tributaries to the Rio Yaqui in Sonora, Mexico. About 6.4 km (4.0 mi) of potential Yaqui chub stream habitat exist within West Turkey Creek. Of this, approximately, 4 km (2.5 mi) of stream habitat are within National Forest lands. These 4 km (2.5 mi) of stream are within the Turkey Creek Allotment. The stream is perennial-intermittent. In severe droughts only a few of the deeper pools are left. Ponds on private land of the El Coronado Ranch also serve as refugia during drought and are the best habitat for the chub in the West Turkey Creek watershed.

We issued a Section 10 permit in 1998 and approved the Habitat Conservation Plan (HCP) for the El Coronado Ranch (Minckley and Duncan 1998). The goals of the HCP include watershed management, improving riparian condition, allowing continued operation of the ranch, and conservation and recovery of native species. The Section 10(a)(1)(B) permit covers incidental take of Yaqui chub, Yaqui catfish, and the Yaqui form of longfin dace, should it ever be listed. Implementation of the HCP should lead to improved watershed and habitat conditions for native fish in the watershed. Management on the El Coronado Ranch under the HCP will improve the baseline by:

- Managing water diversions to maintain a balance of water supply in both West Turkey Creek and ponds to enhance survival of Plan Species;

- Allowing routine maintenance at applicant expense on all components of the water-delivery system and ponds to ensure they remain in good repair;

- Maintaining water levels and biological conditions in ponds where fishes of concern are to ensure adequate habitats to the extent possible given the variable water supply from West Turkey Creek. To the extent possible, the permittee must avoid reintroduction of, and aid elimination of, nonnative predators and competitors of resident populations of chub and other plan species;

- Implementing plans that minimize adverse impacts of livestock grazing in the watershed on native fish habitats or indigenous fishes;

- Avoiding adverse modifications to the watershed on private land that may negatively influence native fish habitats or indigenous fishes;

- Allowing agency personnel access to the El Coronado Ranch on reasonable notice where necessary for monitoring, sampling, research, and other activities including translocation and reintroduction of fishes, when related to management of species and habitats of concern.

Forest Road 41 parallels West Turkey Creek, ending with a trailhead at the Wilderness boundary. This is one of four trailheads that access wilderness recreation trails from West Turkey Creek. Also, along with the El Coronado Ranch, there are 14 recreational summer homes, two semi-developed campgrounds, and several dispersed camping sites in use within the Canyon on your lands. The West Turkey Creek Native Fish Habitat Renovation Project underwent formal consultation on February 4, 1999 (2-21-99-F-130). Its goal is to maintain West Turkey Creek as a native fishery and remove nonnative fishes. The two treatments conducted so far were apparently successful (W. Minckley, pers. comm., 1999).

In 1994, because of the Rattlesnake Fire, significant quantities of ash and other debris were transported downstream into West Turkey Creek. Nevertheless, the resident (nonnative) rainbow trout, and (native) longfin dace and Yaqui chub survived. This event did not impact the watershed equally. The majority of the debris flows affected the lower reaches of West Turkey Creek via Saulsbury and Ward Canyons. The watershed still is continuing to heal and recover.

The Turkey Creek allotment is permitted to the El Coronado Ranch. Permitted use is for 66 cow/calf year-long and an additional 25 cows from September through December. The grazing system involves a “best pasture system. In 1997, the permittee took non-use because of drought, and in 1998, applied for only 25 percent of the permitted use. Livestock are not excluded from West Turkey Creek. No grazing occurs within the West Turkey Creek Recreation Area (=Yaqui chub habitat) during the summer months, but grazing is allowed in the fall and winter. Use any other time tends to be transitory because there is little forage produced in that area (USFWS 1999a). Most livestock use is on the allotment in the watershed above Turkey Creek, including its tributaries.

Range condition on the allotment is moderately low or better, with most of the hectares [about 3,600 (greater than 9,000 ac)] in this category. The trend is static or up, with about 1,100 ha (2,800 ac) in a static trend. Soil condition on the allotment is 96 percent satisfactory.

Critical habitat for Yaqui chub is not designated within the action area and will not be affected by the proposed action.

EFFECTS OF THE ACTION

Livestock grazing can cause direct and indirect effects to fish and their habitat. It has long been acknowledged that grazing has had adverse impacts to native southwestern fishes (Chamberlain 1904, Miller 1961, Hendrickson and Minckley 1984, Minckley 1985, Williams et al. 1985, Marsh and Minckley 1990, Minckley et al. 1991a, Rinne and Minckley 1991). Cattle can directly affect fish through trampling fish, larvae, and eggs. (Roberts and White 1992). Yaqui chub will be directly affected by the proposed action because cattle have access to the habitat occupied by Yaqui chub. Impacts from livestock should be small, because grazing may not occur every year, the area of occupied habitat is grazed only in the winter, and the number of livestock are few.

Indirect effects include alteration of riparian and aquatic habitats and changes to watershed functioning. Livestock grazing alters the species composition of communities, disrupts ecosystem functioning, and alters ecosystem structure (Fleischner 1994). The main impacts to an ecosystem are from cattle grazing of plants and trampling vegetation and soil (Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands. These impacts can indirectly affect Yaqui chub.

The proposed grazing management may negatively impact upland and riparian soils, by affecting the vegetative ground cover, plant vigor, and litter components; however, if implemented as it has been, conditions should improve or remain static. Riparian soil and bank stability should continue to improve (Skovlin 1984, Kovalchik and Elmore 1992). Winter grazing impacts to riparian areas are usually less than grazing during other seasons (Platts 1990,Kovalchik and Elmore 1992). Since soil and range condition on the allotment is moderate or better, the indirect effects of grazing in the watershed are minimal. Vegetation utilization of 45 percent is allowed under the present plan. Research summarized by Holechek et al. (1998) suggests 45 percent utilization may be too high for the vegetation types present on the Turkey Creek allotment.

The indirect effects of livestock grazing will be minimal to Yaqui chub, occupied or potential habitat, and on the watershed above Yaqui chub habitat. The only livestock grazing that occurs is around the upper end of West Turkey Creek. Livestock rarely venture into areas higher up in the watershed, because it is steep, heavily wooded, and does not produce much forage. Details of grazing effects can be found in the Environmental Baseline (Forestwide) section.

There is no designated critical habitat in the action area; therefore, none will be affected by the proposed action.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Most future actions in the watershed will be on Federal lands, and thus would be subject to Section 7. Actions on the El Coronado Ranch have been identified for a 25-year period. The illegal transplanting of exotic fish and amphibians will likely continue to be a problem, although aggressive nonnative aquatic species control methods may aid in reducing their spread. This situation requires periodic habitat monitoring. The drainage may also be closed to fishing in the future by the Arizona Game and Fish Commission.

CONCLUSION

After reviewing the current status of the Yaqui chub, the environmental baseline for the action area, and the anticipated effects of the proposed project, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Yaqui chub or destroy or adversely modify critical habitat. Critical habitat for this species has been designated at the San Bernardino National Wildlife Refuge; however, this action does not affect that area and no destruction or adverse modification of that critical habitat is anticipated. We based our conclusion on the following:

1. Livestock use near West Turkey Creek is relatively light.

2. Soils are about 96 percent satisfactory in the watersheds for Yaqui chub.

3. The rocky nature of West Turkey Creek limits livestock access to occupied habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by you so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. You have a continuing duty to regulate the activity covered by this incidental take statement. If you (1) fail to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

Based on the proposed action, we anticipate the following take:

Incidental take from actions proposed on the Forest is likely to be small because known populations of Yaqui chub on the Forest are also small; therefore, we anticipate no more than five Yaqui chub will be incidentally taken annually. Take may occur through harm and harassment from livestock in the riparian and aquatic habitat of the creek; or by mortality of Yaqui chub when livestock cross or water at occupied habitat.

EFFECT OF THE TAKE

In this BO, we determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES & TERMS AND CONDITIONS

The following reasonable and prudent measure is necessary and appropriate to minimize take of Yaqui chub. In order to be exempt from the prohibitions of section 9 of the Act, you must comply with its accompanying term and condition in regard to the proposed action. This term and condition is nondiscretionary and implements the reasonable and prudent measure as described. This measure shall apply to the Turkey Creek allotment (Chiricahua EMA).

1. Monitor the effects of the proposed action on the Yaqui chub and its occupied habitat.

The following term and condition implements reasonable and prudent measure 1:

a. You shall monitor fish populations and habitat conditions in coordination with other monitoring activities occurring in the watershed: the El Coronado Ranch Habitat Conservation Plan, the West Turkey Creek Native Fish Habitat Renovation Project, and the Johnson Peak fire plan. Monitoring requirements that apply to you from these plans include: for the HCP, sections 11.6.C and 11.6.D of the Implementing Agreement; and for the renovation project, term and condition 2.1 and 3 from the 1999 BO and 3a. in the fire plan BO. A monitoring plan will be developed to detect levels and types of incidental take, as anticipated above. The plan shall be developed in coordination with us and AGFD and provided to us in your March 2003 annual report.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Other actions occurring in the West Turkey Creek watershed should to be analyzed for their potential impacts to listed species. Impacts from the different forms of recreation occurring in the watershed are probably more detrimental to the Yaqui chub and the watershed than actions previously consulted on. A watershed plan could be one appropriate means of addressing these issues. Work cooperatively with us and interested parties to address these issues (Recovery Plan Task 2.0, USFWS 1995:23).

2. Assist with the development of a monitoring plan that addresses all actions occurring the watershed (Recovery Plan Task 2.0, USFWS 1995:23).

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the Arizona Game and Fish Department).

MAMMALS

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) (LLNB)

STATUS OF THE SPECIES

We listed the lesser long-nosed bat (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered (53 FR 38456), dated September 30, 1988. Critical habitat has not been designated for this species.

The lesser long-nosed bat is a small, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations to feed on nectar from the flowers of columnar cactus, such as the saguaro and organ pipe cactus and from paniculate agaves, such as Palmer's agave (*Agave palmeri*), and Parry's agave (*A. parryi* Hoffmeister 1986), *A. desertii* (Engelman 1875), and *A. schotti*. Palmer's agave exhibits many characteristics of chiropterophily, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (though not all) of these same morphological features (Gentry 1982).

The lesser long-nosed bat is migratory and found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991); the bat has only rarely been recorded outside of this time period in Arizona (Fleming 1995, Hoffmeister 1986). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (Snow pers. comm. 1999) but also occur with adult females and young of the year at maternity sites (Fleming 1995). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which typically occurs on rocky slopes or hill tops, scattered within the desert grassland and oak woodland communities within the elevation range of 900 m to 1,800 m (3,000-6,000 ft) (Gentry 1982). Parry's agave reaches higher elevations than Palmer's, extending from grasslands into oak woodland, chaparral, pine/oak forests, and mixed conifer with an elevation range of approximately 1,500 m to 2,500 m (4,900-8,200 ft) (Gentry 1982). Like Palmers' agave, Parry's is typically found on rocky slopes (Gentry 1982). Concentrations of paniculate agaves are generally found on the rocky, shallow soils of hills and ridges. Palmer's and Parry's agaves are also found scattered in areas of deep, heavy soils within grasslands or where there may be thick stands of shrubs, mesquite, oak, and other trees.

The ecology of Palmer's agave appears to be poorly understood, especially as it is affected by livestock use and fire (Slauson, pers. comm., 1997; Wendy Hodgson, Desert Botanical Gardens, Phoenix, pers. comm., 1997). Agaves are perennial succulents. Agave seeds germinate readily with adequate moisture, typically in open areas with limited competition from other plants (Tony Burgess, Biosphere Two Center, Tucson, pers. comm., 1997). Palmer's agave is relatively slow growing, often taking 20 or more years before initiating the single reproductive event in its life (Slauson 1996, 1999). A flowering stalk erupts from the rosette of a mature plant, growing rapidly through the spring and early summer. During the summer 8 to 12 flowering panicles are displayed on the upper third of a stalk, 3 to 5 m (10-16 ft) tall (Gentry 1982). Slauson (1996, 1999) has completed a pollination ecology study of Palmer's agave, finding that many pollinator species contribute to establishing seed set. Lesser long-nosed bats have been recorded visiting individual blooming Palmer's agaves more than 1,000 visits per night (R. Sidner, Tucson, pers. comm., 1997; Petryszyn, pers. comm., 1999), while they may not visit other agaves at all (Slauson, pers. comm., 1997). Bat visits generally last less than one second (Slauson 1999). Apparently there are many factors which influence the year a particular plant may bloom. Precipitation one to several years before blooming is probably of special importance. In the Peloncillo Mountains, about 2 to 5 percent of the agave population flowers each year (Peter Warren, Nature Conservancy, Tucson, pers. comm., 1997). Palmer's agave may occasionally produce off-sets (vegetative reproduction or cloning of "pups" produced from rhizomes) though this is less likely than for many other agave species (Hodgson, pers. comm., 1997). Parry's agave freely produces off-sets (Gentry 1982).

The importance of Parry's agave, as well as desert agave and amole, as a forage resource for *Leptonycteris* bats is unknown. As discussed, Parry's agave generally occurs at higher elevation than Palmer's agave, and occurs in forest openings. Benson and Darrow (1982) note that it typically flowers in June and early July, which is before the lesser long-nosed bat arrives at roosts in southeastern Arizona. However, J. Rorabaugh (USFWS 1999a) noted many Parry's agave in flower high in the Huachuca Mountains on the crest trail during late July in 1997. It may be that agaves at high elevation bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August. In addition, Parry's agave may be very important as a forage plant for those bats which arrive in southeastern Arizona during late spring and early summer.

As indicated above, the lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves is a high-energy food. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak woodland (Gentry 1982). In the Huachuca Mountains, Parry's agave is generally found at higher elevations than Palmer's agave; the former is common in forest openings to the crest of the Huachuca Mountains.

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. Seasonally available food resources may account for the seasonal movement patterns of the bat. The lesser long-nosed bat is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 25 km (15 mi), and in Mexico at 40 km (25 mi) and 61 km (38 mi) (one way)(Virginia Dalton, Tucson, Arizona, pers. comm. 1997; Yar Petryszyn, University of Arizona, Tucson, pers. comm. 1997). Fleming (1995) suggests that a substantial portion of the lesser long-nosed bats at the Pinacate Cave in

Sonora fly 40 to 50 km (25 to 31 mi) each night to foraging areas in Organ Pipe Cactus National Monument. Horner *et al.* (1990) found that lesser long-nosed bats commuted 15.5 miles (25.8 km) between an island maternity roost and the mainland in Sonora. The authors suggested that bats regularly flew at least 47 miles (78.3 km) each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Yar Petryszyn, pers. comm. 1997).

In her study of the foraging ecology of lesser long-nosed bats, Ober (2000) found that bats flew an average of 18.9 km (11.3 miles) from their day roosts to their core use-areas. The bats spent the majority of the night foraging in their core use-areas before returning to their day roosts in the morning. Core use-area sizes ranged from 3 to 42 ha (7.4 to 103.7 acres). Core use-areas are defined as the smallest area that accounted for 50 percent of locations collected for each individual (n= 60) throughout 1998 and 1999. Home ranges were also calculated; they are defined as the smallest area that accounted for 95 percent of all locations collected for each bat. Home ranges varied widely, from 174 to 5258 ha (430 to 12992.5 acres).

Density of flowering and dead standing *A. palmeri* were calculated within bat home ranges. The combined densities (plants/ha) ranged from 3.6 to 10.4 in 1998 and 1.6 to 9.3 in 1999. Ober found that home range size did not vary with changes in density of flowering *A. palmeri* or with density of both live and dead standing agave inflorescences. The density of flowering and dead standing agave in home ranges of adult bats was greater than that available in the surrounding landscape, indicating that bats seem to select areas that have high food abundance as well as evidence of high food abundance in previous years. The density of flowering *A. palmeri* (plants/ha) inside bat home ranges was 2.6 to 5.4 in 1998 and 0.2 to 3.0 in 1999. Despite this variation in agave flowering density, the sizes of home ranges and core use-areas were similar for bats in those years. This would suggest that the size of home ranges and core use-areas is not strongly influenced by fluctuations in resource abundance (Ober 2000). The bats did exhibit site fidelity.

Lesser long-nosed bats typically consume 150 percent of their body mass in nectar per night in captivity (Winter and von Helversen 1998). The small size of individual *A. palmeri* flowers force bats to visit many flowers a night. *Agave palmeri* flowers produce nectar for five consecutive nights and each stalk can produce 1600-2240 flowers during the flowering season (Slausen 1999). Agaves in a patch will flower asynchronously. Therefore, a patch of agaves can provide rich nectar resources for weeks. This probably explains why Ober observed bats returning to the same core-use areas on consecutive nights.

A <u>roost</u> is considered to be any cave, mine, building, etc, that is used by any number of bats, anytime. A <u>maternity roost</u> is a site where pregnant bats give birth and raise their young. A <u>primary roost</u> is a site with greater than 50 bats documented on a fairly regular basis, and for which we have relatively recent data. A <u>large roost</u> is considered a site with about 450 or greater bats. A <u>small roost</u> is considered to be a site with less than 50 bats documented in use, and for which available information is 20 years or older (M. Coffeen, pers. comm. 2002).

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (Fleming 1995). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, the species appears to be sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days; however, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

According to Fleming (1995), there are 16 known large roost sites in Arizona and Mexico (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats and of these, just over 100,000 are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). Disturbance of these and other large (greater than 450 bats) roosts, or removal of the food plants associated with them, could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

Potential threats which may contribute to the decline of lesser long-nosed bat populations are excess harvesting of agaves in Mexico, the collection of cacti in the U.S., the conversion of habitat for agricultural uses, livestock grazing, wood-cutting, and other development. This species of bat is particularly vulnerable to disturbances due to many individuals using only a small number of communal roosts.

ENVIRONMENTAL BASELINE

You requested consultation on the effects of livestock management to the lesser long-nosed bat for 159 out of 187 grazing allotments. For this specific species, due to its wide range (see map in Appendix A - Concurrences), we have not listed each of the 159 allotments. Refer to the July 2002 Allotment Summary Tables for the specific allotments per EMA for this species. These allotments are found throughout the Forest, are in each of the twelve EMAs, and include the majority of acres within most EMAs.

Those allotments per the Proposed action (Allotment Summary Tables) constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for lesser long-nosed bat states:

No Effect (must meet one of the criteria):

1. Allotment is not located within the range of the species (see map).

2. All known, suitable, or potential roost sites within the allotment will be protected from disturbance or modification, and no bat food plants (*Agave palmeri*, *A. parryi*, *A. deserti*, *A. schottii*, saguaros) occur in portions of the allotment grazed by livestock.

May Effect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Livestock grazing occurs on allotment and all known, suitable, or potential roosts will be protected from disturbance or modification.

2. The livestock grazing program will not facilitate public access to known, suitable, or potential roosts.

3. Livestock management activities located within the range of the species will not damage or destroy more than 1 percent of bat food plants within 0.5 miles of the project site.

4. Within the range of the bat, livestock grazing will not occur between April 1 and June 15 to allow agave bolts to reach a height where livestock grazing on agaves is unlikely to occur.

5. Within the range of the bat, in saguaro communities, annual livestock grazing utilization will not be greater than 30 percent of all palatable species to ensure that saguaro populations continue to exist and/or thrive on the allotment (Holecheck 1988). (Note: Per Holecheck [1988] utilization rates recommended for semidesert scrub and shrubland is 30 to 40 percent.

Leptonycteris bats require suitable forage plants (paniculate agaves and columnar cacti) and suitable roost sites. Mines and caves occurring across the Forest provide suitable sites for post-maternity roosts of the lesser long-nosed bat. Potential foraging habitat for the lesser long-nosed bat on the Forest is found where paniculate agaves, and perhaps saguaro, occur. Agaves are found in varying densities and age classes within the broad vegetation community classification of desertscrub, desert grassland, interior chaparral, oak woodland, pinyon-juniper woodland, pine-oak woodland, and mixed conifer. The primary agave used by the bat is Palmer's agave, which, as estimated by you, is widely scattered over 390,000 ha (1,000,000 ac) at densities from less than 3 to greater than 40 individuals per ha (10 to 200 per ac), generally between the elevations of 909 and 1,818 m (3,000 to 6,000 ft). Parry's agave is found between 1,545 and 2,485 m (5,000 to 8,200 ft), and begins blooming in mid-spring.

Analysis of grazing activities undertaken by you was conducted on a landscape level, evaluating for each allotment the permitted grazing utilization rates and use of the allotment during the early part of the known agave bolting season (April 1 through June 15) against the general distribution of lesser long-nosed bat forage plants (primarily agaves, but also saguaros). This analysis did not include information on specific agave densities by allotment or EMA. There are about 420,362 capable rangeland hectares (1,068,734 ac) on the Forest. Of these, 83 percent [380,023 ha (950,057 ac)] may have livestock use at some time during the agave bolting season. Assessing bolting season use is confounded because information is lacking on the number of pastures per allotment or the pasture rotation schedules, so all acres of the allotment have been calculated into this parameter, though it is not expected that all pastures will be used during the bolting period.

There are no documented lesser long-nosed bat maternity colonies known from the Forest; however, a maternity colony is suspected to exist on the Saguaro National Monument, East (in the Rincon Mountains), immediately next to your lands. Several maternity roosts exist off-Forest, but are within commuting distance (66.7 km or 40 mi). Several post-maternity roosts (not the same as a maternity colony), which house from many thousands to only a few individual bats, are known from various locations on and near the Forest in different mountain ranges. These roosts are generally occupied from July through September, though the bats have been recorded in southeast Arizona in April (USFWS 1999a), and the species may remain into October (Sidner 1997). Based on distances lesser long-nosed bats have been known to travel from roost sites to foraging areas, potential foraging habitat may extend in a 67 km (40 mi) radius from roosts. Data from Ober (2000), suggests that bats forage within an average distance of 18.2 km (11 mi) from their day roosts. Ober's work was conducted in the Huachuca mountains of southeastern Arizona. From known roost sites in southeastern Arizona, all or major portions of each EMA lie within this potential foraging range of the lesser long-nosed bat. Thorough surveys for the species have not been completed and many potential roost sites (mines, caves, bridges, and abandoned structures) within each EMA remain unexamined.

Chiricahua EMA

At a minimum, four primary roost sites are known in the Chiricahua EMA. Additional records exist for several other bat locations known in and close to this EMA and the surrounding areas where lesser long-nosed bats have been observed (AGFD HDMS). These sites represent locations from where a few individual bats were recorded foraging and occurring at temporary roosts, to two roost sites containing greater than 1,000 bats, and another roost site with greater than 3,000 bats. There have been ongoing efforts to survey for lesser long-nosed bats in the general Chiricahua EMA, though not all potential roost sites have been found or investigated.

Dragoon EMA

At least one primary roost site is known from this range. This EMA includes large areas of desert grassland, prime habitat for Palmer's agave. Surveys for lesser long-nosed bats in association with mines have been conducted within the Dragoon EMA, but the entire range has not been surveyed.

Galiuro EMA

Male lesser long-nosed bats were detected here in 2000 (T. Snow, AGFD). The roost site has not yet been located. We are not aware of any intensive bat survey work completed in the Galiuro Mountains.

Huachuca EMA

Numerous records of lesser long-nosed bats, and large and primary roost sites, are known from throughout the Huachuca EMA. Many thousands of bats have been documented at roosts in the Huachuca Mountains including those on National Park Service, Department of Defense Fort Huachuca, Forest, and private lands. Several large (greater than 450 bats) post-maternity roosts are found off-Forest within or near the Huachuca Mountains (Fort Huachuca, Coronado National Memorial, Mustang mountains). Other large roosts in the Santa Rita Mountains and Patagonia area are within foraging flight distance of the Huachuca EMA. Fort Huachuca has conducted many surveys, monitoring studies, and other investigations. Roosting lesser long-nosed bats have been recorded at Fort Huachuca from late July into October. Numbers of bats typically peak in early September (Sidner 1996). A lesser long-nosed bat banded at Wren Bridge on Fort Huachuca was found the next night at the Patagonia Bat Cave, showing that individuals of this species move relatively long distances and bats foraging and roosting in the Huachuca EMA are part of a larger regional population (Howell 1996, Sidner 1996). Several studies have been conducted, and are currently underway on Coronado National Memorial. Howell (1996) suggests there are many potential roost sites in the Huachuca Mountains where hundreds of nectar feeding bats could roost without being detected. Lesser long-nosed bats have also been recorded from the vicinity of Canelo Hills, Turkey Creek, and the Patagonia Mountains, all considered to be in the Huachuca EMA.

Peloncillo EMA

Within the Peloncillo EMA and areas west to San Bernardino Ranch, there are a few records of lesser long-nosed bats. These records report two to four individuals per site. Within the Peloncillo Mountains there are recent reports from the Baker Canyon vicinity and a 1970 record from a cave in Guadalupe Canyon. About 50 bats suspected to be *Leptonycteris* were reported from the Cowboy Flat area. In 1997, a biological opinion was completed for the Maverick Prescribed Burn which included a large portion of the Peloncillo Mountains. As part of that consultation, various investigations were conducted in the Peloncillo Mountains to address the question of the effects of fire on paniculate agaves and the use of agaves by bats. Occupied day roosts are known from the neighboring Chiricahua Mountains to the north, and Animas Mountains (in New Mexico) to the east. Slauson et al. (1998) reported very low rates of bat use of observed agaves in the Cowboy Flat area.

Pinaleno EMA

Though apparently suitable lesser long-nosed bat foraging habitat is found throughout the Pinaleno EMA, we are aware of only one record of a lesser long-nosed bat from this vicinity. A juvenile male was captured in the south end of the Pinaleno Mountains during the fall in 1986. We are not aware of any intensive bat survey work completed in the Pinaleno Mountains. The Pinaleno EMA is further than 67 km (40 mi) from any known lesser long-nosed bat roost.

Santa Catalina EMA

Both the Santa Catalina and Rincon mountain ranges are included in this EMA. There are no recent records of lesser long-nosed bats in this EMA; older records exist of this bat being found in low numbers from a few scattered localities within the EMA, including on the Forest. Extant roost sites are known from private property next to the Forest boundary. One maternity roost site (in Saguaro National Park, East) has many observational records where the numbers of lesser long-nosed bats fluctuated widely from year to year, from several hundred to zero. There are two roost sites on BLM lands within forging distance of this EMA. The Santa Catalina and Rincon mountains are believed to provide suitable foraging habitat for the bat, especially on their lower and intermediate elevation slopes.

Santa Rita EMA

At least three locations for lesser long-nosed bat, and at least two large roost sites, are known from the Santa Rita EMA. In addition, there are several records of foraging bats scattered within the EMA and vicinity. The roost, associated with Sawmill Canyon, has had up to several hundred bats present. Foraging bats have been reported using hummingbird feeders in Madera Canyon. Surveys completed for lesser long-nosed bat in the Santa Rita Mountains have not thoroughly covered the EMA. The large roost at Patagonia Bat Cave is within close foraging distance of the Santa Rita EMA. Due to the distribution of past bat records in the Santa Rita EMA, including large roosts (Cave of the Bells, currently unoccupied; and an unnamed mine audit within one mile of this cave), we believe the Santa Rita EMA provides foraging habitat for lesser long-nosed bats and suspect additional undiscovered roosts exist in the Santa Rita Mountains.

Santa Teresa EMA

There are no known lesser long-nosed bat records from the Santa Teresa EMA. The Santa Teresa Mountains are very rugged and are believed to provide suitable foraging habitat for the bat. We are not aware of any bat survey work conducted in this mountain range. The Santa Teresa EMA is further than 67 km (40 mi) from any known lesser long-nosed bat roost.

Tumacacori EMA

We are aware of one lesser long-nosed bat roost site from within the Tumacacori EMA, in the Pajarito Mountains. The closest known bat sites next to the EMA are near Patagonia, about 25 km (15 mi) from the EMA. Approximately the east half of the EMA is within the potential 67 km (40 mi) foraging distance of bats from their day roosts in the Patagonia area. Paniculate agaves are found throughout the EMA, and saguaro are at lower elevations. The EMA is believed to provide appropriate foraging habitat for lesser long-nosed bats. This EMA is located in the general geographic corridor between maternity colonies to the west and summer roost areas farther to the east. Little survey work for this species has been completed in this rugged mountain complex.

Whetstone EMA

Red Cave, a primary lesser long-nosed bat roost site, exists in the Whetstone EMA, and another primary roost site is known (2002) from the Mustang Mountains (south of the Whetstones). These bats are known to have traveled from roosts in the Huachuca Mountains to the Mustangs. The Whetstone Mountains are believed to provide suitable foraging habitat for the lesser long-nosed bat and possibly undiscovered roost locations. We are not aware of any intensive bat survey work completed in the Whetstone Mountains.

Winchester EMA

There are no known lesser long-nosed bat records from the Winchester EMA. Two lesser long-nosed bat observations have been recorded from the neighboring Galiuro and Pinaleno mountains. The Winchester Mountains are believed to provide suitable foraging habitat for the bat. We are not aware of bat survey work conducted in this mountain range.

EFFECTS OF THE ACTION

Direct effects from the proposed action on lesser long-nosed bats would be disturbance of known roost sites. Roads that have been put in to facilitate livestock grazing practices, such as roads to stock tanks, may allow access to roost sites. Indirect effects would be those that affect the food resource of the bat. These would include construction projects, removal of agave flowering stalks by livestock, grazing in areas during the agave bolting season, livestock grazing practices that could affect seedling germination of agaves or contribute to degraded watershed conditions that may affect the microsites for agave germination and development, the effect of non-native grasses on native grass communities, and grazing in Sonoran desert plant communities that may affect saguaros.

You have committed to not disturbing or modifying any known roost sites on any allotments (USFS 1998). Range project construction actions are to be conducted so that no more than one percent of agaves and saguaros within 800 m (0.5 mi) of a range construction project are affected. Undetected roosts probably exist in various allotments, possibly in each EMA. In addition, some old records of roost sites for the species have not been re-surveyed for 20 or more years. Direct disturbance or modification to these unknown sites could occur due to range project construction activities or by public use of roads (originally created and maintained for use in the livestock grazing program) to access roost sites. Roads maintained for grazing activities provide access for the public to reach roost sites that were possibly protected before the roads were created. In 2002, there was a documented disturbance of a large maternity roost by drug smugglers and illegal aliens. The lesser long-nosed bats were disturbed to the point that they left the cave (M.Coffeen, pers. comm.)

Indirect effects from livestock grazing to *Leptonycteris* bats may occur through effects on forage plants, primarily paniculate agaves and saguaros. Impacts to forage plants through implementation of the range management program may occur through direct herbivory and trampling by livestock, alteration of the vegetation community, degradation of soil and watershed conditions, modification of the fire regime, and range projects. You have provisions in place to reduce effects on agaves from construction and maintenance activities associated with grazing management. Prescribed fire, herbicide application, and seeding of non-native plants are not part of the proposed actions. As these types of projects are proposed, they will be addressed under site-specific consultations.

The potential severity of effects to *Leptonycteris* bats resulting from the reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat. Densities of flowering agave plants, within bat home ranges, varied between an average of 3.5 plants/ha in 1998 to 0.8 plants/ha in 1999 (Ober et al 2000). Areas supporting these densities of agaves, especially within 18.9 km (11 miles) of roost sites, are probably very important for bats.

Saguaros may be impacted both directly and indirectly by grazing activities. Saguaros occur on slopes, bajadas, and in valleys. Impacts due to livestock grazing activities may occur from trampling of young saguaros, grazing of nurse plants which results in reduction or removal of protective cover, or grazing of the young saguaros themselves (Abouhalder 1992). Nurse plants, which shade sensitive saguaro seedlings, may be reduced by grazing, and germination sites may be adversely altered due to soil compaction, erosion, and reduced infiltration. Livestock seek shade under trees, and forage for annual vegetation within shrub and tree cover. Benson (1982) noted grazing that has obliterated seedbeds of saguaros. Neiring et al. (1963) found that enhanced reproduction of saguaros on slopes was correlated with reduced localized levels of grazing. Across the Forest, saguaros occur in varying densities on the lower slopes of the mountains of the western EMAs, especially the Tumacacori and Santa Catalina EMAs; however, by mid-summer when most bats arrive on the Forest from maternity roosts farther to the west, saguaros have completed flowering and no longer provide a food source for the lesser long-nosed bat.

An important factor for *Leptonycteris* bats is the reliable availability every year of agave flowering stalks. In southeastern Arizona, Palmer's and Parry's agaves are the only reliable food source for long-nosed bats in middle to late summer. Agaves are patchily distributed over the landscape and the presence of flowering agaves naturally fluctuates from year to year. Nectar feeding bats are opportunistic foragers, taking advantage of local floral resources. During the breeding season lesser long-nosed bats may fly great distances in search of food resources, and later in the season they may shift roost sites and foraging areas based on the presence (or absence) of flowering agaves (USFWS 1999a). The distance the bats will forage from a roost site appears to be related to the size of the colony and the available floral resources (USFWS 1999a). Lesser long-nosed bats are generally still present in southeastern Arizona after the bats have left their maternity colonies and migrated to southeast Arizona and southwest New Mexico in mid to late summer when agaves are in flower.

No long-term investigation has quantitatively documented the effect of grazing on agave mortality or flowering stalk herbivory. Individual paniculate agave plants bloom only once in their life of about 20 years. Agave stalks are rich in carbohydrates, and as they begin to bolt are particularly palatable to domestic livestock and wild herbivores, including deer, javelina, rodents, and rabbits (Howell 1996; USFWS 1999a). The desirability of these stalks in early spring is likely influenced by availability of quality forage in the area. Under conditions of inadequate precipitation to facilitate a spring green-up, especially when high levels of utilization are reached or following range fires, cattle as well as local wildlife may seek out agave stalks (USFWS 1999a). Cattle have been known to “walk down agave flowering stalks (USFWS 1999a). Cattle probably trample young agaves, causing some level of mortality among these plants. Agave germination and seedling establishment may be influenced by degraded ecological conditions such as soil compaction, erosion, reduced infiltration, and altered plant species composition. Effects on bat forage plants due to livestock grazing are expected to be more intense where livestock congregate near water sources, and less intense on steep slopes or among rocks where grazing is generally lighter and agaves are at higher densities.

Widmer (2001) studied the contribution of livestock grazing to other sources (such as deer) of inflorivory (eating the flowering stalks) of *A. palmeri*. She found that inflorivory was greater at sites grazed by livestock, during the agave bolting season, than at sites without livestock. The difference was statistically significant. This also correlated with a very dry winter and low numbers of *A. palmeri* producing flowering stalks. The trend remained the following year, but was not significant. The winter was wetter and more agaves produced flowering stalks. None of the other factors investigated (slope, stocking, forage availability, and utilization) significantly affected the intensity of herbivory. This work indicates that livestock may eat more flowering stalks during drought years. Agave flowering stalks may be reduced due to lowered precipitation, and may be further reduced by livestock use. This situation could make food resources less available across the Forest landscape to lesser long-nosed bats. This may be critical to bats utilizing the Santa Rita, Huachuca, Whetstone, Dragoon, and Chiricahua EMAs, as there are significant roost sites located there. Year round grazing, or grazing during the entire agave bolting season, occurs on 91 percent of the allotments in the Huachuca EMA, 60 percent of the allotments in the Whetstones, 59 percent of the allotments in the Santa Ritas, 67 percent of the allotments in the Dragoons, and 28 percent in the Chiricahuas. The dietary specialization of lesser long-nosed bats during their time in southeast Arizona makes them vulnerable to fluctuations in the availability of floral resources across space and time.

Ober (2000) also investigated energetic requirements of lesser long-nosed bats. The high annual variability of nectar influences their ability to meet their energy demands. Bats spent 66 percent less time roosting and 120 percent more time foraging during the year when resource abundance was low (1998) compared to 1999, when resource abundance was higher. Intuitively, bats spend more time foraging when resources are not as common. Reductions in food resources, caused by seasonal fluctuations in rainfall, and possibly exacerbated by livestock grazing, may force bats to commute farther for resources, roost in substandard roosts, or increase competition among individual bats for food. These results would be very detrimental for juvenile bats. In years when floral resources are low, as in drought years, the energy expended by bats is higher. This may affect the long-term survival of the bat.

Livestock management practices (past and present) and non-native plant introductions have contributed to changes in the natural dynamics and composition of vegetation communities (Fleischner 1994), as has past fire control policies. For an overview of livestock management effects to natural ecosystems see the general effects discussion earlier in the biological opinion. How past land management activities have affected the agave distribution and abundance present today is unclear, as are the potential effects of fire in an altered system.

Effects of livestock grazing on fire frequency and intensity, and subsequent effects to agaves and floral resources for bats are complex. Before about 1900, widespread surface fires occurred in the Madrean borderlands. These frequent ground fires ceased to occur about the time intensive livestock grazing began (Swetnam and Baisan 1996). Although other factors likely played some role in the elimination of frequent ground fires, most authors agree that livestock grazing was probably the most important, at least before effective fire suppression began in the 1930's (Bahre 1991, 1995, Swetnam and Baisan 1996, Danzer et al. 1997). Livestock grazing removes dried herbaceous fine fuels that normally carry fire. Without fire, ladder fuels and woody material build up in woodlands. The result is that when fires finally do occur, they can be catastrophic and stand-replacing (Danzer et al. 1997). How this change in fire frequency and intensity caused in part by livestock grazing affects agave populations is unknown. In the absence of frequent ground fires, agave populations could potentially benefit due to reduced mortality resulting from fire. However, infrequent intense fires could kill greater percentages of agaves when fires occur, if agaves are growing amid brush or other areas of high fuel loads.

Other factors are important in determining the effects of livestock grazing on fire regimes and subsequent effects to agaves and floral resources. Activities that directly or indirectly promote invasions or increased density of nonnative grasses, particularly Lehmann lovegrass, may result in increased fire frequency or intensity, reduced densities of Palmer's agave, and thus reduced floral resources for the lesser long-nosed bat. Lehmann lovegrass is abundant in some portions of the Forest, especially the Tumacacori, Huachuca, Santa Rita, and Santa Catalina EMAs and its relative abundance has been positively correlated with livestock grazing intensities (Anable et al. 1992, McClaran and Anable 1992). This species increases after fire (Martin 1973, Ruyle et al. 1988, Sumrall et al. 1991, Howell 1996), but also produces an abundance of fine fuel that promotes hot fires (McPherson 1995). Frequent fire is likely to increase the abundance of Lehmann lovegrass, and increased abundance of this grass can fuel more fires and hotter fires, creating a positive feedback loop (Anable et al. 1992). Frequent, hot fires caused by prescribed fires and increasing prevalence of Lehmann lovegrass could reduce densities of Palmer's agave. In an ungrazed setting at Fort Huachuca, Howell (1996) found that Lehmann lovegrass creates areas of continuous fuels that burn at relatively uniform temperature compared to the patchy fuels and fire intensity typical of native grasses. Agaves can persist in fire-prone native grasslands in bare areas or refugia that burn lightly or not at all. Such refugia are less common in Lehmann lovegrass stands. Howell (1996) also noted a negative relationship between the proportion of agave seedlings and ramets and the amount of Lehmann lovegrass. She suggested that Lehmann lovegrass appears to suppress agave recruitment independent of fire effects. The mechanism of suppression is unclear, but Howell (1996) suggests Lehmann lovegrass may compete effectively with agaves for nutrients, moisture, or light. If agave densities are reduced due to elevated fire effects or recruitment suppression caused by Lehmann lovegrass invasion, forage resources of the lesser long-nosed bat will be reduced. Agaves in desert grasslands have evolved with fire, but unnatural, high fire frequency can lead to decline or elimination of agave populations (Howell 1996). Howell (1996) found that a fire frequency of three to six per decade on Fort Huachuca is "clearly too high to allow sexual reproduction to persist in the agave community... too high to permit seedling establishment and too high to allow even the fast growing clones to achieve reproductive status.

Agave mortality due to fire may affect the abundance and distribution of blooming agaves on the landscape for many years into the future, especially if there is high mortality within certain age and size classes. Although fire may affect the availability of blooming agaves, nectar production and sugar content of surviving plants is little effected. Working in the Peloncillo Mountains, Slauson et al. (1998) found that nectar production and sugar content did not differ between unburned agaves and burned agaves with up to 80 to 90 percent of the leaf area burned. The complexity of variables influencing agave flowering may mask the effects of a fire on agave flowering for several years after a fire. In addition, natural recruitment of agaves may be episodic and the effects of fire on the agave seed bank in the soil are unknown. Livestock grazing, especially at high utilization levels, often promotes the increase of non-native and less-palatable species, which may influence the resulting fire regime. Often the objectives of livestock management are to increase the abundance of grasses while the direct impacts of livestock herbivory are the reduction of grass cover. Grasses are probably one of the strongest competitors with agave seedlings (USFWS 1999a). Increased abundance of grass could result in reduced agave abundance. When overgrazing results in declines of perennial grasses (Martin and Cable 1974, Eckert and Spencer 1987), there may be less competition between grasses and agaves. There may also be increased trampling of smaller agaves by livestock, and these increases in woody/shrub vegetation result in an altered fire regime.

Effects to *Leptonycteris* bats occur through direct herbivory and trampling of agaves, alterations of species composition of the community, disruption of ecosystem functions, alteration of ecosystem structure, and the related effects on agaves. Agaves have persisted on the landscape (and sometimes may have even increased) over the course of more than a century of livestock use on the landscape.

Slauson (USFWS 1999a) concluded that overgrazing is detrimental to agaves, but what level is considered overgrazing? A review of the literature by Holechek et al. (1998) shows that grazing in southwestern habitats is sustainable, but at moderate levels of utilization. Utilizations levels must be managed to maintain critical dry matter residue on the ground to protect the soil, and maintain forage plant vigor, wildlife habitat, and a natural fire regime. Utilization levels recommended by Holechek et al. (1998) for semiarid grasslands range from 25 percent to a maximum of 40 percent in the best, most easily managed area (e.g., flats). A major concern is the frequency of drought conditions in the Southwest. Overgrazing often accompanies drought conditions when stocking levels cannot be quickly reduced to match the limited forage production. Periodic overgrazing can damage range resources (Eckert and Spencer 1987) and have long-term negative effects.

Grazing utilization levels over 40 percent are considered damaging to the ecosystem (Martin 1975, Eckert and Spencer 1987, Holechek et al 1998). Greater than 80 percent of the allotments on the Forest have proposed grazing utilizations above 40 percent during the growing season. How these or other specific levels of utilization are directly correlated to effects on agaves is not known; however, as utilization levels or stocking levels increase, effects to the vegetation community and agaves also increase. No information is available on the relationship of grazing management systems and utilization levels to the associated effects on agaves. Until this information is available, you should be careful not to preclude management and conservation options for the bat. The effects that livestock are having today on the landscape will be manifested in changes in the ecosystem for years and decades to come. The effects of livestock use today on seedling agaves may not influence bat populations for 20 or more years, when those plants would be reaching maturity and bolting. By contrast, the effect of livestock today through herbivory on bolting agaves results in immediate reductions of forage resources available to *Leptonycteris.*

In summary, superimposing the potential effects of livestock use as it affects the availability of floral resources, adult plant mortality, and seedling mortality, upon the natural variability in agave phenology, episodic reproductive events, and patchy distribution on the landscape, grazing may affect agaves and nectar feeding bats in a variety of ways. *Leptonycteris* bats are opportunistic foragers and are capable of long distance flights. Temporary and minor shifts in the abundance of flowering agaves as an available resource for these bats are expected to have relatively small effects. As these impacts to lesser long-nosed bat food resources occur across larger portions of the landscape, as analyzed through the EMAs on the Forest, bat survivorship may be reduced through increased foraging flight distances and related energy expenditures, increased exposure to predators, changes in use patterns of limited large roost sites, and potential disruption of the "nectar corridor. These effects may be most evident in those years where weather patterns, fire, or other causes have also affected agaves. The long-term effect of livestock use contributes to ecosystem based changes. The net result is that there are effects from livestock activities across the landscape to the ecosystem upon which the lesser long-nosed bat depends. We remain very concerned with the amount of livestock grazing that occurs during the agave bolting season across the Forest.

You have proposed to monitor the density of agave flowering stalks within 11 miles of two large roosts, and you will consider adding a third roost to monitor after evaluation and discussion of results from the first year's work. If agave flowering densities fall below 0.2 plants/hectare, we would consider that to be new information warranting reinitiation of consultation.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed action. Effects of past Federal and private actions are considered in the Environmental Baseline. Much of the land in the project area of concern for the lesser long-nosed bat (foraging and roosting habitat) is managed by Federal agencies, particularly the Forest, Bureau of Land Management, Coronado National Memorial, and Fort Huachuca.

On a landscape level, paniculate agave populations are widely dispersed; however, the percentage of the agave population which successfully produces flowering stalks is unknown. Large segments of the range of the bat and its forage plants are exposed to Federal, State, Tribal, and private livestock grazing activities. The overall effects of grazing (herbivory, trampling, and ecosystem changes affecting plant reproduction, recruitment, and establishment) on bat forage plants is unknown. This, along with potential disturbance of roost sites and loss of habitat due to urbanization and other activities on tracts of State and private lands within the range of the bat, contributes to negative impacts on lesser long-nosed bats. The effects of all these actions are considered cumulative to the proposed action.

CONCLUSION

After reviewing the current status of the lesser long-nosed bats, the environmental baseline for the action area, and the anticipated effects of the reinitation of your livestock grazing program, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat. Critical habitat has not been designated for this species; therefore, none will be affected. We based our conclusion on the following:

1. You have included minimization measures in the proposed action to avoid destruction of agaves and disturbance of known lesser long-nosed bat roosts during construction of range projects.

2. Some areas of the Forest will not be experiencing grazing during the agave bolting season. In those areas with year round grazing, not every pasture will be used during the agave bolting season, so some floral resources should be available to foraging lesser long-nosed bats.

3. In non-drought years, food resources for bats do not seem to be a limiting factor.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

We do not anticipate the proposed action will result in incidental take of lesser long-nosed bats because it is not known if the density of agave flowering stalks is a limiting factor for the bats, especially during drought years. In addition, you have agreed to monitor flowering densities within 11 miles of two, possibly three, lesser long-nosed bat roosts.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Continue and expand your cooperative efforts to survey for *Leptonycteris* bat roosts, and protect and monitor these sites (Recovery plan task 1, USFWS 1997).

2. Routinely conduct exit counts on known roost sites.

3. Monitor livestock utilization within all pastures used during the agave bolting season of the allotments within the Chiricahua, Huachuca, Whetstone, and Santa Rita EMAs (Recovery plan task 2, USFWS 1997).

4. Investigate and monitor the invasion of Lehmann lovegrass on the Forest and assist other agencies in developing methods for controlling this nonnative grass (Recovery plan task 2, USFWS 1997).

5. Apply restrictions on the exposure of bolting agaves to livestock use Forestwide, especially during drought. (Recovery plan task 1, USFWS 1997).

6. Continue support and cooperation in the investigations of agave and bat relationships to livestock grazing (Recovery plan task 1, USFWS 1997).

7. Implement the Lesser Long-nosed Bat Recovery Plan, as appropriate.

In order for us to be kept informed of actions reducing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

(Note: Surveys for lesser long-nosed bats, or other bats, that involve capture or take require appropriate permits from us and AGFD).

Mexican long-nosed bat (*Leptonycteris nivalis*)

STATUS OF THE SPECIES

We listed the Mexican long-nosed bat as endangered on September 30, 1988 (USFWS 1988a). Critical habitat has not been designated for this species. We completed the recovery plan in 1994 (USFWS 1994).

The Mexican long-nosed bat is a medium-sized bat, about 70 to 90 mm (2.76 to 3.54 in) long and weighs 18 to 30 g (0.634 to 1.05 oz), with the third finger measuring longer than 105 mm (4.13 in). The back is pale brown to gray. There is no visible external tail; however, the tail actually consists of three vertebrae. The interfemoral membrane (uropatagium), a narrow strip of skin along the inside of each leg, has long hairs extending beyond its edge. Other diagnostic characters are the minute tail and the tiny hairs extending beyond the edge of the interfemoral membrane. These distinguishing characteristics are best seen when the species is captured and in hand; the Mexican long-nosed bat is easily misidentified in flight.

With an elongated snout and a small, prominent, triangular noseleaf on the tip, these bats use their long, protruding tongue with inward-pointing, elongated papillae at the tip to feed on nectar and pollen of agave and cactus flowers, some soft fruits, and perhaps, incidentally, insects associated with flowers. They become active in late evening, leaving roosts in search of their night blooming food plants. There is some description in the literature of flock foraging behavior. The Mexican long-nosed bat, and other nectar feeding species, are considered vital pollinators for some plant species like the agave. The agave is the primary ingredient in the production of tequila, mescal, and pulque liquors. While the government regulated liquor producers such as Jose Cuervo only use cultivated agaves, leaving some rows unharvested for bats and replanting those that are harvested, the loss of foraging habitat is most likely linked to bootleg producers. In 1993, it was estimated that bootleg mescal producers were eliminating between 500,000 and 1,200,000 wild paniculate agaves a year in Sonora alone. Other reductions in available foraging habitat include the conversion of agave habitat to agriculture and other land uses.

This migratory bat species ranges from southern Mexico to southwestern Texas (primarily in Big Bend National Park), and southwestern New Mexico. Specimens have been collected from the following Mexican States: Coahuila, Durango, Guerrero, Hidalgo, Jalisco, Estado de Mexico, Michoacan, Morelos, Nayarit, Nuevo Leon, Puebla, Queretaro, San Luis Potosi, Sinaloa, Tamaulipas, Zacatecas, and the Distrito Federal. It is known from 500 to 3,000 m (1,550 to 9,330 ft) in desert scrub, open conifer-oak woodlands, and pine forest habitats in the Upper Sonoran and Transitional Life Zones.

The species is colonial and usually roosts in caves but can also be found in mines, culverts, and hollow trees. There are no references in the literature to roosts that are occupied year-round nor whether seasonally occupied roosts are occupied by the same colony when they return. A particular colony may use one or more winter roosts, several migratory roosts, and still other summer roosts. Food resource availability probably drives this species' migratory movements which might be tied to taking advantage of peaking food sources. As of 1994, Mt. Emory cave in Big Bend National Park is the only cave habitat of the bat that has been studied somewhat extensively. It is described as a shallow fault block cave with a small, crumbling entrance. Temperatures are generally cooler inside the cave during the summer, with a constant breeze blowing through it. Roosting occurs in an upper level on a high ceiling. Information on the Mexican long-nosed bat's roosting habitat is scarce. The species' use of a roost in Big Bend National Park may reflect use in years when flower production is low in Mexico. Possible food plants include columnar cacti such as the cardon (*Pachycereus pringlei*) and paniculate agaves (*Agave* spp.). The migratory path of the species is not well known.

The current population size is difficult to estimate. Mexican long-nosed bat populations appear to have dramatically decreased during the last three decades. A 1985 survey of 14 known roost sites resulted in a determination of very small numbers of this species. Causes of the decline have not been identified with complete certainty, but they very likely relate to human activities. Human disturbances in roosts due to camping, fires, caving, mining, illegal immigration and drug traffic activities can be severe and permanent. Modification or destruction of roost sites and foraging habitat are probably the major threat. Other threats may include pesticides, competition for roosts and nectar, natural catastrophes, disease, and predation. As with other colonial roosting bats, Mexican long-nosed bats are probably limited by the number of sites that provide the proper roosting environment, especially for parturition. Caves and mines in the southwest are generally becoming increasingly subject to human destruction and disturbance. This species is particularly sensitive to perturbation of the roost. Foraging habitat disruption and destruction has also been identified as a threat. Foraging habitat can be modified or destroyed by harvesting of agave, expansion of agriculture, and other land uses.

Reproductive information for the Mexican long-nosed bat is limited. Most parturition probably occurs in May, but some studies indicate that this species might have two birth peaks a year, the first in spring and the second peak in September. It is suggested that the migratory nature of this species is derived from the mutualistic relationship it shares with the agave plants on which it feeds. Although the agaves, which flower only once before dying, and other of the bat's food plants, can reproduce vegetatively by sending shoots from the bottom to the main stem, they rely on the Mexican long-nosed bat and other nectar feeders for cross-pollination to keep up an adequate amount of gene flow. The bat's migratory pattern suggests that it follows the onset of flowering agaves northward, seasonally. When climactic conditions severely limit the number of agaves that flower in any given year, the bat will range farther for additional food sources. There is speculation that this seasonal migration habitat may be the reason that population estimate numbers have fluctuated so dramatically at Mt. Emory cave from year to year. Some of the lack of information regarding basic life history for this species may be attributed to the fact that the Mexican long-nosed bat was considered conspecific with the lesser long-nosed bat *(Leptonycteris curasoae)* from 1940 to 1962. It is possible some of the older biological information for *L. nivalis* should really be attributed to *L. curasoae* (USFWS 1994).

ENVIRONMENTAL BASELINE

All allotments located in the Peloncillo EMA were analyzed for livestock effects to the Mexican long-nosed bat. The following determinations were based on historical records of species occurrence within southeastern Arizona from the AGFD HDMS, personal communications with our biologist Mike Coffeen and plant ecologist Mima Falk, and field observations from your district biologists and habitat surveys.

Those allotments listed below constitute the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

Guidance criteria for the Mexican long-nosed bat states:

No Effect (must meet one of the criteria):

1. Allotment does not occur in Hidalgo County, New Mexico or within the Peloncillo Mountains in Cochise County, Arizona.

2. All known, suitable, or potential roost sites within allotment will be protected from disturbance or modification and no bat food plants (*Agave palmeri*, *A. parryi*, *A. deserti*, *A. schottii*) occur in portions of the allotment grazed by livestock.

May Effect, Not Likely to Adversely Affect (must meet all of the of the criteria):

1. Livestock grazing occurs on the allotment and all known, suitable, or potential roosts will be protected from disturbance or modification.

2. Grazing and livestock management activities will not facilitate public access to known, suitable, or potential roosts.

3. Livestock management activities located within the range of the bat will not damage or destroy more than 1 percent of bat food plants within 0.5 mi of the project site.

4. Within the range of the bat, livestock grazing will not occur between April 1 and June 15 to allow agave bolts to reach the height where livestock grazing on agaves is unlikely to occur.

You determined that livestock grazing on 11 allotments may adversely affect this species. The allotments are:

Clanton/Cloverdale, Deer Creek, Geronimo, Graves, Guadalupe, Juniper Basin, Maverick, Outlaw Mountain, Robertson, Skull Canyon, and Walnut Canyon.

While there are no documented records for this bat species from Arizona, collections of the species are from areas relatively close to the Peloncillo EMA, the Arizona-New Mexico border, and from a suspected (not yet pinpointed) roost site in the Animas Mountains of southwestern New Mexico.

The Peloncillo EMA provides appropriate foraging habitat (agaves) for the Mexican long-nosed bat. The Peloncillo Mountains are within typical foraging flight distance (64.4 km) (40 miles) of the Animas Mountains, lying about 40 km (25 miles) west of the Animas range.

Two specimens taken in Hidalgo County (in 1963 and 1967) in southwestern New Mexico were determined to be Mexican long-nosed bats (USFWS 1994). The species presence was again confirmed when individual bats were netted over a water tank in Hidalgo County on August 26, 1992. The capture location of the above individuals is relatively close to the Peloncillo EMA.

Livestock grazing and associated roads, range improvements, and public access issues are the primary concerns and factors that could affect this species' food sources (agaves) and any unknown roost sites in the Peloncillo EMA.

EFFECTS OF THE ACTION

The severity of adverse effects to *Leptonycteris* bats resulting from the potential reduction in forage resources is dependent on the importance of forage plants in a specific area to reproduction, survival, and growth of the bat. The way in which livestock management activities may affect *Leptonycteris* bats is discussed in detail in this biological opinion in the Effects of the Action section for the lesser long-nosed bat. For this BO, only the Peloncillo EMA is considered potential foraging habitat on the Forest for the Mexican long-nosed bat. Areas with high densities of paniculate agaves in Arizona and New Mexico may be important to the Mexican long-nosed bat, especially in certain years when the bat may tend to wander widely, perhaps due to reductions in forage opportunities near occupied roosts.

About 94 percent of the Peloncillo EMA is managed as capable grazing acres. While grazing is permitted on 85 percent of the capable area some time during the agave bolting season, the actual area grazed is less than this because of grazing rotation and rest systems. Allowable use levels are greater than 45 percent (measured at key areas) on allotments comprising 97 percent of the capable area. Since not all areas receive uniform use, some areas will receive slightly higher than allowable use, others less. Of the total EMA, 11 percent is in low or moderately low range condition and 52 percent has impaired or unsatisfactory soil condition. There are several records of lesser long-nosed bats using this area, but for the Mexican long-nosed bat, there are only incidental occurrence records from areas near the EMA.

CUMULATIVE EFFECTS

Cumulative effects are those adverse effects of future State, Tribal, local government, and private actions that are reasonably certain to occur in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Much of the land in the project area of concern for the Mexican long-nosed bat is managed by you, although there are substantial areas of private land in both Arizona and New Mexico.

On a landscape level, paniculate agave populations appear to be well dispersed; however, the percentage of the agave population which successfully produces flowering stalks is unknown. Throughout much of the range of the Mexican long-nosed bat in the United States, its forage plants are exposed to Federal, State, Tribal, and private livestock grazing management activities. The overall effects of grazing (herbivory, trampling, and ecosystem changes affecting plant reproduction, recruitment, and establishment) on bat forage plants is unknown. *Leptonycteris* bat foraging ecology and energy budget is largely unknown. This, combined with potential disturbance of roost sites and loss of habitat due to urbanization and other activities on large tracts of State and private lands within the range of the bat, contributes to negative impacts on Mexican long-nosed bats. The Peloncillo EMA, the only EMA where the Mexican long-nosed bat may potentially occur, is not known to support any roosts. On-going activities in the Peloncillo EMA are primarily livestock management associated with Federal, State, and private lands. The effects of these actions on State and private lands are considered cumulative to the proposed action.

CONCLUSION

After reviewing the current status of the Mexican long-nosed bat, the environmental baseline for the action area, and the anticipated effects of the reinitation of your livestock grazing program, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mexican long-nosed bat. Critical habitat has not been designated for this species; therefore, none will be affected. We based our conclusion on the following:

1. You have included measures to reduce the destruction of agaves during livestock construction and maintenance activities to no more than 1 percent.

2. The Peloncillo EMA, with potential habitat and food sources, is a very small portion of the species' known range, and lies on the westernmost portion of that known range.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE

We do not anticipate take of any Mexican long-nosed bat because there are currently no known roosts on the Forest.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Continue and expand cooperative efforts to survey for *Leptonycteris* bat roosts, and protect and monitor these sites.

2. Continue, your support and cooperate in the investigations of agave relationships to livestock grazing, and of the effects of prescribed fire on paniculate agaves.

3. Implement the Mexican long-nosed bat recovery plan, as appropriate.

4. Fund or help fund studies that determine the relationships between *Leptonycteris* bats and food sources (agaves).

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

(Note: Surveys or other activities that involve capture or other forms of take of this species require appropriate permits from us and the applicable state Game and Fish Department).

<u>PLANTS</u>

Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*)

STATUS OF THE SPECIES

We listed the Huachuca water umbel as an endangered species in a Federal Register notice (62 FR 665), dated January 6, 1997. Critical habitat was designated on the upper San Pedro River, Garden Canyon on Fort Huachuca, and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek on July 12, 1999 (64 FR 37441). The umbel is an herbaceous, semiaquatic perennial plant with slender, erect leaves that grow from creeping rhizomes. The leaves are cylindrical, hollow with no pith, and have septa (thin partitions) at regular intervals. The yellow/green or bright green leaves are generally 1 to 3 mm (0.04 to0.12 inch) in diameter and often 3 to 5 cm (1 to 2 inches) tall, but can reach up to 20 cm (8 inches) tall under favorable conditions. Three to ten very small flowers are borne on an umbel that is always shorter than the leaves. The fruits are globose, 1.5 to 2 mm (0.06 to 0.08 inch) in diameter, and usually slightly longer than wide (Affolter 1985). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode. An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants which then may reroot in a different site along aquatic systems.

Huachuca water umbel was first described by Hill (1926) based on the type specimen collected near Tucson in 1881. Hill applied the name *Lilaeopsis recurva* to the specimen, and the name prevailed until Affolter (1985) revised the genus. Affolter applied the name *L. schaffneriana* var. *recurva* to plants found west of the continental divide.

Huachuca water umbel has been documented from 27 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo 1990, Warren et al. 1989, Warren et al. 1991, Warren and Reichenbacher 1991). The plant has been extirpated from six of the 27 sites. The 21 extant sites occur in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are between 3,500 and 6,500 feet in elevation.

Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800s to early 1900s. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

In stream and river habitats, Huachuca water umbel can occur in backwaters, side channels, and nearby springs. After a flood, it can rapidly expand its population and occupy disturbed habitat until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek in August 1988, when a scouring flood removed about 95 percent of the Huachuca water umbel population (Gori et al. 1990). One year later, the umbel had recolonized the stream and was again codominant with watercress, *Rorippa nasturtium-aquaticum* (Warren et al. 1991). The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of "refugia where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

Density of umbel plants and size of populations fluctuate in response to both flood cycles and site characteristics. Some sites, such as Black Draw, have a few sparsely-distributed clones, possibly due to the dense shade of the even-aged overstory of trees, dense nonnative herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5 percent of a 500.5 square meter (5,385 square foot) patch of habitat (Gori et al. 1990). Some populations are as small as 1 to 2 square meters (11 to 22 square feet). The Scotia Canyon population, by contrast, has dense mats of leaves. Scotia Canyon contains one of the larger Huachuca water umbel populations, occupying about 57 percent of the 1,450 meter (4,756 foot) perennial reach (Gori et al. 1990, Falk and Warren 1994).

While the extent of occupied habitat can be estimated, the number of individuals in each population is difficult to determine because of the intermeshing nature of the creeping rhizomes and the predominantly asexual mode of reproduction. A "population of Huachuca water umbel may be composed of one or many genetically distinct individuals.

Overgrazing, mining, hay harvesting, timber harvest, fire suppression, and other activities in the nineteenth century led to widespread erosion and channel entrenchment in southeastern Arizona streams and cienegas when above-average precipitation and flooding occurred in the late 1800s and early 1900s (Bahre 1991, Bryan 1925, Dobyns 1981, Hastings and Turner 1980, Hendrickson and Minckley 1984, Martin 1975, Sheridan 1986, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, approximately 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring flow, and may have preconditioned the San Pedro River channel for rapid flood-induced entrenchment (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat on the San Pedro River and throughout southern Arizona and northern Mexico. Much habitat of the Huachuca water umbel and other cienega-dependent species was presumably lost at that time.

Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, nonnative species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Dredging extirpated the Huachuca water umbel from House Pond, near the extant population in Black Draw (Warren et al. 1991). The umbel population at Zinn Pond in St. David near the San Pedro River was probably lost when the pond was dredged and deepened. This population was last documented in 1953 (Warren et al. 1991).

Livestock grazing can affect the umbel through trampling and changes in stream hydrology and loss of stream bank stability; however, existence of the umbel appears to be compatible with well-managed livestock grazing (Service 1997). In overgrazed areas, stream headcutting can threaten cienegas where the umbel occurs. Such headcutting occurs at Black Draw just south of the international boundary and at Los Fresnos, in the San Rafael Valley, Sonora, Mexico. Groundwater pumping has eliminated habitat in the Santa Cruz River north of Tubac, and threatens habitat in the San Pedro River. Portions of the San Pedro River occupied by the umbel could be dewatered within a few years unless measures are implemented very soon to halt or mitigate groundwater pumping in the Sierra Vista-Fort Huachuca area (ASL 1998). Severe recreational impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of the Huachuca water umbel. Populations in Bear Canyon in the Huachuca Mountains have been impacted by trampling and off-highway vehicles.

A suite of nonnative plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997), including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear; however, in certain microsites, the nonnative Bermuda grass, *Cynodon dactylon*, may directly compete with the umbel. Bermuda grass forms a thick sod in which many native plants are unable to establish. Watercress is another nonnative plant now abundant along perennial streams in Arizona. It is successful in disturbed areas and can form dense monocultures that can outcompete Huachuca water umbel populations.

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. Populations are in most cases isolated, as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

Critical Habitat

Critical habitat was designated in the July 12, 1999, Federal Register (64, No.132) notice. The constituent elements identified in the final rule provide for permanent water, stable stream channels, and riparian plant communities composed of native plant species. The constituent elements also provide for continuous reaches of habitat to allow *Lilaeopsis* populations to expand and contract in response to flood events.

1) Sufficient perennial base flows to provide a permanently or nearly permanently wetted substrate for growth and reproduction of Huachuca water umbel;

2) A stream channel that is relatively stable, but subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for water umbel expansion;

3) A riparian plant community that is relatively stable over time and in which nonnative species do not exist or are at a density that has little or no adverse effect on resources available for water umbel growth and reproduction; and

4) In streams and rivers, refugial sites in each watershed and in each reach, including but not limited to springs or backwaters of mainstem rivers, that allow each population to survive catastrophic floods and recolonize larger areas.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southern Arizona from the AGFD Heritage Data Management System (HDMS), field observations from your district personnel, habitat surveys, and communications from species experts. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for plants state:

No Effect (must meet one of the criteria):

1. Livestock grazing will not occur within any subwatershed on the allotment containing suitable or occupied habitat of any listed plant species.

2. TEP species and their habitat in the allotment will be excluded from livestock grazing by topography or other physical barriers.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Herbivory to individual plants from livestock grazing is not likely to occur.

2. Trampling of individual plants by livestock is not likely to occur.

3. Suitability and sustainability of the habitat to support the plant will not be altered.

4. Potential habitat will not be prevented from becoming suitable habitat for the plant by changes in plant community composition or deterioration of subwatershed/soil stability.

5. Plants and/or their habitats will not be physically disturbed and potential habitat will not be prevented from becoming suitable habitat by adverse effects from livestock management activities.

The Manila, Lone Mountain, and Pagago allotments constitute the action area for this species' analysis. These three allotments support Huachuca water umbel populations and lie on the west slope of the Huachuca Mountains (Manila and Lone Mountain allotments) and in the Canelo Hills (Papago allotment) in southeastern Arizona. Elevations range from 1,220 m (4,000 ft) on the Papago allotment to 2,880 m (9,450 ft) on the Lone Mountain allotment. Terrain is mountainous and steep at the higher elevations, but fairly rolling and gentle terrain dominates at the lower elevations. Vegetation communities include Petran montane conifer forest, madrean evergreen woodland, and plains/great basin grasslands (Brown and Lowe 1980, Brown 1982). Riparian plant associations occur as stringers in canyon bottoms. Patches of chaparral communities also occur within the project area (USFS 1998).

The Huachuca Mountains and Canelo Hills have a long history of human use; however, it is unclear precisely how those uses have affected the habitats of the Huachuca water umbel. Evidence of historical mining activity is commonly encountered throughout the area (Taylor 1991), but mining was probably more important in the Patagonia Mountains to the west and at Tombstone and Bisbee (Hereford 1993, Hadley and Sheridan 1995). Nevertheless, direct impacts of mining, such as tailings piles, roads, areas cleared for settlements, and probably most important, fuelwood harvest to support the mines and settlers, likely resulted in localized denuded landscapes and degraded watersheds (Hadley and Sheridan 1995.) A sawmill operated in Sunnyside Canyon probably in the late 1800's. Other sawmills operated in Carr, Ramsey, Sawmill, and Miller canyons in the Huachuca Mountains (Taylor 1991). By 1902 all usable timber had been harvested from the Huachuca Mountains (General Wildlife Services 1999).

Cattle were grazed in the area as early as 1680 (Hadley and Sheridan 1995). Free-ranging cattle were abundant on Fort Huachuca in 1886 when the post quartermaster requested fencing of the installation to protect forage for cavalry horses (General Wildlife Services 1999). Severe drought combined with overstocking in the 1880s and 1890s led to overgrazing in the region. During the drought, some ranchers drove cattle from the San Rafael Valley into the Huachuca Mountains where forage was cut from oak and ash trees to keep the cattle alive (Hadley and Sheridan 1995.) The Huachuca Forest Reserve, a precursor to the Coronado National Forest, was established in 1906. At that time policies were initiated to limit grazing to within range capacity and to protect timber resources. These policies were strengthened over time.

Fire regimes for the Garden Canyon watershed and in a study area around Pat Scott Peak in the Huachuca Mountains were reconstructed using dendrochronology (Danzer et al. 1997). Before 1870, fires were frequent (mean of 4 to 8 years), low-intensity (ground fires), and widespread. Since 1870, only two widespread fires occurred (1899 and 1914) in the study area. Danzer et al. (1997) attribute this change in fire regime to extensive use of timber, mineral, range, and water resources and associated reductions in fuel loads. Active fire suppression by you and others also reduced fire frequency. Exclusion of fire has promoted encroachment of shade-tolerant, less fire-resistant tree species such as Douglas fir, gambel oak, and southwestern white pine, and inhibited growth of pondersosa pine. The 1899 fire was a devastating crown fire that halted all large-scale logging operations at the "Reef" in Carr Canyon and below Ramsey Peak on Fort Huachuca (Danzer et al. 1997.) Danzer et al. (1997) suggest that the fire regime has been altered from frequent, low intensity fire to infrequent, stand-replacing fires. Recent stand-replacing fires on Carr Peak, Miller Peak, and Pat Scott Peak support this hypothesis.

In grassland and oak woodlands of southeastern Arizona, fire intervals can only be inferred from adjacent forest communities where dendrochronological evidence can be collected, or from historical accounts. Fire return intervals in the desert grassland community have been estimated at approximately 8 to 20 years (Wright and Bailey 1982, McPherson 1995, Howell 1996, Kaib et al. 1996). Natural fire has been excluded from these communities primarily because of livestock overgrazing and drought which removed fine fuels, and past fire suppression. Lack of natural fires and overgrazing have resulted in encroachment or increased density of woody species such as mesquite and juniper, and various half-shrub woody species. There has also been a reduction in coverage of perennial grasses. This conversion of grasslands to shrublands and woodlands has reduced available forage for livestock and some wildlife species, runoff and soil erosion has increased, and some wildlife species characteristic of woodlands have benefitted.

Most canyons in the Huachuca Mountains and Canelo Hills today are either too dry to support Huachuca water umbel, or existing permanent streams exhibit high gradients in narrow, shaded canyons that do not provide the boggy, cienega conditions required by this plant. Whether conditions were different in pre-settlement times is unknown and cannot be reconstructed from available historical accounts; however, erosion in watersheds degraded by overgrazing, timber harvest, and mining, and erosion and downcutting in streams after stand-replacing fires that began in 1899, may have largely eliminated cienega habitats in the canyons of the Huachuca Mountains. Observations of historical versus current distribution of leopard frogs *(Rana pipiens* complex), suggest wetland habitats in the canyons of the Huachuca Mountains may have been altered in historical times. Leopard frogs, which are primarily frogs of low-gradient streams and boggy pools and ponds, were once found in many canyons in the Huachuca Mountains. The frogs are largely absent today, low-gradient streams and sizeable natural pools and ponds are almost nonexistent, and the only places leopard frogs are found with regularity in the Huachuca Mountains are constructed ponds and livestock tanks.

A biological opinion (2-21-96-F-190) was issued in August 2001, concerning the effects of the Lone Mountain land exchange. This was a non-jeopardy opinion that will result in the upper headwaters of Scotia canyon coming under your management. This will benefit *Lilaeopsis* because these headwaters and associated springs are the source of water for downstream occupied habitat. The springs are also occupied and are part of designated critical habitat.

All extant populations of water umbel within Forest allotments occur on the west slope of the Huachuca Mountains and the east side of the San Rafael Valley (Bear and Lone Mountain canyons and associated tributaries; Scotia and Sunnyside canyons, Sycamore Springs in Sycamore Canyon; Mud Springs, Joaquin Creek, O'Donnell Creek, Freeman Springs, and a population at the Cimarron Road Crossing). Populations in Bear, Lone Mountain, Scotia and Sunnyside canyons, and associated tributaries, all on the Lone Mountain allotment, are in critical habitat designated for the species (USFWS 1999b).

Localities of the Huachuca water umbel in and near the Lone Mountain, Manila, and Papago allotments are summarized in USFS (1998) and Haas and Frye (1997). On the Lone Mountain allotment, the water umbel is found in a 2.1 km (1.3 mi) reach of Scotia Canyon, a 0.6 km (0.4 mi) reach of Sunnyside Canyon, about a 0.3 km (0.2 mi) reach of Sycamore Canyon immediately downstream of Sycamore Spring, less than 98 m (320 ft) reach of Mud Spring, a 0.6 km (0.4 mi) reach of Lone Mountain Canyon, and in several reaches of Bear Canyon totaling about 3.5 km (2.2 mi)(USFS 1998). The plant is also found on roughly 1.9 km (1.2 mi) of two tributaries of Lone Mountain Canyon, a 1.0 km (0.6 mi) reach of a tributary to Bear Canyon, and at several other small locations in the Bear and Lone Mountain canyon areas (Gori et al. 1990, Haas and Frye 1997, USFS 1998; Mima Falk, Coronado National Forest, pers. comm., 1999; J. Rorabaugh, Service, pers. obs., 1995-9). On the Papago allotment, the water umbel occurs at springs or short reaches of streams at Freeman Springs and O'Donnell Creek (USFS 1998). On the Manila allotment, the plant was found in a creek at Cimarron Road near the boundary with Fort Huachuca. The plant was apparently extirpated below the road because of road construction and possibly upstream water diversion, but still occurs upstream on private lands and could recolonize the site. The umbel does not occupy all portions of the reaches described here, but rather is found intermittently within an estimated 2.5 km (1.55 mi) of these canyons on the Forest (USFS 1998).

Metapopulations of Huachuca water umbel were monitored in Bear and Scotia canyons in 1989, 1993, and 1995, 1998, 1999, and 2001(Gori et al. 1990, Falk and Warren 1994, Falk 1998). You set a new transect up in Sunnyside Canyon in 2001. The Bear Canyon population increased in linear extent by 10 m (33 ft) and patches were found more frequently (umbel found on 46 percent versus 33 percent of transects across the creek) in 1993 as compared to 1989. By 1995, the umbel had expanded another 350 m (1,150 ft) along Bear Creek, but frequency decreased to 38 percent. In Scotia Canyon, the linear extent of the stream occupied by the water umbel varied from 1,066 m (3,494 ft) in 1989, to 1,431 m (4,722 ft) in 1993, and to 1,421 m (4,660 ft) in 1995. Frequency varied from 47 percent (1989) to 60 percent (1993) and 64 percent (1995). Because of the dynamic nature of riparian systems, variation from year to year is expected under natural conditions. As a result, long-term population trends cannot be discerned from these data; however, based on this limited sampling, populations in Bear and Lone Mountain canyons appear to be relatively stable.

Critical habitat was designated in a July 12, 1999, Federal Register (64, No.132) notice. Within Coronado National Forest allotments, critical habitat for the Huachuca water umbel was designated only on the Lone Mountain allotment in the following areas: Scotia Canyon [5.4 km (3.4 mi)], Sunnyside Canyon [1.1 km (0.7 mi)], Bear Canyon [1.6 km (1.0 mi)] and an unnamed tributary to Bear Canyon [0.9 km (0.6 mi)], Lone Mountain Canyon [1.6 km (1.0 mi)] and associated tributaries including "Rattlesnake Canyon [1.6 km (1.0 mi)] and an unnamed tributary [1.0 km (0.6 mi)]; which totals 13.2 km (8.3 mi), or 16 percent of the total stream/river miles designated as critical habitat. The only large reach of umbel habitat is on the upper San Pedro River, where 54.2 km (33.7 mi) were designated as critical habitat. Total stream miles of critical habitat under various grazing regimes are shown in Table 2.

EFFECTS OF THE ACTION

The water umbel may be affected by livestock grazing in the following ways: 1) trampling by cattle, 2) direct impacts from construction of range projects, 3) changes in stream geomorphology that lead to erosion, sedimentation, and downcutting, and 4) watershed degradation and resulting adverse effects to stream hydrology. The umbel is an opportunistic, early- or mid-successional species that probably benefits from periodic disturbance, such as floods, fire, or perhaps grazing by livestock or wildlife. In areas without disturbance, other aquatic and semi-aquatic species, such as cattail, watercress, and bermuda grass may outcompete or reduce water umbel populations to remnant patches or to seeds or rhizomes (Haas and Frye 1997). Periodic disturbance opens these habitats up and allows recolonization or expansion of water umbel populations. Occasional trampling by livestock, or periodic disturbance of bank and stream channels by livestock may mimic natural forms of disturbance that recreate early successional stages favorable for population expansion; however, continual or frequent disturbance, or severe damage to stream morphology, such as head cuts and downcutting would likely reduce populations or eliminate them from areas.

Table 1. Location by allotment and proposed grazing regime of Huachuca water umbel populations on the Coronado National Forest.

Location	Proposed Grazing Strategy
Lone Mountain Allotment	
Bear Canyon and 1 tributary	1.2 km (0.75 mi) of exclosure near Wakefield Camp, 2.4 km (1.5 mi) of riparian pasture (Bear Pasture) downstream of the Wakefield exclosure. Bear Pasture to be rested until sufficient biomass has accumulated in deergrass on the streambanks (~2 growing seasons). Then, a herd of 50 cows only would graze it during winter when riparian trees are dormant. Utilization of riparian trees, seedlings, and saplings not to exceed 30 percent . Utilization of upland browse would vary from 35-45 percent of annual herbaceous forage. In the stream bottom, average stubble height on deergrass of at least 25-33 cm (10-13"), with the lower limit applying to smaller plants and the upper limit applying to more robust plants, and streambank alteration[1] not to exceed 10 percent when cattle leave the pasture.
Lone Mtn Canyon and 2 tributaries (Wakefield Pasture)	2.8 ha (7 acre) exclosure near the Bear Creek confluence proposed. Other reaches and 2 tributaries grazed opportunistically during the winter months (November-March) and only when winter rains are sufficient to provide adequate water throughout the pasture to encourage livestock dispersal away from the canyon bottom. Utilization of riparian trees, seedlings, and saplings not to exceed 30 percent . Utilization of upland browse would vary from 35-45 percent of annual herbaceous forage. In the stream bottom, average stubble height on deergrass of at least 25-33 cm (10-13"), with the lower limit applying to smaller plants and the upper limit applying to more robust plants, and streambank alteration not to exceed 10 percent when cattle leave the pasture.
Sunnyside Canyon	Grazed opportunistically during the winter months (November-March) and only when winter rains are sufficient to provide adequate water throughout the pasture to encourage livestock dispersal away from the canyon bottom. Utilization of riparian trees, seedlings, and saplings not to exceed 30 percent . Utilization of upland browse would vary from 35-45 percent of annual herbaceous forage. In the stream bottom, average stubble height on deergrass of at least 25-33 cm (10-13"), with the lower limit applying to smaller plants and the upper limit applying to more robust plants, and streambank alteration not to exceed 10 percent when cattle leave the pasture.
Scotia Canyon	Exclosure in lower 2.8 km (1.75 mi) of Scotia Canyon proposed (would exclude cattle for at least 5 years, then conditions and need for exclosure would be reevaluated). Upper reach grazed in winter (November-March) and only when winter rains are sufficient to provide adequate water throughout the pasture to encourage livestock dispersal away from the canyon bottom. Utilization of riparian trees, seedlings and saplings not to exceed 30 percent . Utilization of upland browse does not exceed 35-45 percent . In the stream bottom, average stubble height on deergrass of at least 25-33 cm (10-13"), with the lower limit applying to smaller plants and the upper limit applying to more robust plants, and streambank alteration not to exceed 10 percent when cattle leave the pasture. Develop additional waters in uplands of the upper canyon to draw cattle away from the creek.
Mud Springs	Grazed in winter (November-March). Utilization of riparian trees, saplings, and seedlings not to exceed 30 percent . Utilization of upland browse not to exceed 50 percent .
Sycamore Springs	Grazed in winter (November-March). Utilization of riparian trees, saplings, and seedlings not to exceed 30 percent . Utilization of upland browse not to exceed 50 percent .
Joaquin Canyon	Grazed in winter (November-March). Utilization of riparian trees, saplings, and seedlings not to exceed 30 percent . Utilization of upland browse not to exceed 50 percent .
Papago Allotment	
Freeman Sp.	Cattle exclosure, no grazing
O'Donnell Cr.	Cattle exclosure, no grazing
Manila Allotment	
Cimarron Road Crossing	Cattle exclosure, no grazing

[1] Methods to determine percent streambank alteration will be developed by the Service and the Coronado National Forest in coordination with the permittee.

Disturbance of soils, possibly cryptobiotic crusts, and removal of vegetation in the watershed by grazing combine to increase surface runoff and sediment transport and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997). Effects are cumulative and interactive. Loss of vegetation cover and trampling of soils promotes deterioration of soil structure which in turn accelerates vegetation loss (Belsky and Blumenthal 1997). These changes in the watershed tend to increase peak flows and reduce low flows (DeBano and Schmidt 1989), making stream courses more "flashy. In degraded watersheds we expect more frequent sedimentation events that could bury plants, scouring events that may displace plants and bury them or move them downstream, and longer more severe drought periods in which flows are diminished or absent. These factors could have variable effects on water umbel populations. Because the water umbel is tolerant of some level of disturbance, if background levels of disturbance are relatively low, effects of watershed degradation may be minimal; however, additive effects of watersheds degraded by grazing, recreation, fire, historical mining, and other activities, and increased disturbance due to livestock trampling of plants and banks may be enough to reduce or eliminate umbel populations. In intermittent stream segments where water umbel occurs, such as in portions of Bear and Lone Mountain canyons, increased dry periods would reduce the ability of the plant to grow, reproduce, and expand populations. Even if the water umbel can survive long periods of drought as seeds or rhizomes (Haas and Frye 1997), at some point increasing aridity would eliminate the plant, including seed stock and rhizomes, from intermittent reaches.

The rediscovery of the Huachuca water umbel on the upper San Pedro River during the 1990s suggests that elimination of grazing and off-road vehicles after designation of the Riparian National Conservation Area in 1988 may have improved habitat for the water umbel. Riparian vegetation, especially understory and channel vegetation, has also recovered; however, the San Pedro River is very different from the stream, spring, and cienega habitats on the Forest, in that it periodically experiences large scouring flood events. Haas and Frye (1997) found no differences in a water umbel population near Lewis Springs before and after a 1997 flood event with peak flows of 3,000 cubic feet per second, but peak flows can be much larger and more destructive to populations of this small plant. Al Anderson (pers. comm. 1995) of the Gray Hawk Ranch witnessed the apparent extirpation of two patches of water umbel after a large flood in 1994. Similar eradication from stream reaches after a flood was observed by Warren et al. (1989) on Sonoita Creek. Nevertheless, the mechanisms that have lead to apparent reestablishment (or expansion) of water umbel populations on the San Pedro River (reduced disturbance from livestock and vehicles) could perhaps have the same effect elsewhere.

Additional information exists suggesting reduced levels of grazing can benefit the water umbel. Monitoring of umbel populations at Cottonwood Spring near Patagonia occurred before and after livestock were removed. Within two years following removal of cattle, the area became wetter and the riparian area expanded. The area occupied by the umbel increased, although it was becoming less dense in areas that were growing over with cattails and other wetland plant species (D. Gori and P. Warren, pers. comm., in Falk 1998).

In some systems, natural levels of disturbance may be relatively low, allowing establishment and growth of emergent and other wetland plants, such as sedges and cattails, that may crowd out water umbel. At the Van Horn exclosure on a tributary of Bear Canyon on the Lone Mountain allotment, wetland vegetation has become very dense. Water umbel has not been found within the exclosure recently, but occurs just downstream of it where the stream bed is much more open. Negative survey results within the exclosure could depend on the difficulty posed in finding water umbel among the dense vegetation, but this may be a site in which some level of grazing could improve the habitat for water umbel because natural levels of disturbance are low.

Lone Mountain Allotment

The Lone Mountain allotment is large and divided into 27 pastures, giving the operator great management flexibility. Because of diligent management by the permittee, range condition is much better (75 percent in moderately high condition with an upward trend) than most allotments in the San Rafael Valley area. The new Wakefield exclosure protects 1.2 km (0.75 mi) of a tributary to Bear Canyon that water umbel occupies. Exclosures of 2.8 ha (7 ac) and 2.8 km (1.75 mi) are proposed for Lone Mountain Canyon and lower Scotia Canyon, respectively. Construction of the 2.4 ha (7 ac) exclosure and associated recreational developments are being addressed in another consultation (2-21-99-I-097).

Water umbel populations outside exclosures would be grazed in winter. Populations in Scotia and Sunnyside canyons, Lone Mountain Canyon and its two tributaries, and Bear Canyon in the Bear Pasture would also be subject to the following restrictions: 1) average stubble height on deergrass is at least 25 to 33 cm (10-13 in), with the lower limit applying to smaller plants and the upper limit applying to more robust plants, 2) streambank alteration does not exceed 10 percent, and 3) grazing would occur only when winter rains are sufficient to provide adequate water throughout the pasture to encourage livestock dispersal away from the canyon bottom. These areas also correspond to critical habitat in the Lone Mountain allotment.

Winter grazing probably has varying effects on the water umbel depending on many factors, including 1) stocking rate, 2) availability of green forage and water other than that in water umbel habitat, 3) erodability of the soils in the stream bottom, and 4) sources of disturbance other than livestock grazing. All else being equal, the higher the stocking rate or the longer cattle are in water umbel habitat, the greater the potential for trampling of plants and degradation of habitat. In March 1999, at the end of an extremely dry winter, your and our personnel observed heavy use of water umbel habitats in Lone Mountain Canyon and a tributary locally known as “Rattlesnake Canyon. In the lower part of Rattlesnake Canyon, only trampled water umbel specimens were found, banks were nearly completely disturbed, bank vegetation was absent or trampled, and headcuts were beginning in several places. The uplands appeared to be little used. During this very dry winter, cattle were clearly concentrating into the few remaining watered areas in the pasture where both water and some green vegetation were present. Unfortunately, these areas were also serving as refugia for water umbel.

Erodability of soils varies between sites and depends on the nature of the area’s substrates, slope, and vegetation or rock armoring. In portions of Bear and Joaquin canyons, the stream gradients are low and it is often flowing over bedrock, which makes these areas less susceptible to erosion and structural damage to the stream bed. In Rattlesnake Canyon, which is relatively narrow and steep, and not armored in bedrock, cattle use resulted in severe damage to banks.

Falk (1998) noted that the drainage in Scotia Canyon is incised in several places and there is little to no floodplain development. She further finds “many banks have little or no vegetation on them, there is a lack of large woody debris in the upper watershed that would serve to dissipate energy, thereby reducing the bedload to the gentler gradients where *Lilaeopsis* is found. The upper drainage on the private lands has a long history of human use, including several impoundments and a highly eroded and braided jeep trail that contribute to watershed degradation. These problems extend onto Forest lands. You are considering closing the jeep trail at the Forest boundary, but a head cut threatens the lower impoundment. If the head cut breaches the tank, massive erosion and sedimentation would likely ensue in the water umbel habitat immediately downstream.

Current conditions and effects of grazing at some water umbel sites on the Lone Mountain allotment (Sunnyside Canyon, Sycamore and Mud Springs, Joaquin Canyon) are unknown, but recent grazing prescriptions for these areas were similar to that of grazed portions of Scotia, Lone Mountain, and Bear canyons, so some same habitat degradation has probably occurred in these sites. As mentioned, Joaquin Canyon may be less susceptible to habitat damage due to low gradient and bedrock substrates.

As just described, some canyons on the Lone Mountain allotment are incised or exhibit head cuts; however, other factors besides grazing (such as erosion from roads, especially in upper Scotia Canyon, or from flood events possibly associated with fire) have probably contributed to structural degradation of the canyon bottoms. Upland watershed conditions on the Lone Mountain allotment appear good, which is supported by the allotment's relatively good range condition and trend. Thus, current range and watershed condition, at least outside the canyon bottoms, is probably not a factor in observed habitat degradation. Some of this apparent degradation may be quite old, predating use by the current permittee; however, contribution of recent grazing practices is difficult to tease out from these other factors that can cause degradation of water umbel habitat.

Water umbel populations under a winter grazing regime were relatively stable from 1989 to 1995 in Bear and Scotia Canyons (Falk 1998); with the additional conservation measures you took, we believe the proposed action should allow for at least maintenance, if not enhancement, of water umbel populations and an initiation of recovery of structural damage (incision, head cuts) to stream channels. Because of the uncertainty regarding the causes of observed habitat degradation and the effects of proposed treatments, monitoring will be essential to gauge the success of these changes. As a result, you have committed to monitor all populations of Huachuca water umbel on Forest lands on the Lone Mountain allotment. We believe the results of the monitoring will be essential in judging the effectiveness of these treatments in meeting the goals of maintenance or enhancement of populations and recovery of habitats. Having areas under different treatments (exclosures, winter grazing from December to March, and winter grazing with limitations on grass stubble height, streambank alteration, and drought restrictions) will provide needed information about the effects of different grazing strategies that will allow better analysis of the effects of grazing regimes. For instance, will total exclusion of livestock in some reaches with low levels of disturbance lead to increased cover by other wetland plants that may crowd out water umbel? Monitoring of water umbel populations under these various grazing scenarios will answer this and other questions.

The proposed action includes 12 planned improvements, including the pasture fences and exclosures discussed above, other pasture and boundary fences, replacement and burial of 3.2 km (2 mi) of pipeline, reconstruction of a well and the Peterson pond, both of which are in Scotia Canyon, the airpost mill waterlot, and the Eighty Pasture trap. Only the exclosures in Lone Mountain and Scotia canyons, the well, pond reconstruction, and pipeline in Scotia Canyon would affect the water umbel. Other improvements are found outside water umbel habitat.

As discussed, the exclosures would remove grazing in Lone Mountain Canyon and remove cattle in lower Scotia Canyon for at least five years, which are expected to benefit the water umbel. The well construction in Scotia Canyon may entail replacement of the windmill in lower Scotia Canyon with a solar-powered pump, or other possible options. The windmill is next to water umbel habitat in the canyon bottom. Careful project design should eliminate or reduce any potential adverse effects from the project. The proposed pipeline would probably tap into an existing pipeline and take water upslope away from the canyon bottom in Scotia Canyon, but precise location of the project is yet to be determined. With careful design, the project should affect water umbel minimally or not at all. You have agreed to develop mitigation plans for the well and pipeline projects. If we concur with the mitigation plans and believe the projects, mitigation, and effects of the actions fall within the scope of that just described, then this biological opinion will cover those projects and no further consultation will be necessary. The

Peterson pond reconstruction is a project that could have varying effects on the water umbel and its habitat depending on the nature of the project, which is as yet uncertain. This opinion does not cover the Peterson pond project.

Manila Allotment

As described in the environmental baseline, water umbel was found in 1997 at a creek crossing of Cimarron Road. Because of sedimentation and other alteration of habitat during construction activities in 1998, the water umbel was apparently extirpated or could not be found. Upstream water diversion may have contributed to the extirpation (Jeanne Wade, Coronado National Forest, pers. comm., 1999). Water umbel reportedly occurs upstream of the site on private lands, and could potentially recolonize the area disturbed by road construction. The USFS (1998) found that "the site was trampled by livestock when we visited it, the deergrass had greater than 45 percent utilization. Grazing probably was slowing recolonization and recovery of the habitat. The noted utilization of deergrass is greater than the maximum allowable (45 percent) on the allotment (USFS 1998). Several unauthorized roads also lead into the spring area, and habitat has been degraded because of off-road vehicles and cattle (February 2, 1999 letter from the Sierra Vista District Ranger to "Interested Parties).

Range condition on capable acres is 68 percent moderately high, 23 percent moderately low, and 9 percent low, with 83 percent of capable acres in a static trend and 17 percent in a downward trend. Soil conditions are 57 percent satisfactory, 35 percent impaired, and 8 percent unsatisfactory. The impaired and unsatisfactory conditions suggest degraded watershed condition which may result in higher peak flows, lower low flows, and high sedimentation and erosion in stream channels, all of which are detrimental to water umbel habitat, as described above. You built an exclosure in 1999, approximately 480 by 320 m (300 by 200 ft) of the drainage, which includes most of the area where the water umbel occurs. The exclosure should result in recovery of the habitat and a greater likelihood that the site will be successfully recolonized by the water umbel population. Degraded watershed condition may hamper recovery outside the exclosure; however, a planned division fence and water development in the Center Pasture should ease better management of cattle in the channel where the water umbel occurs. These planned improvements are likely to benefit the water umbel.

Effects to Critical Habitat

Effects analyses must determine if the proposed action would destroy or adversely modify critical habitat. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical (50 CFR 402.02).

As discussed previously, grazing can adversely affect constituent elements. Alteration of the watershed can result in destabilized channels with higher high flows and lower low flows (Gifford and Hawkins 1978, Blackburn 1984, DeBano and Schmidt 1989), possibly scouring water umbel habitats or drying them out (constituent elements 1 and 2). Cattle grazing can promote establishment of nonnative plants in riparian systems (constituent element 3) (Stromberg and Chew 1997). As described, field trips to the Lone Mountain area in March 1999, an extraordinarily dry spring, revealed concentrations of cattle and severe impacts to plant communities and channel morphology in the last few wetted places; these places are also critical refugia for water umbel during drought (constituent element 4). Cattle may play a role in producing open microsites for water umbel expansion (constituent element 2).

Table 2. Proposed grazing strategies in Huachuca water umbel designated critical habitat on the Coronado National Forest.

Stream	No Grazing	Limited Winter Grazing
Bear Canyon and tributary	1.2 km	1.3 km[1]
Lone Mountain Canyon and tributaries	0.1 km	4.0 km[2]
Scotia Canyon	2.8 km	2.65 km[2]
Sunnyside Canyon	-	0.6 km[2]

[1] Grazing in winter when riparian trees are dormant, and when cattle leave the area average stubble heights on deergrass in the wetted stream bottoms will not be less than 25-33 cm and streambank alteration will not exceed 10 percent. The Bear Pasture will be rested until deergrass biomass increases to a point that it is somewhat resistant to grazing (perhaps 2 growing seasons).
[2] Grazing from December through March, but only in winters when rainfall is sufficient to provide adequate water for cattle dispersal away from the canyon bottom. When cattle leave the area average stubble heights on deergrass in the wetted stream bottoms will be at least 25-33 cm and streambank alteration will not exceed 10 percent.

As discussed and as witnessed, with relatively good range condition and an upward trend, upland watershed degradation on the Lone Mountain allotment does not appear to be a problem as a result of grazing. Water umbel populations in Scotia and Bear Canyons were relatively stable from 1989-1995 under a regime of winter grazing. With additional measures as proposed, we expect recovery of plant communities, a slow recovery of channel morphology (rebuilding of banks, reversal of channel incision and head cuts), and maintenance or enhancement of water umbel populations.

Plants are probably most affected by grazing during the growing season, which will not occur in critical habitat. Streambank damage is probably most extreme during the driest periods and seasons when cattle are concentrated in wetted areas. Cattle will not be in critical habitat during the driest season (May and June), and in the Scotia, Sunnyside, and Lone Mountain canyon areas, cattle will not be present in winters in which precipitation is not adequate for cattle dispersal away from the canyon bottoms. Where winter grazing occurs, limits on streambank alteration and deergrass stubble height will minimize grazing effects.

Although we predict recovery of habitats and enhancement of water umbel populations, careful monitoring will be necessary to ensure recovery. You have committed to monitoring water umbel populations on Forest lands. New monitoring transects will be set up in Sunnyside Canyon. Populations within critical habitat are proposed to be monitored every other year following the current protocol (Falk 1998). Based on the results of that monitoring, adjustments to cattle management may be needed to provide for long-term maintenance of water umbel populations and constituent elements of critical habitat.

The only proposed range projects covered by this opinion that may affect critical habitat are the exclosures in Lone Mountain and Scotia canyons, and the well, pond reconstruction, and pipeline in Scotia Canyon. As discussed above, the exclosures are expected to benefit water umbel habitat, and effects resulting from the well, pond, and pipeline projects are expected to be minimal or none. You have agreed to develop mitigation plans in coordination with us for these projects to reduce effects to the water umbel.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, or local private actions that are reasonably certain to occur in the project area. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. Effects of past Federal and private actions are considered in the Environmental Baseline. Because of the extent of Federal lands in the project area, few non-Federal activities are expected to occur. No State lands are known to occur in the project area.

CONCLUSION

After reviewing the current status of the Huachuca water umbel, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Huachuca water umbel. Furthermore, the proposed action is not likely to result in adverse modification and destruction of critical habitat. We based our conclusions on the following:

1) You propose several significant mitigating measures and modifications to grazing strategies that reduce effects of grazing activities on the water umbel and its critical habitat.

2) All water umbel sites would either not be grazed or be grazed only in winter. Cattle will not be in critical habitat during the driest season (May and June), and in the Scotia, Sunnyside, and Lone Mountain canyons, cattle will not be present in winters in which rain is not adequate for cattle dispersal away from canyon bottoms. Where winter grazing occurs, limits on streambank alteration and deer grass stubble height will minimize grazing effects. Populations in Scotia and Bear canyons were relatively stable from 1989-1999 under a winter grazing strategy.

3) You propose monitoring of water umbel populations and grazing effects to ensure those grazing prescriptions are being implemented and to document effects to the umbel. If effects to the umbel are not as predicted herein, you agreed to discuss the need for further changes to grazing strategies.

Note that in regard to "take of listed species in sections 7(b)(4) and 7(o)(2) of the Act, these sections generally do not apply to listed plant species, thus no incidental take statement is included here for the Huachuca water umbel; however, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants and malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or during any violation of a State criminal trespass law.

If monitoring reveals that habitats and water umbel populations are not responding as predicted in the effects analysis herein, you should consider this new information suggesting the effects of the action are affecting the species or critical habitat in a manner or to an extent not previously considered, and in accordance with 50 CFR 402.16, consultation should be reinitiated.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Provide assistance to us in developing a recovery plan for the Huachuca water umbel.

2. Fund or help fund additional surveys for the water umbel on Forest lands, and support research on the ecology of the species, and land use history and changes in vegetation communities and ecological conditions in the Huachuca Mountains.

In order for us to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitat, we request notification of the implementation of any conservation recommendations.

Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)

STATUS OF THE SPECIES

We listed the Pima pineapple cactus as endangered in a Federal Register notice (58 FR 49875) on September 23, 1993. The rule became effective on October 25, 1993; critical habitat has not been designated for this species. Factors that contributed to the listing included habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution and plant species rareness, illegal collection and difficulties in protecting areas large enough to maintain functioning populations. The biological information below is summarized from the proposed and final rules, and other sources.

Pima pineapple cactus is a low-growing hemispherical cactus with adults varying in stem diameter from 5.0 cm (2.0 inches) to 21.0 cm (8.3 inches) and height from 4.5 cm (1.8 inches) to 45.7 cm (18.0 inches). Individuals are considered adults when they reproduce sexually. Plants can be either single or multi-stemmed with yellow flowers blooming with the summer rains. Clusters of Pima pineapple cactus stems are formed primarily from vegetative clones produced at the plant base (Benson 1982, Roller 1996). The diagnostic field character of this taxon is the presence of one stout, straw-colored, hooked central spine. Radial spines extend laterally around the central spine and average 10 to 15 spines on large cacti and 6 on small cacti (Benson 1982).

Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at very low densities throughout both the Altar and Santa Cruz Valleys, and in low lying areas connecting the two valleys.

Groups of flowers begin to bloom for single day periods following 5 to 7 days after the first monsoon rains. Flowering is triggered by as little precipitation as 3 mm (0.12 inches). Generally flowers begin opening midmorning and close at dusk (Roller 1996). Adult plants bloom one to three days each year; flowering is usually over by the end of August. Cross-pollination produces significantly more viable seeds than self-pollination. Fruits are mature within two weeks following successful pollination. Germination has been observed in the field during the summer monsoon rainy season (Roller 1996). Anecdotal observations indicate the species' flowers are visited by a variety of native bees and European honey bees, which have been observed to leave the flowers with their forehead and hind legs covered in Pima pineapple cactus pollen.

Habitat fragmentation and isolation may be an important factor limiting future seed set of this cactus. Recent data show that the species cannot successfully self pollinate and is reliant on invertebrate pollinators. One hypothesis is that the spatial distribution pattern of individual Pima pineapple cacti within a given area may regulate pollinator visitations, thus resulting in more successful cross-pollination and subsequent seed set over the population (Roller 1996). If the pollinators are small insects, with limited ability to fly over large distances, habitat fragmentation may contribute to a decrease in pollinator effectiveness with a subsequent decrease in seed set and recruitment.

Extrapolations from recent (1992-1997) surveys of known Pima pineapple cactus locations suggest that the cactus may be more numerous than previously thought. Projections based only on known individuals may underestimate the total number of individuals. This in no way indicates that the cactus is not rare or endangered. Pima pineapple cactus is widely dispersed in very small clusters across land areas well suited for residential, commercial or mining development. As well, field observations suggest a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historical human impacts. Thus, populations are already considerably isolated from each other in many portions of the range, and population size and apparent recruitment varies significantly across the range. On a more local scale, population variability may relate to habitat development, modification, and/or other environmental factors such as slope, vegetation, pollinators, dispersal mechanisms, etc.

The transition zone between the two regions of vegetation described by Brown (1982) as semidesert grassland and Sonoran desert-scrub contains denser populations, better recruitment, and individuals exhibiting greater plant vigor. Vegetation within this transition zone is dominated by mid-sized mesquite trees, half shrubs (snakeweed, burroweed, and desert zinnia) with patches of native grass and scattered succulents. Because populations are healthier in this transition zone, conservation within these areas is very important (Roller and Halvorson 1997); however, this important habitat type is not uniformly distributed throughout the plant's range. Populations of Pima pineapple cacti are patchy, widely dispersed and highly variable in density. The higher population densities have only been documented at three sites. Compared to other surveys, two of these sites are very small in scale and range from 6.3-7.5 plants per ha (1-3 plants per acre). Other densities across the majority of the plant's range vary between one plant per 1.9 ha (4.6 acres) and one plant per 8.5 ha (21 acres) (Mills 1991, Ecosphere 1992, Roller 1996).

Land areas surrounding developed parts of Green Valley and Sahuarita, Arizona (including adjacent areas of the San Xavier District of the Tohono O'odham Nation) may be important for the conservation of this species within its range. Analysis of surveys conducted from 1992 to 1995 with a multivariate statistical analysis established a pattern of greater population densities, higher ranks of cactus vigor and reproduction occurring within the transition vegetation type found in this area of the northern Santa Cruz Valley (Roller and Halvorson 1997). This area could be defined as an ecotone boundary between semidesert grassland and Sonoran desert scrub.

Seedling and sub-adult size classes are uncommon in documented populations across the range; however, this may be a function of the difficulty of finding such small, well-camouflaged plants in a large-scale survey, or because the establishment phase of the seedling may be limited in some unknown way. Research on Pima pineapple cactus reproduction has suggested that the establishment phase of Pima pineapple cactus life history may limit recruitment within populations (Roller 1996). Evidence presented to support this conclusion was the abundance of flowers, fruits and viable seed, and the rarity of seedling presence at different sites spread

through the plant's range (Roller 1996). Other research has confirmed that the establishment phase of other Sonoran cacti species may be critical for survival to reproductive maturity (Steenbergh and Lowe 1977).
Generally, the Pima pineapple cactus grows on gentle slopes of less than 10 percent and along the tops (upland areas) of alluvial bajadas nearest to the basins coming down from steep rocky slopes. The plant is found at elevations between 720 m (2,362 ft) and 1,440 m (4,593 ft) (Phillips et al. 1981, Benson 1982, Ecosphere 1992), in vegetation characterized as either the Arizona upland of Sonoran desert scrub or semidesert grasslands or a combination of both (Brown 1982).

The acquisition of baseline information began with surveys documenting the presence of Pima pineapple cactus as early as 1935. More intensive surveys were initiated in 1991 and other research established in 1993 further investigated the reproductive biology, distribution, fire effects and mortality associated with various threats. Therefore, the best available baseline information is relatively recent and may not represent actual changes in distribution since the decline in the status of the species began.

Widely scattered surveys have been conducted across sites that varied considerably in cacti density. Densities ranged between 0.1-7.5 plants per ha (0.05-3 plants per acre). Pima pineapple cactus occurs in 50 townships within its US range; however, a considerable amount of land area within the range boundaries does not provide habitat for the species due to elevation, topography, hydrology, plant community type, and human degradation. To date, an estimated 22,959 ha (56,730 acres), (10 to 20 percent of the U.S. range) has been surveyed. Not all of this area has been intensively surveyed; some has only been partially surveyed using small land blocks to estimate densities rather than 100 percent ground surveys. A conservative estimate of total cacti located to date would be 3,800 individuals. The majority of those were located after 1991.

It is important to clarify that the above number represents the total number of locations ever found and not the current population size. It would be impossible to estimate densities over the remaining unsurveyed area because of the clumped and widely dispersed pattern of distribution of this species. Of the 3,800 individuals known at this time, 2,203 (58 percent) of them have been removed throughout the range. This quantity includes observed and authorized mortalities and individuals transplanted since the species was listed in 1993 to present. A small portion of these mortalities were caused by natural factors (i.e., drought). Moreover, this figure does not take into account those cacti that are removed from private land or other projects that have no Federal nexus.

The area of habitat authorized to be modified or destroyed between 1987 and 2000 (i.e., habitat developed or significantly modified beyond the point where restoration would be a likely alternative) is approximately 9,886 ha (24,429 acres) which represents 43 percent of the total area surveyed to date. In 1998, more than 445.5 ha (1,100 acres) of Pima pineapple cactus were lost including 143 ha (353 acres) from the Las Campanas Housing Development project, and 304.6 ha (752 acres) from the ASARCO, Inc. Mission complex project. In 2000, 237.3 ha (586 acres) of habitat were lost with the expansion of a state prison in Tucson. In 2001, 71.7 ha (177 acres) of habitat were lost through development, but 375.8 ha (888 acres) of occupied and suitable habitat were conserved through conservation easements. We are aware of housing developments along Valencia Road, Pima County, Arizona, in the vicinity of T15S, R12E, Section 15 and surrounding areas, that support Pima pineapple cactus. These developments affect several hundred acres of habitat and have not been evaluated through the section 7 process. The number of acres lost through private actions, not subject to Federal jurisdiction, is not known but given the rate of urban development in Pima County, is expected to be significant.

Most of the documented habitat development has occurred south of Tucson down through the Santa Cruz Valley to the town of Amado. This area is critical for the future recovery of the species. The expansion of urban centers, human population increases, and mining activities will continue to eliminate habitat and individuals and result in habitat fragmentation.

The protection of habitat and individuals is complicated by the varying land ownership within the range of this species. An estimated 10 percent of the potential habitat for Pima pineapple cactus is held in Federal ownership. The remaining 90 percent is on Tribal, State, and private lands. Most of the federally owned land is either at the edge of the species' range or in scattered parcels. The largest contiguous piece of federally owned land is the Buenos Aires National Wildlife Refuge, located at the southwestern edge of the species' range at higher elevations and lower plant densities.

Based on surveys and habitat analysis, land areas south of Tucson through the Santa Cruz Valley to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham Nation, appear to support abundant populations, some recruitment, and units of extensive habitat still remain; however, the primary threat to the status of this species throughout its range is the accelerated rate (i.e., since 1993) at which this prime habitat is being developed, fragmented, or modified.

Under section 9 of the Act, the taking of listed animals is specifically prohibited, regardless of landownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from Federal lands. There is no protection against removal from, or destruction of, plants on any non-Federal lands under the Act by a land owner. The Arizona Native Plant Law may delay vegetation clearing on private property for the salvage of specific plants species within a 30-day period. Although the Arizona State Native Plant Law does prohibit the illegal taking of this species on state and private lands without a permit for educational or research purposes, it does not provide for protection of plants in situ through restrictions on development activities.

Section 7 protection extends to listed plants regardless of landownership if there is a Federal nexus; however, without Federal agency involvement, section 7 does not apply to projects on non-Federal lands. Much of the development likely on State or private lands has a limited exposure to Federal regulatory requirements. Additional Pima pineapple cacti and associated habitat on these lands are almost certain to be lost as development in southern Arizona continues through the Santa Cruz Valley. Efforts to transplant individual cacti to other locations have had limited success, and as development increases, suitable locations will become scarce as habitat is converted.

Based on current knowledge, the following threats documented with this reduction in habitat alter the landscape in a manner that would be nearly irreversible in terms of supporting Pima pineapple cactus populations: urbanization, farm and crop development, and exotic species invasion. Prescribed fire can have a negative effect if not planned properly.

Other specific threats which have been previously documented (USFWS 1993), such as overgrazing and mining, have not yet been analyzed to determine the extent of effects to this species; however, partial information does exist and can be applied. Mining has resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of the species. Much of the mining activity has been occurring in the Green Valley area, which is the center of the species' distribution and the area known to support the highest densities of individuals. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving exotic Lehmann lovegrass (*Eragrostis lehmanniana*) may also negatively affect Pima pineapple cactus populations (USFWS 1993).

Very little is known regarding the effects of low to moderate levels of livestock grazing on Pima pineapple cactus distribution. Currently, a study has been established to observe the effects of grazing on Pima pineapple cactus on the Forest. The species is patchy in distribution and widely dispersed and occupies relatively xeric soils (i.e., these plants do not inhabit areas immediately adjacent to or along water tanks or streambanks) (Roller 1996). The grazing use of these sites varies considerably. Some areas have received use above the authorized intensity (Falk, pers. obs.). The monitoring from allotments on the Forest have not shown significant differences between cacti in the exclosures and those that are not protected; however, the plots have been monitored only for 6 years and the differences may not be seen for many years to come. Young cacti could be trampled by livestock, or site hydrology may be altered in ways that might affect seedling establishment and recruitment.

Habitat effects of livestock overuse could include erosion, hydrological and micro-climatic changes, invasion or expansion of exotic grasses due to livestock preferences for native grass species over exotics. Some range management practices such as mechanical imprinting, chaining, ripping, and seeding of non-native grasses have contributed to the modification and loss of habitat and individual cacti. Overgrazing in some areas continues today.

It is uncertain the extent to which overgrazing affects the cactus by altering the structure and function of the ecosystem; however, long-term grazing (particularly overgrazing), fire suppression, and drought in arid grassland ecosystems have all been hypothesized as being the cause, either individually or collectively, of changes in community structure and function (Bahre 1985). Altered edaphic (stability and water infiltration ability) conditions, caused by damage to micro-biotic and biological crusts over soils with grazing, have been documented in arid land systems (Schlesinger et al. 1990, Fleischner 1994).

Vegetation associated with higher Pima pineapple cactus densities, reproduction, and greater levels of cactus vigor is described as a mid-sized mesquite shrub land with an assortment of other succulent species and native bunch grasses. Many of the species dominant in this vegetation type are associated with grazing (i.e., "increasers under some grazing practices). Less intensively grazed pastures did support greater native grass coverage with more species present; however, even with an increased bunch grass abundance, the fuel structure of the community was not continuous and allowed for substantial open patches along the drip line of shrub species where the cactus often occurs (Roller and Halvorson 1997). Also, specific levels of soil movement are required for seed germination because the seed will not germinate on the surface; it generally germinates at a depth of 0.5-1.5 cm (0.2 - 0.6 inches) (Roller 1996). Few locations throughout the plant's range have documented the presence of seedlings or sub-adults; however, all but one of the known locations had been grazed within three years of the observation. Whether light to moderate grazing practices provide the appropriate level of soil movement to cause seed germination has not been determined. Over-land sheet flow across these areas may also move soil and deposit it over sediments. The study established on the Forest should provide some insight on seed germination relative to specific grazing intensities.

Reduced herbaceous biomass within the immediate proximity of individuals may reduce heat intensity with fire. Reduced herbaceous cover and continuity decrease fire frequencies in semidesert grasslands, and over the long-term increase cactus survival following fire (McPherson 1995, Thomas and Goodson 1992, Wright and Bailey 1982).

The invasion of Lehmann lovegrass combined with fire is a threat to Pima pineapple cactus populations. Continuous distributions of fuels and greater biomass near the apex of individual plants are believed to increase mortality following fire (Roller and Halvorson 1997). Fire increases Lehmann lovegrass distribution; correspondingly, fire intensity and fire frequency increases with Lehmann lovegrass invasion (McPherson 1995), a positive-feedback cycle.

Even with complete data on historical change related to Pima pineapple cactus distribution and abundance, we cannot reliably predict population status due to compounding factors such as climate change, urbanization, and legal and political complexities (McPherson 1995). We do not know if the majority of populations of Pima pineapple cactus can be sustainable under current reduced and fragmented conditions; thus, the need for information on what limits the plant's distribution under current habitat conditions is significant.

Based on monitoring results, the range-wide status of the Pima pineapple cactus appears to have been recently affected by threats that completely alter or considerably modify more than a third of the species' surveyed habitat, and have caused the elimination of nearly 60 percent of documented locations. These values are supplied to serve as an extrapolation of the situation which might be taking place across the rest of the entire population. Current information regarding the status of this species must be supplemented by more precise and thorough spatial analysis through the use of geographical information systems, databases, and on-the-ground surveys.

Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact the habitat. The remaining habitat also is subject to degradation or modification from current land management practices, increased recreational use when adjacent to urban expansion (i.e., off-road vehicle use and illegal collection), and the continuing aggressive spread of nonnative grasses into its habitat. Habitat fragmentation and degradation will likely continue into the foreseeable future based on historical data and growth projections produced by the Pima County Association of Governments (1995). There is very little Federal oversight on conservation measures that would protect or recover the majority of the potential habitat. Even some areas legally protected under the Act have been modified and may not be able to support viable populations of the Pima pineapple cactus over the long-term.

ENVIRONMENTAL BASELINE

The following determinations were based on historical records of species occurrence within southern Arizona from the AGFD Heritage Data Management System (HDMS), field observations from your district personnel, habitat surveys, and communications from species experts. The Alisos/Sierra Tordilla allotment, in the Huachuca EMA, constitutes the action area for this species' analysis. Based on a review of the guidance criteria, site-specific information provided in your BA, and our knowledge of the species in the action area, we agree with your effects determinations.

The guidance criteria for plants state:

No Effect (must meet one of the criteria):

1. Livestock grazing will not occur within any subwatershed on the allotment containing suitable or occupied habitat of any listed plant species.

2. TEP species and their habitat in the allotment will be excluded from livestock grazing by topography or other physical barriers.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Herbivory to individual plants from livestock grazing is not likely to occur.

2. Trampling of individual plants by livestock is not likely to occur.

3. Suitability and sustainability of the habitat to support the plant will not be altered.

4. Potential habitat will not be prevented from becoming suitable habitat for the plant by changes in plant community composition or deterioration of subwatershed/soil stability.

5. Plants and/or their habitats will not be physically disturbed and potential habitat will not be prevented from becoming suitable habitat by adverse effects from livestock management activities.

Livestock grazing on the Alisos/Sierra Tordilla allotment was the subject of a formal consultation in 1995 (2-21-95-F-293). At that time, there were 39 Pima pineapple cactus known to occur on this allotment. In your 1995 proposed action, you committed to building exclosures around 23 of the known individuals. Those fences were built in 1996. Monitoring of all the Pima pineapple cactus on the allotment was to take place annually for the life of the permit (10 years). Monitoring results were supposed to be evaluated at the mid-point. We have attempted to assist you with the monitoring task. Our plant ecologist worked with the district biologist on the Sierra Vista Ranger District in 2001 to relocate and monitor Pima pineapple cactus within the exclosures. It is not known how often the cactus outside the exclosures have been monitored. The vegetation transects that were to be set up within and outside the exclosure were never implemented. As a result, we have virtually no information on the effects of livestock grazing on Pima pineapple cactus and its habitat on this allotment.

There are at least 16 Pima pineapple cactus outside of the exclosure, based on the information in the 1995 biological opinion. On December 6, 2001, you requested reinitiation of consultation on this allotment because grazing utilizations exceeded those described in the proposed action. Possible effects to Pima pineapple cactus were not discussed. Our site visit in 2001 confirmed the overuse, and several dead Pima pineapple cactus were located. It is not known if the overuse in the allotment contributed to their mortality.

EFFECTS OF THE ACTION

Potential direct impacts of cattle grazing include trampling of mature, juvenile, and seedling-sized individuals that could uproot or damage Pima pineapple cactus. In a project level survey conducted in Green Valley, Arizona, Pima pineapple cactus were found that had been trampled and uprooted by cattle (R. Duncan, pers. comm. 2002). The cacti can also be damaged by cattle, resulting in dessication and pathogen or insect infestation access, leading to their demise. The indirect effects of cattle grazing are less apparent and habitat-related. Long-term grazing is known to alter the existing vegetation, disrupt nutrient cycling, alter ecosystem processes that influence water infiltration, and damage soil biotic crusts.

Some monitoring has occurred within the exclosures on the allotment. You have agreed to continue monitoring for the life of this opinion. These data will be useful in determining if livestock grazing is having some kind of an effect on Pima pineapple cactus. Unfortunately, information on habitat changes that might be related to livestock grazing will be unavailable since the transects were never put in. That element of the 1995 proposed action has not been incorporated in your current proposed action. We remain concerned about the Pima pineapple cactus that are outside the exclosures, and the effect that livestock grazing may have on them. Pima pineapple cactus and its habitat is being rapidly altered. You have an opportunity to protect a significant population of this increasingly rare cactus.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Development in this geographic area can be expected to increase. State and private lands not presently developed surrounding the action area are quickly becoming urbanized. It is unknown what the plans are for the State and private lands. Much of this development will have little or no Federal nexus. Without any protection under the Act, the only protection available is through the Arizona Native Plant Law, which provides only for salvage for scientific and educational expenses. Regardless of salvaged Pima pineapple cactus transplant success, the habitat would be lost in urbanized areas. Much of the habitat and the individuals of the species are at significant risk of destruction or continued degradation. Without the protection under section 9 that applies on non-Federal lands, there is little regulatory authority to use in reducing those risks.

CONCLUSION

After reviewing the current status of Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of Pima pineapple cactus. No critical habitat has been designated; therefore, none will be affected. We base this conclusion on the following:

> You have agreed to continue monitoring the Pima pineapple cactus on the Alisos/Sierra Tordilla allotment. The exclosures will remain in place to provide protection for approximately 60 percent of the known Pima pineapple cactus on the allotment.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species; however, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law. Neither incidental take nor recovery permits are needed from us for implementation of the proposed action.

CONSERVATION RECOMMENDATIONS

We recommend the following:

1. Install vegetation monitoring transects for Pima pineapple cactus in the Sierra Tordilla/Alisos allotment by December 2003. Transects would be set up inside and outside the exclosures to examine whether livestock grazing is affecting the habitat of Pima pineapple cactus. Monitor those transects every two years for the life of this plan.

2. Continue to implement measures to reduce illegal off-road vehicle use throughout the Sierra Tordilla/Alisos allotment.

3. Pursue ways to reduce the cover of Lehmann's lovegrass in the Sierra Tordilla/Alisos allotment.

DISPOSITION OF DEAD OR INJURED LISTED SPECIES

Upon locating a dead, injured, or sick listed species, initial notification must be made to our Law Enforcement Office, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (telephone: 480/835-8289) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

REINITIATION AND CLOSING STATEMENT

This concludes formal consultation and conference on the proposed action outlined in the reinitiation request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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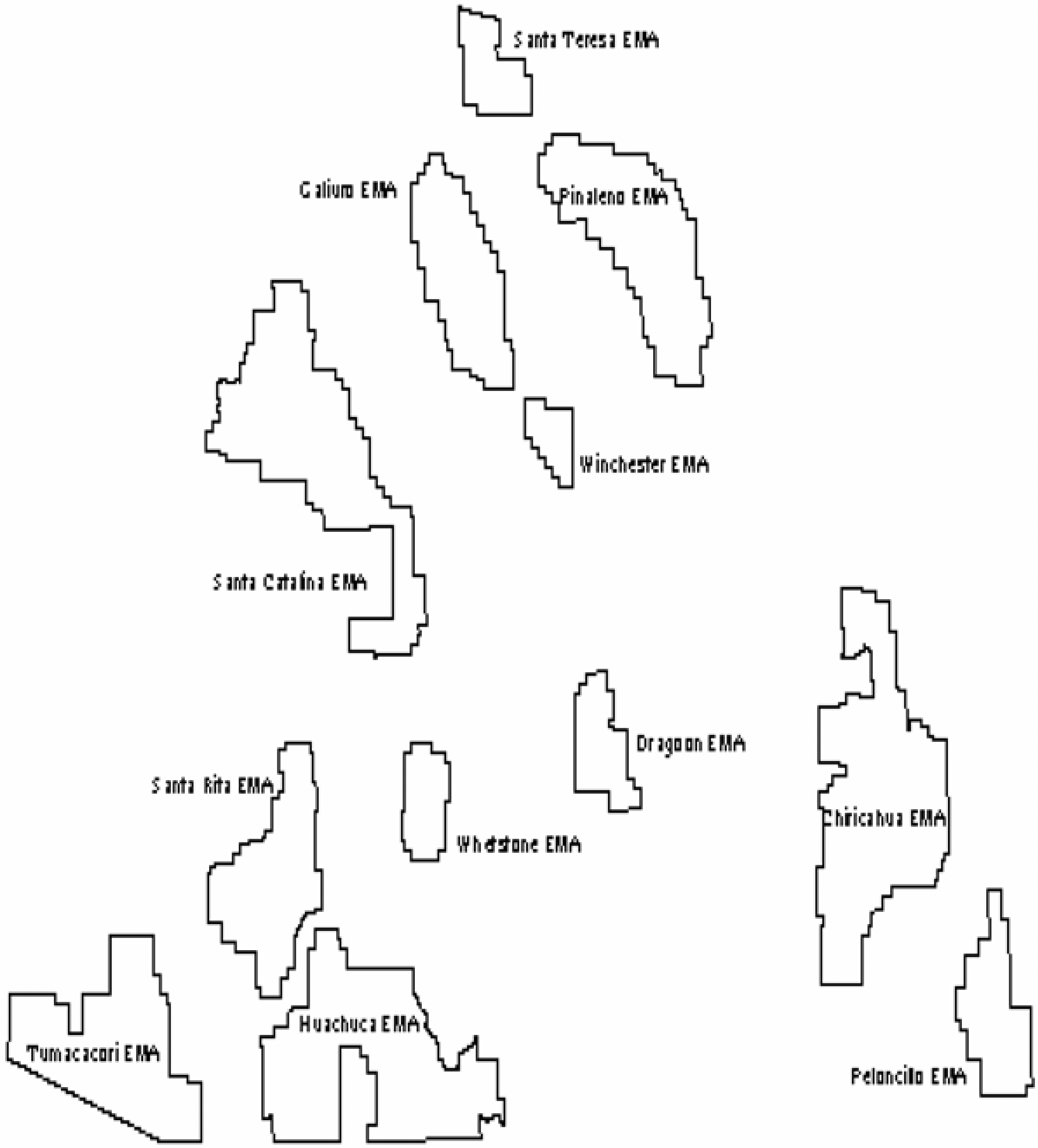

Figure 1. Ecosystem Management Areas on the Coronado National Forest.

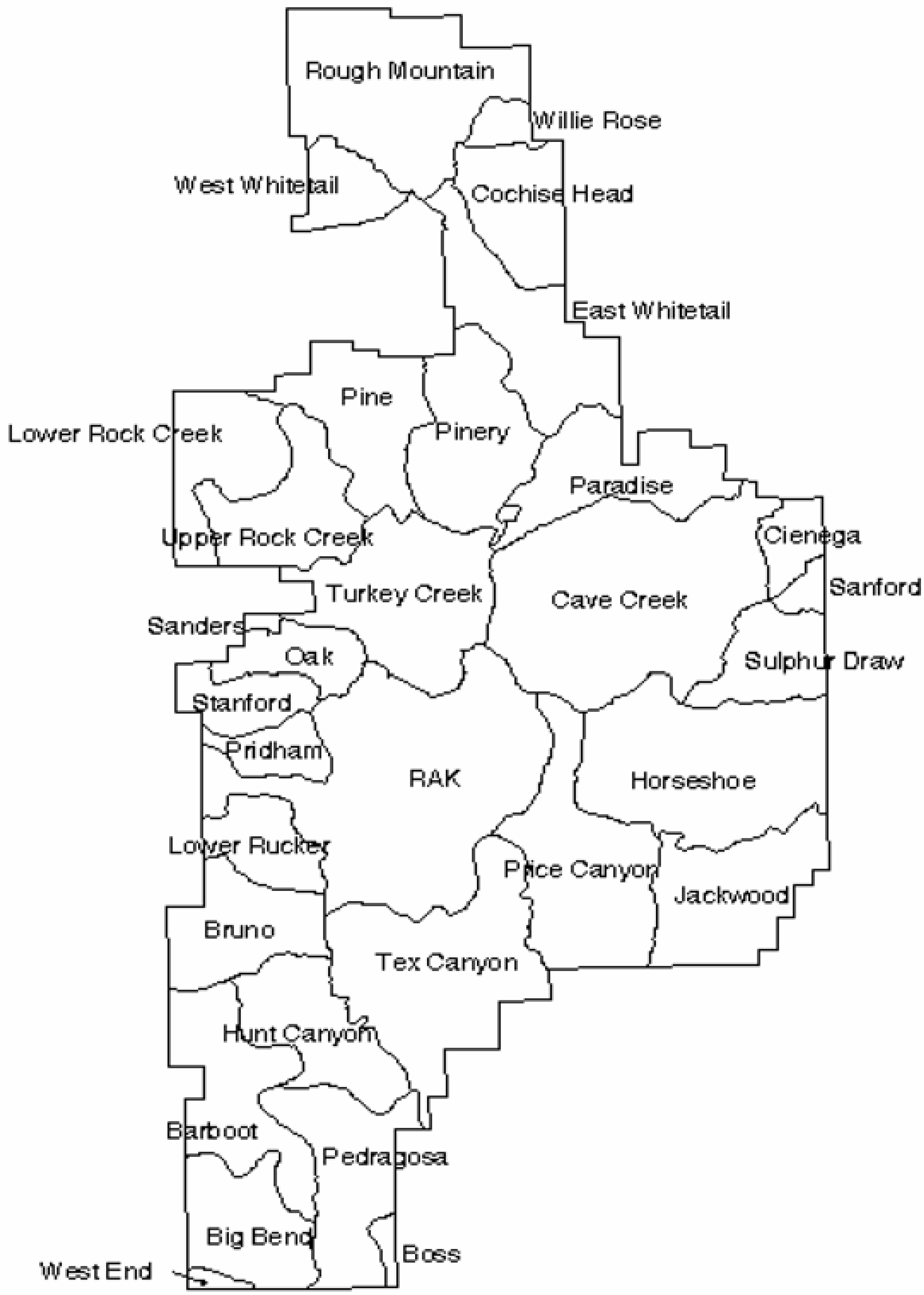

Figure 2. Grazing allotments in the Chiricahua EMA, CNF.

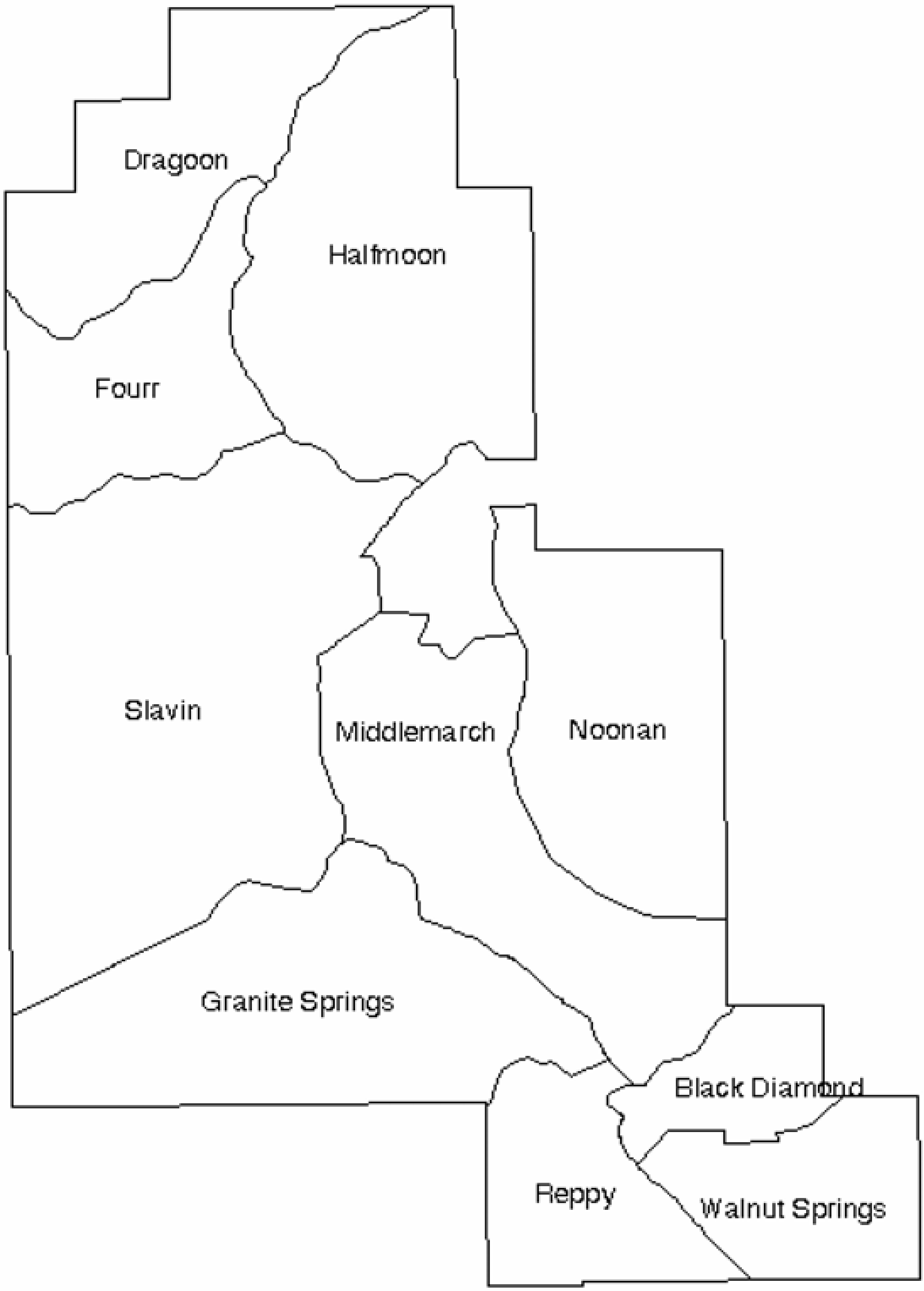

Figure 3. Grazing allotments in the Dragoon EMA, CNF.

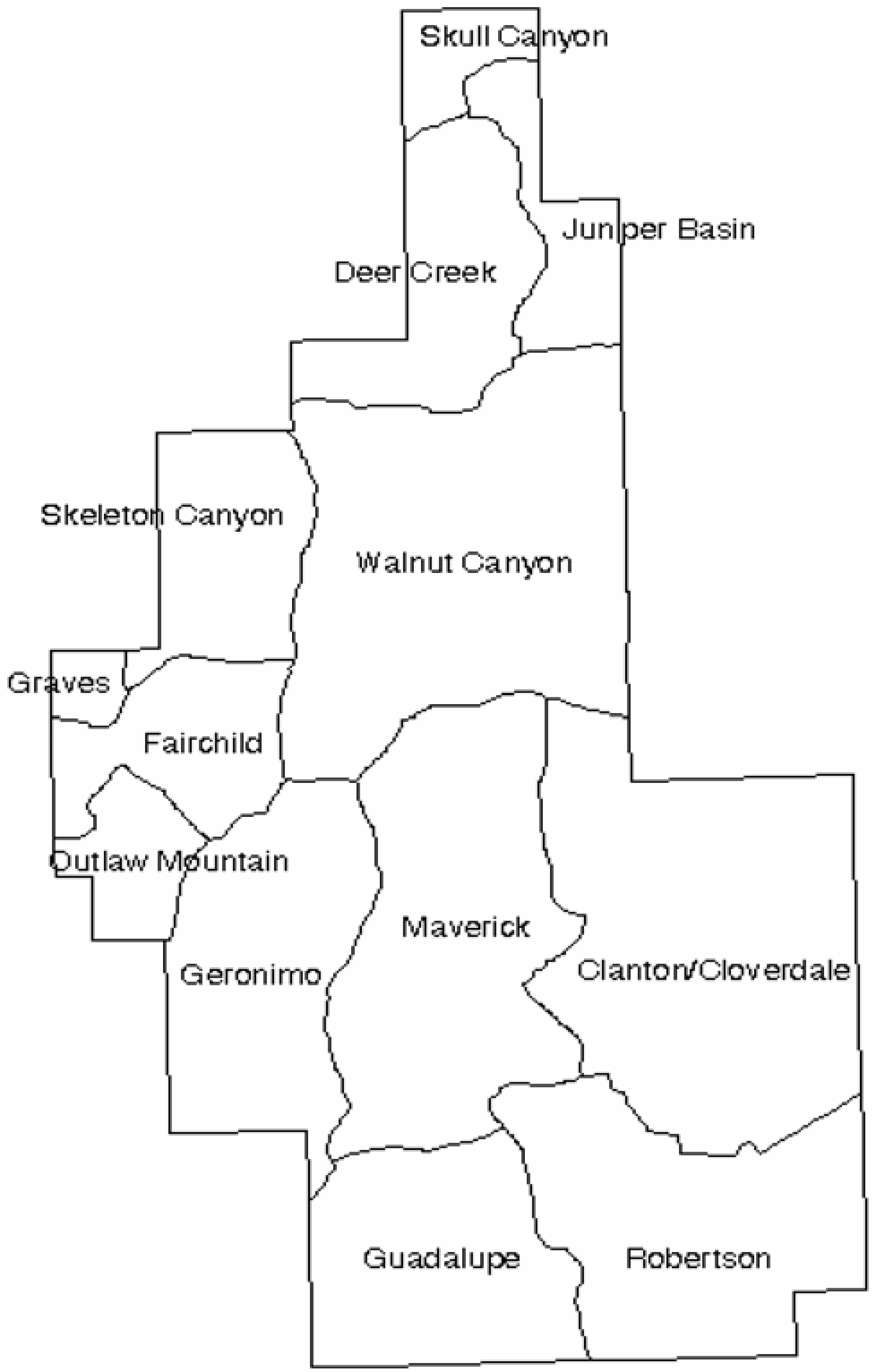

Figure 4. Grazing allotments in the Peloncillo EMA, CNF.

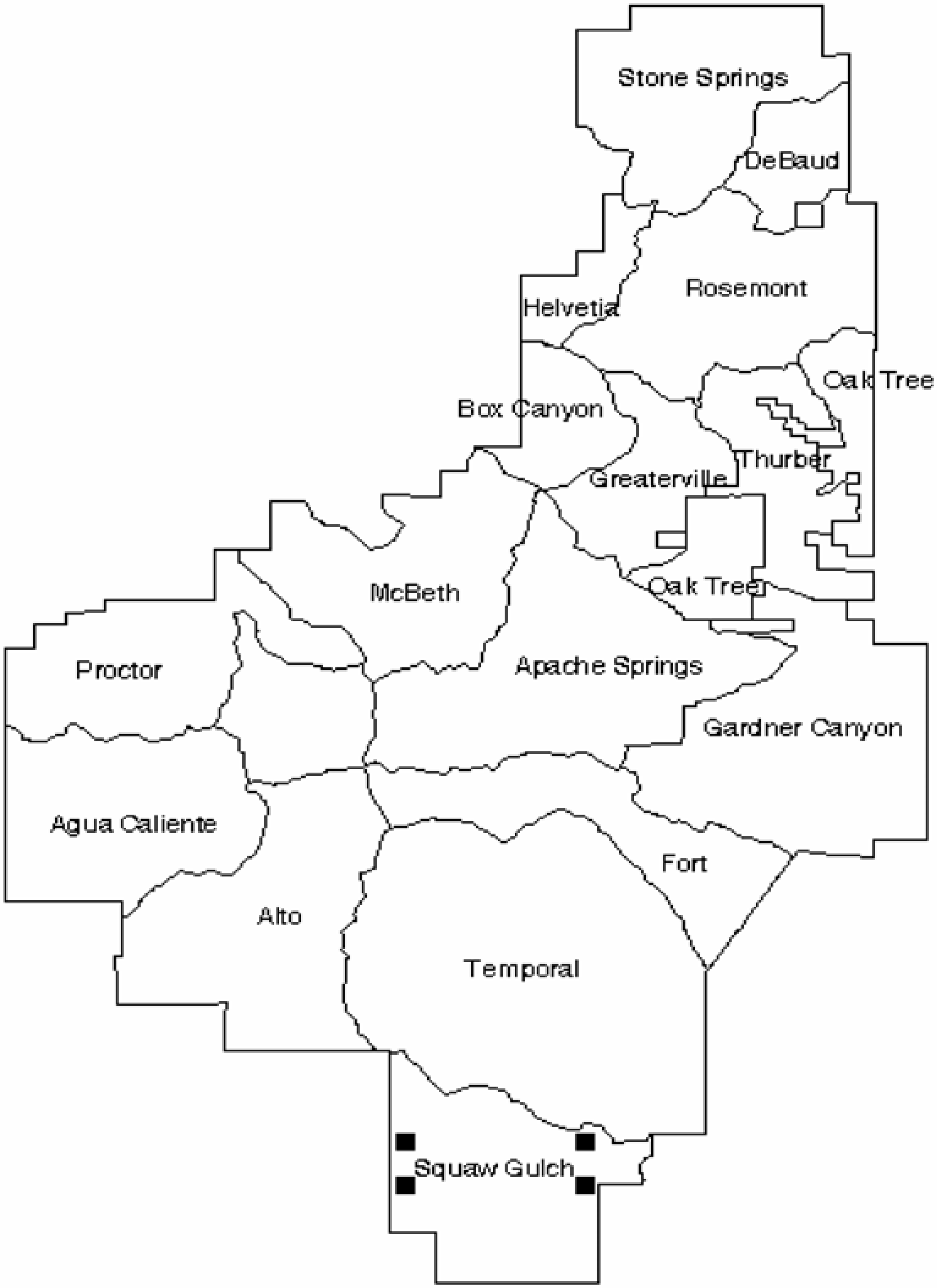

Figure 5. Grazing allotments in the Santa Rita EMA, CNF.

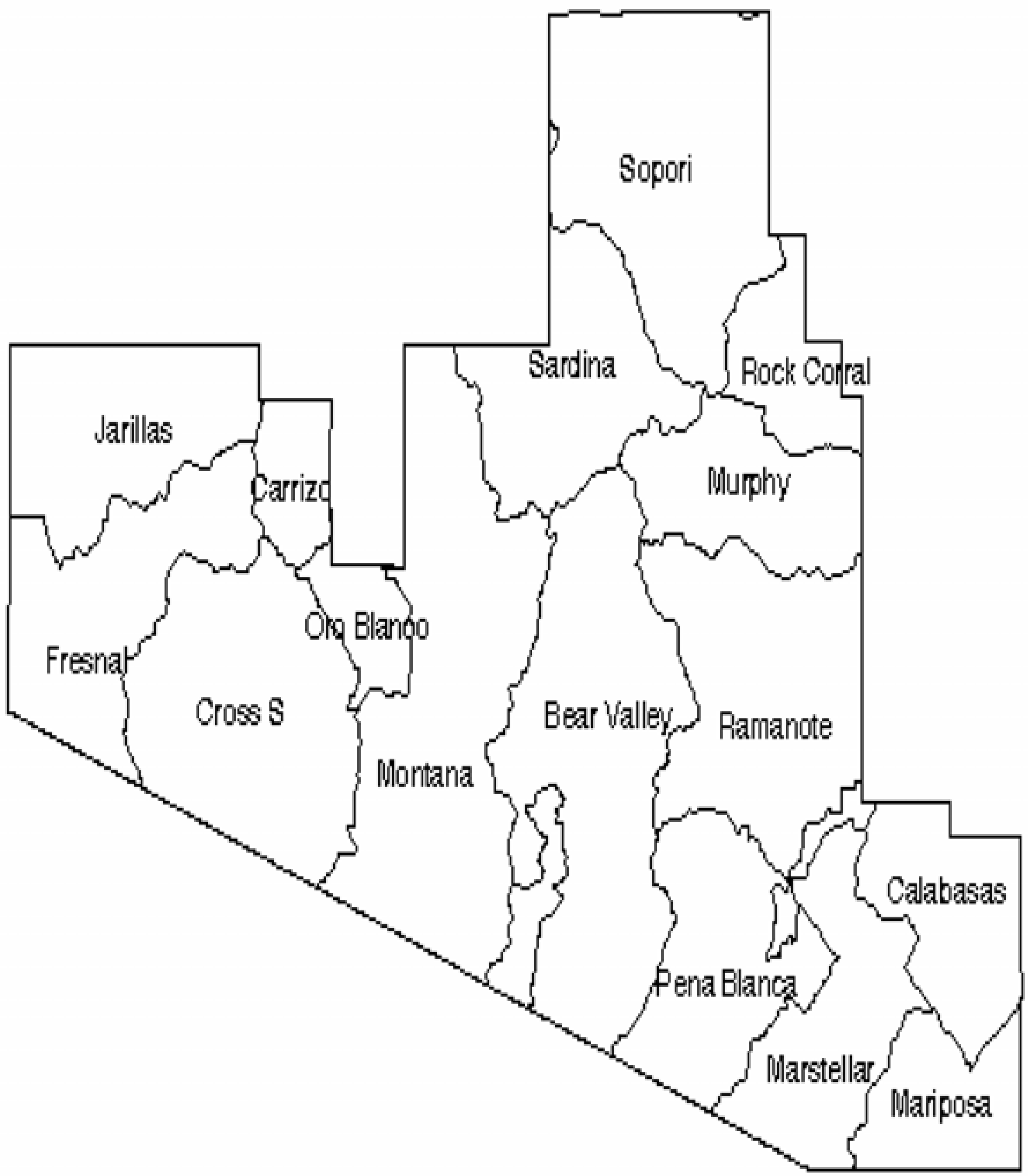

Figure 6. Grazing allotments in the Tumacacori EMA, CNF.

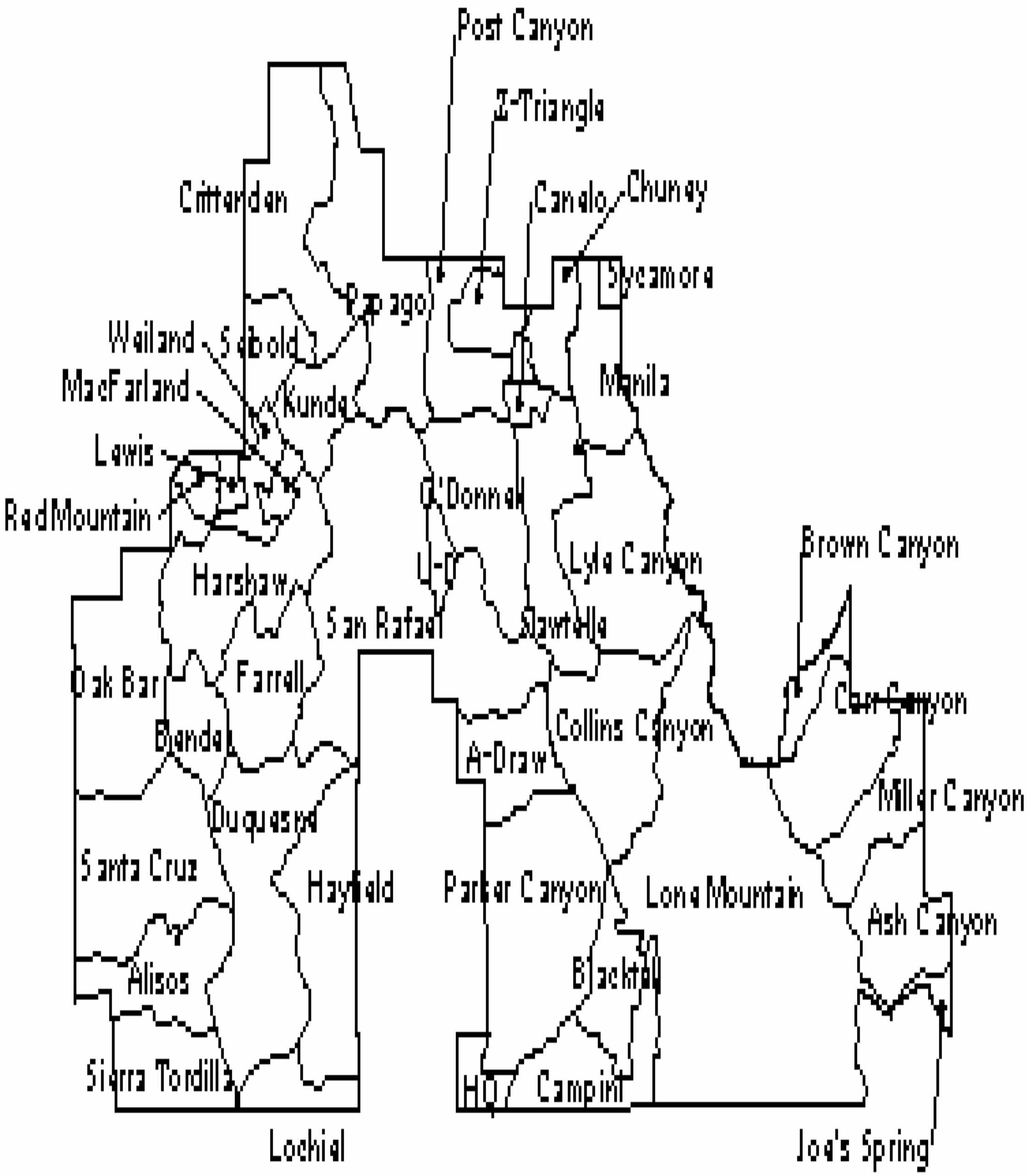

Figure 7. Grazing allotments in the Huachuca EMA, CNF.

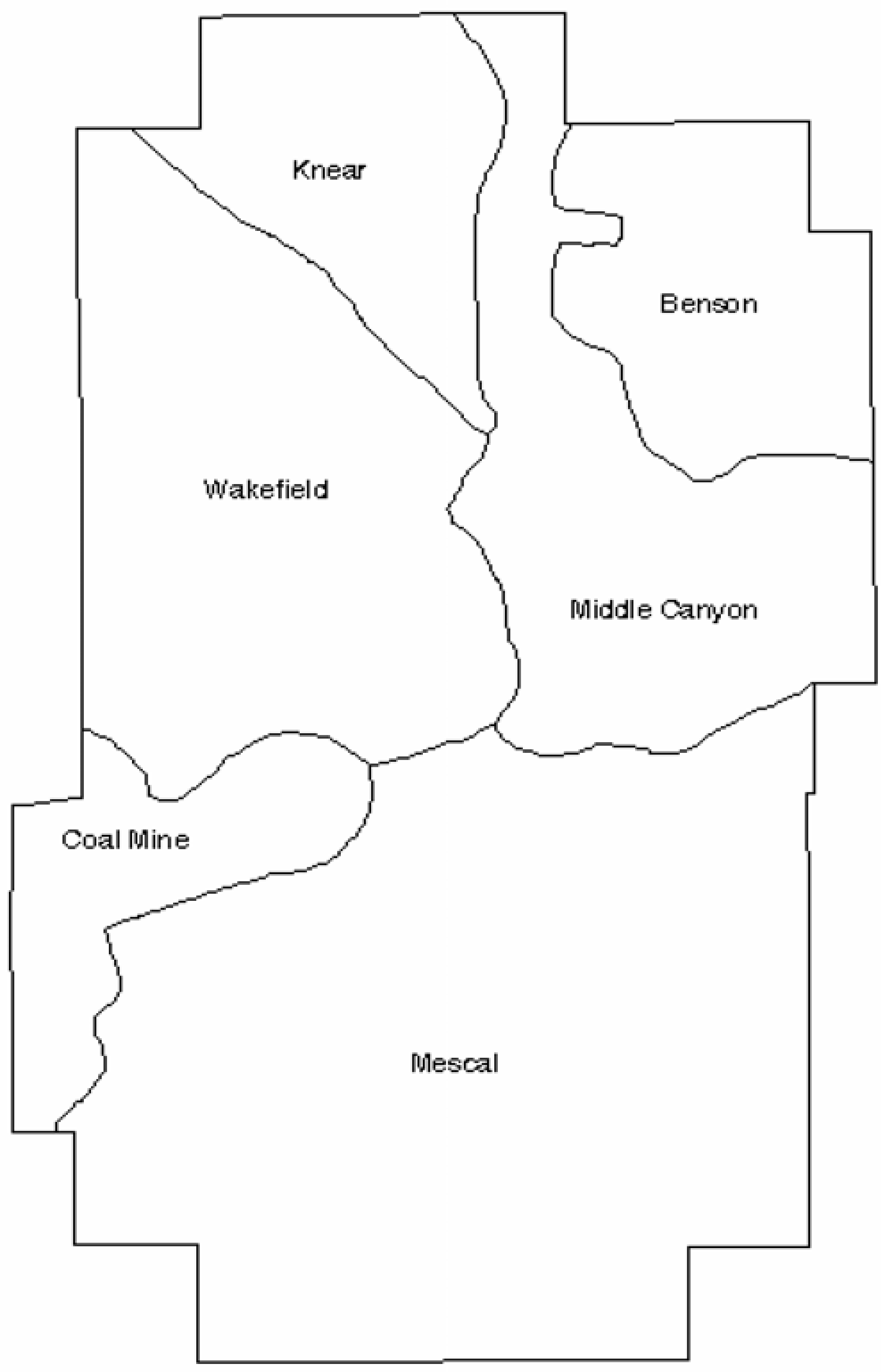

Figure 8. Grazing allotments in the Whetstone EMA, CNF.

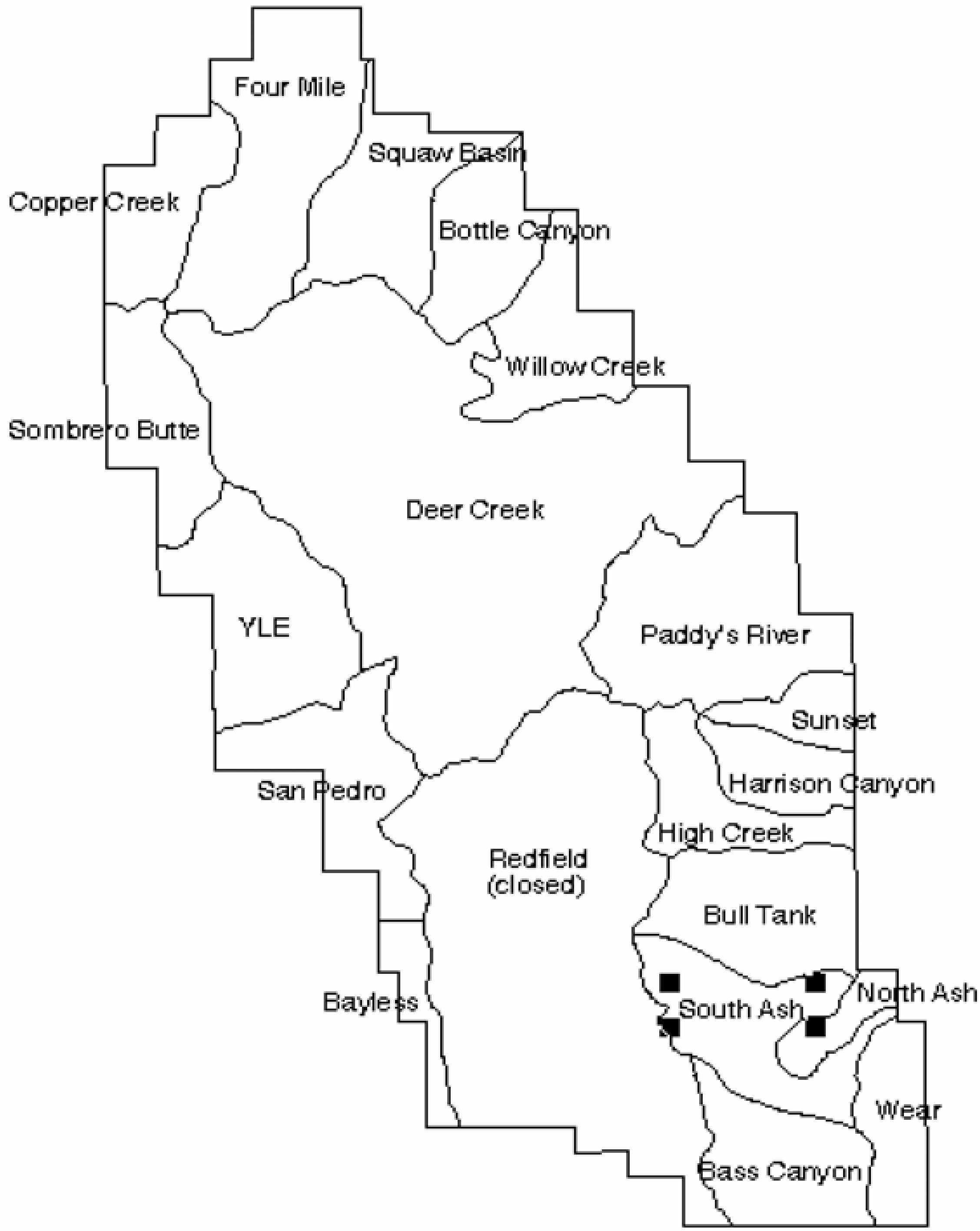

Figure 9. Grazing allotments in the Galiuro EMA, CNF.

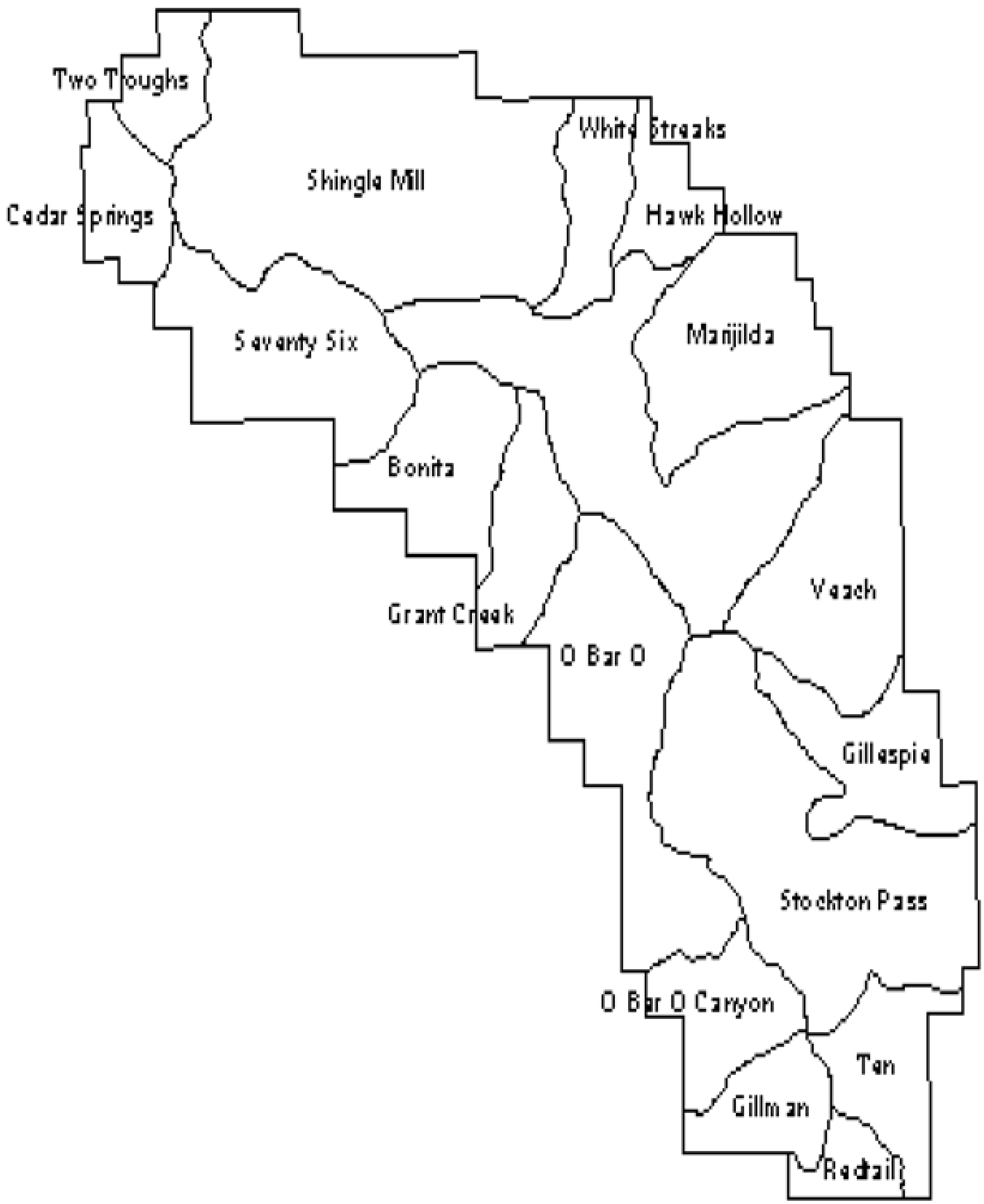

Figure 10. Grazing allotments in the Pinaleno EMA, CNF.

Figure 11. Grazing allotments in the Santa Teresa EMA, CNF.

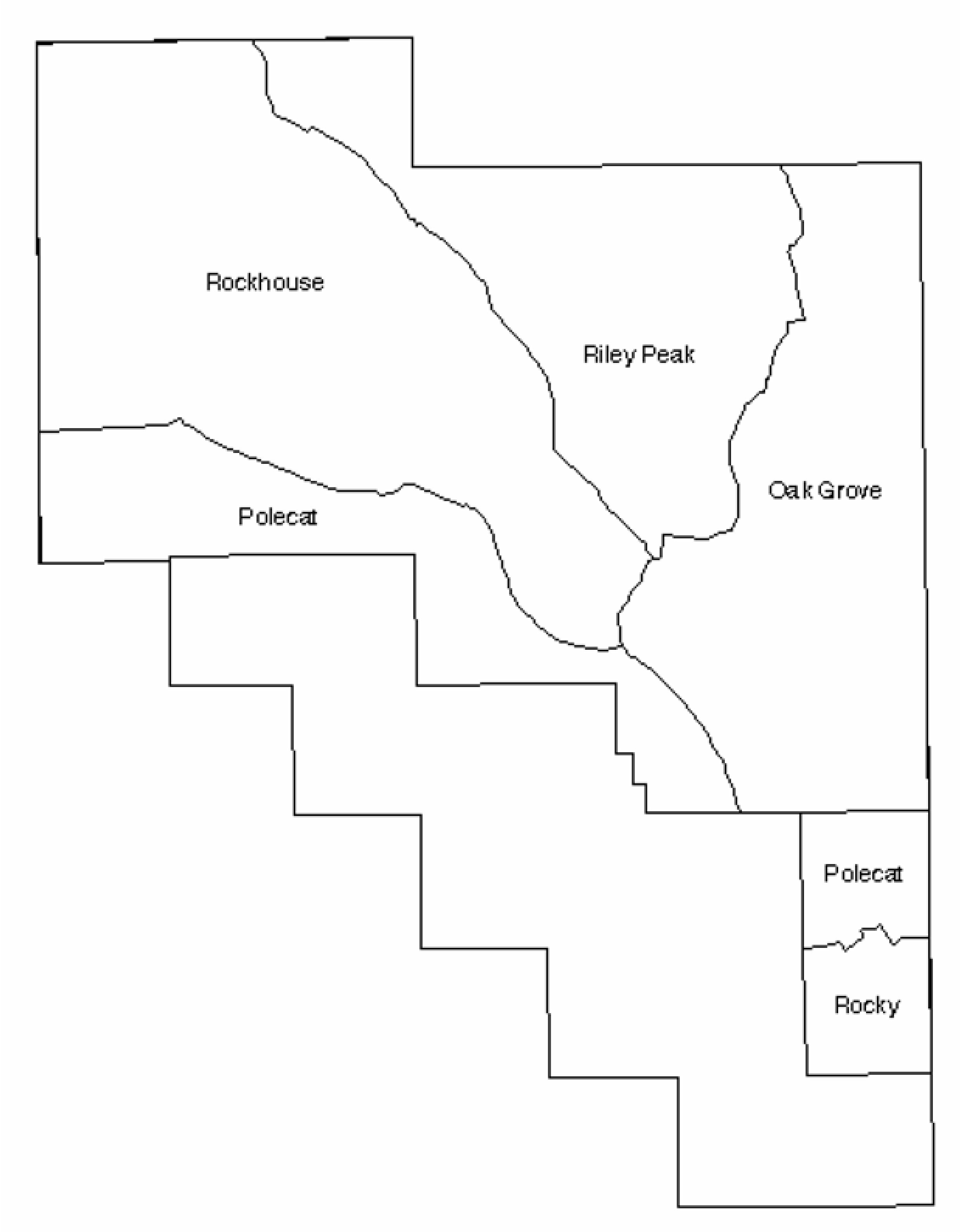

Figure 12. Grazing allotments in the Winchester EMA, CNF.

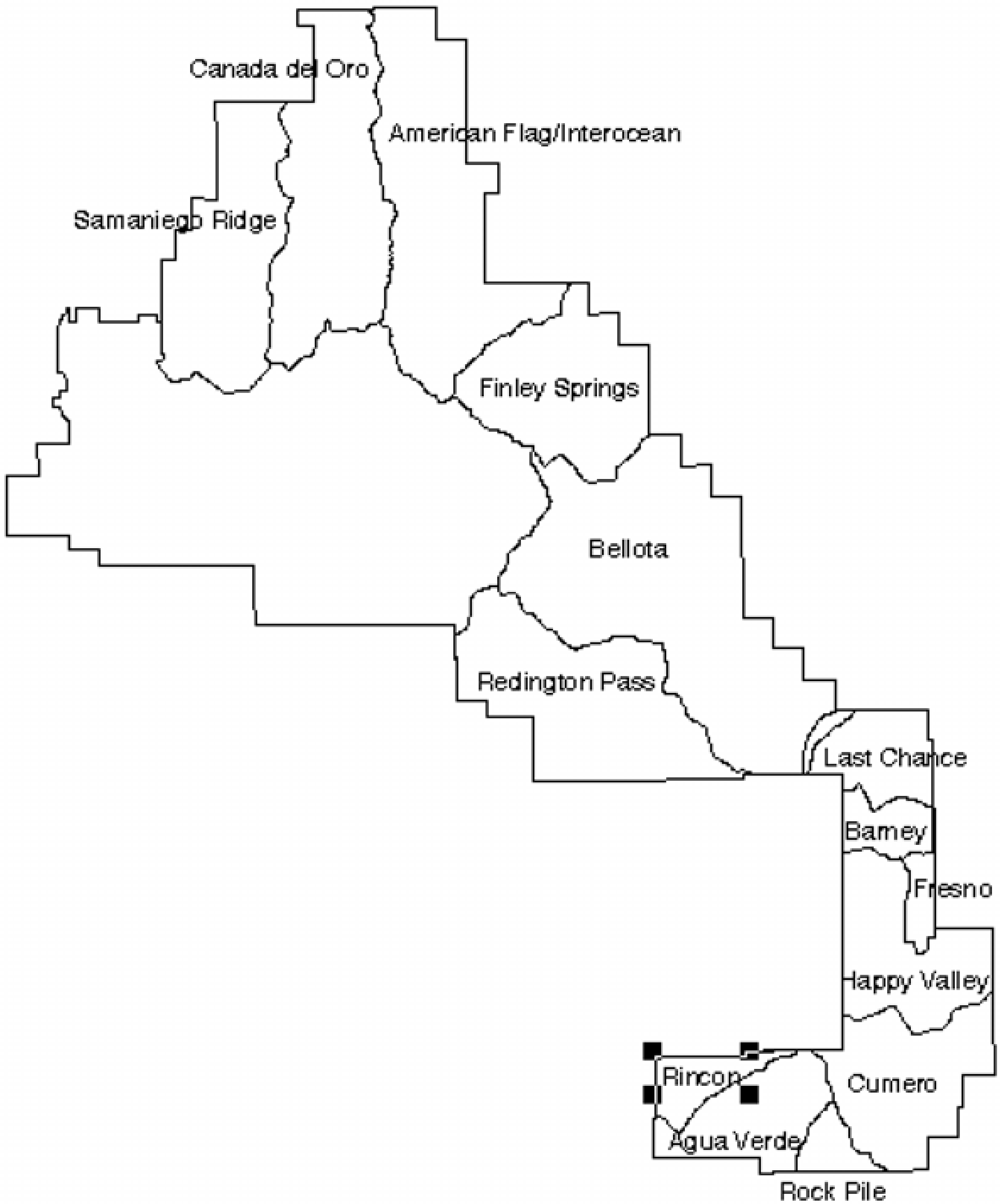

Figure 13. Grazing allotments in the Santa Catalina EMA, CNF.

APPENDIX A

CONCURRENCES

AMPHIBIANS AND REPTILES

Chiricahua leopard frog (CLF)

We listed the Chiricahua leopard frog as threatened in a Federal Register notice (67 FR 40790) dated June 13, 2002, without critical habitat. We are working on a recovery plan (2002).

Detailed information on species description, habitat, range, etc., is contained in the CLF section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for CLF states:

No Effect (must meet criteria 1a and 1b or must meet criteria 2):

1.a. No livestock grazing or livestock management activities on the allotment will occur in suitable or potential habitat, and

1.b. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will not degrade watershed condition and livestock grazing is not proposed in areas that contribute to unsatisfactory watershed condition. This **does not apply** to stock tanks**,** irrigation sumps, acequias, mine adits, backyard ponds, or other suitable human-made habitats that are typically not affected by watershed condition.

2. Based on surveys conducted using FWS protocol no Chiricahua leopard frogs are present on or within five miles of the allotment or there is no potential or suitable habitat on or within five miles of the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. No livestock use or livestock management activities will occur in occupied or likely to be occupied aquatic habitat.

2. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will contribute to the improvement of the subwatershed or will not contribute to a continued decline in subwatershed condition. Indicators of watershed health and Chiricahua leopard frog habitats demonstrate that effects from grazing and livestock management activities will be insignificant and discountable. This **does not apply** to stock tanks**,** irrigation sumps, acequias, mine adits, backyard ponds, or other suitable man-made habitats that are typically not affected by watershed condition.

3. Proposed livestock management activities will not result in increased public access to aquatic sites occupied or likely to be occupied by Chiricahua leopard frogs, or increase the likelihood that nonnative predators or chytrid fungi will colonize or be introduced to such aquatic sites.

You determined that livestock grazing on 116 allotments is not likely to adversely affect the species. The allotments are:

Chiricahua EMA: Boss, Bruno, Cienega, Cochise Head, East Whitetail, Horseshoe, Hunt Canyon, Jackwood, Lower Rucker, Oak, Pedegosa, Price Canyon, RAK, Rough Mountain, Sanford, Sulfer Draw, Tex Canyon, West Whitetail, and Willie Rose.

Dragoon EMA: Middlemarch.

Peloncillo EMA: Clanton/Cloverdale, Deer Creek, Fairchild, Geronimo, Graves, Juniper Basin, Outlaw Mountain, Robertson, Skeleton Canyon, Skull Canyon, and Walnut Canyon.

Santa Rita EMA: Aqua Caliente, Alto, DeBaud, Gardner Canyon, Greaterville, Helvetia, Oak Tree I, Oak Tree II, Proctor, Rosemont, Squaw Gulch, Stone Springs, Temporal, and Thurber.

Tumacacori EMA: Calabases, Cross S, Fresnal, Mariposa, Rock Corral, Sardina, and Sopori.

Huachuca EMA: Alisos, Ash Canyon, Bender, Carr Canyon, Crittenden, Kunde, Lewis, Manila, McFarland, Miller Canyon, Oak Bar, Papago, Santa Cruz, Sierra Tordilla, Sycamore, and Weiland.

Whetstone EMA: Benson, Coal Mine, Knear, Mescal, Middle Canyon, and Wakefield.

Galiuro EMA: Bayless, Bottle Canyon, Copper Creek, Four Mile, Paddy’s River, San Pedro, Sombrero Butte, Willow Creek, and YLE.

Pinaleno EMA: Bonita, Cedar Springs, Gillespie, Gillman, Grant Creek, Hawk Hollow, Marijilda, O Bar O, O Bar O Canyon, Redtail, Seventy Six, Shingle Mill, Stockton Pass, Ten, Two Troughs, Veach, and White Streaks.

Winchester EMA: Oak Grove, Polecat, Riley Peak, Rockhouse, and Rocky.

Santa Teresa EMA: Black Rock, Foster, South Goodwin, Jakes, Kane Springs, Laurel Canyon, North Reef, South Reef, and VJ.

We based our concurrence on the following:

1. You have included minimization measures and methods of stock tank cleaning to reduce effects to the CLF.

2. You are working with Arizona Game and Fish Department and others to find suitable reintroduction sites on the Forest for this species.

<u>BIRDS</u>

American bald eagle (*Haliaeetus leucocephalus*)

We listed the American bald eagle as threatened in a Federal Register notice (60 FR 35999), dated July 12, 1995, without critical habitat. We completed the recovery plan for the southwest population in September 1982.

A small, resident population of approximately 40 pair nest along the Salt, Verde, Gila, Bill Williams, Agua Fria, San Pedro, and San Francisco rivers and along the Tonto and Canyon creeks of Arizona. Bald eagles winter throughout the state of Arizona, with at least 200 to 300 located each year. The greatest numbers of wintering eagles are found along the Mogollon Rim east though the White Mountains, but some are located in all fifteen Arizona counties. Some allotments on the Forest support potential bald eagle roost sites for migrating and wintering bald eagles. Forest biologists conduct annual bald eagle surveys when time and funding permits.

Bald eagles were threatened (and previously endangered) due to reproductive failure caused by pesticide use, namely DDT; and unrestricted killing by humans. Now the species faces more threats from habitat loss, human encroachment on nesting sites, entanglement in fishing line, reduction in native fish prey species, illegal shooting, and heavy metals contact and consumption.

Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for bald eagle states:

No Effect (must meet one of the criteria):

1. Livestock grazing will not occur within any subwatershed that drains any identified bald eagle nesting habitat (upper Verde and Salt rivers and Tonto Creek in Arizona) or roost site.

2. Livestock management activities (beyond presence of livestock) on the allotment will not occur within 0.25 miles of a bald eagle roost or nest site during any time of occupation by bald eagles.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria):

1. Livestock grazing that occurs in riparian areas will not reduce long-term roost and nest tree regeneration.

2. Livestock management activities (beyond presence of livestock) that occur within 0.25 mi of a bald eagle nest or roost site will not occur during the season of bald eagle occupation.

3. Subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitat demonstrate that any effects will be insignificant or discountable.

Livestock can disturb roosting and nesting sites, although simple presence of livestock seems not to concern eagles. Livestock gathering activities around bald eagle nests have elicited reactions from eagles, but there are no known nests on the Forest.

Livestock effects can alter riparian vegetation, and/or the functioning of aquatic systems and their watersheds. Riparian trees can be affected by livestock; some of these trees could be chosen by eagles for roost or nest sites. Livestock grazing in riparian zones and in the watershed can affect specific components of them and degrade the entire system (USFWS 1999a). Riparian area effects are discussed in greater detail in the general Effects of the Action section and in the Gila Topminnow section of this BO.

You determined that livestock grazing on 11 allotments is not likely to adversely affect the species. The allotments are:

Chiricahua EMA: Lower Rock Creek, Lower Rucker, Oak, Pine, RAK, Rough Mountain, Turkey Creek, and West Whitetail.

Tumacacori EMA: Pena Blanca.

Galiuro EMA: Deer Creek and High Creek.

We based our concurrence on the following:

1. The action, as proposed, should not reduce roost trees in upland areas.

2. There are no known nesting or roost sites in Forest allotments; therefore, we believe no disturbance of such sites is occurring.

3. You are continuing to conduct annual surveys for bald eagle.

Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) (CFPO)

We listed the cactus ferruginous pygmy-owl as an endangered distinct vertebrate population in a Federal Register notice (62 FR 10730), dated March 10, 1997.

Detailed information on species description, habitat, range, etc., is contained in the CFPO section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for CFPO states:

No Effect (must meet one of the criteria):

1. No livestock grazing in pygmy-owl habitat will occur within the allotment.

2. No suitable pygmy-owl habitat is present within the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Livestock grazing will be at levels that maintain understory vegetation and provide for regeneration of any strata of desert scrub, xero-riparian, and riparian vegetation, and is limited to 30 percent forage utilization of all palatable species in desert scrub and xero-riparian areas.

2. Livestock gathering activities will not occur within 0.25 mi of an occupied pygmy-owl site or unsurveyed suitable habitat between February 1 and July 31.

You determined that livestock grazing on 12 allotments is not likely to adversely affect the species. The allotments are:

Santa Rita EMA: Aqua Caliente, McBeth, Proctor, Squaw Gulch, and Stone Springs.

Santa Catalina EMA: Canada del Oro, Cumero, Findley Springs, Happy Valley, Last Chance, Rincon, and Aqua Verde.

We based our concurrence on the following:

1. Livestock grazing utilizations levels are set at 30 percent in the Rincon/Aqua Verde allotment in lands below 4,000' in elevation, and livestock gathering activities are not conducted within 0.25 mi of a detection site or unsurveyed habitat between February 1 and July 31, annually.

2. CFPO nesting habitat does not exist on the noted allotments, although dispersal and foraging habitat does exist and is not precluded from CFPO use.

Masked bobwhite (*Colinus virginianus ridgwayi*)

We listed the masked bobwhite as endangered in a Federal Register notice (35 FR 4001), dated March 11, 1967, and (35 FR 8495), dated June 2, 1970, without critical habitat. We completed a recovery plan in February 1978 and revised it in 1984 and in 1995.

Male birds are characterized by a brick-red breast and a black head and throat. Females closely resemble other races of the species and are essentially indistinguishable from the Texas bobwhite (Colinus virginianus texanum.)

They are found in desert grasslands at 300 to 1,200 m (1,000 to 4,000 ft) in elevation, in areas with a high density of moderately dense native grasses and forbs and adequate brush cover. This subspecies has been found to be closely associated with unarmed acacia (*Acacia angustissima*), apparently using the seeds as a major food in winter, fall, and early spring.

Its historical range was in grasslands throughout most of Sonora, Mexico, and the Altar and Santa Cruz valleys of Pima and Santa Cruz counties, Arizona. It inhabited the Sonoran savanna grasslands, the Sonoran desertscrub, and the Sinaloan thornscrub of extreme southcentral Arizona and adjacent central Sonora, Mexico.

Extirpated from the U. S. around 1900, we established a refuge population and captive rearing was established in 1985 at the Buenos Aires National Wildlife Refuge in the southern Altar Valley in Pima County, Arizona. In 1996, Buenos Aires' masked bobwhite population was estimated at 300 to 500 birds. Three very small, natural populations still persist in central Sonora, Mexico, consisting of fewer than 1,000 individuals.

The masked bobwhite was listed as endangered due to loss and deterioration of habitat due to overgrazing and possibly due to competition with other native species of quail. It appears tolerant of very light grazing of its habitat. Those allotments listed below constitute the action area for this species' analysis.

Guidance criteria does not address the masked bobwhite.

We concur with your effect determination on three allotments that the proposed project may affect, but is not likely to adversely affect, this species. The allotments are:

Tumacacori EMA: Cross S, Fresnal, and Jarillas.

We based our concurrence on the following:

1. Masked bobwhite are not known from the Forest, but do occur on lands adjacent to Forest allotments.

2. Utilization levels are 35 percent during the growing season and 45 percent during the dormant season on two of the three allotments, allowing a continuing supply of food sources and brush cover for the species.

Mexican spotted owl (Strix occidentalis occidentalis)

We listed the Mexican spotted owl as threatened in a Federal Register notice (58 FR 14248), dated March 16, 1993, with critical habitat (66 FR 8530), dated February 1, 2001. We completed a recovery plan in 1995, and is under revision (2002).

The Mexican spotted owl is a medium-sized owl with large dark eyes and no ear tufts; it closely resembles the barred owl. The plumage is brown with numerous white spots and posterior underparts have short, horizontal bars or spots; it is about 0.4 m (17 in) long, and the wingspan is about 1.0 m (3.3 ft).

It lives in varied habitat, consisting of mature montane forest and woodland, shady, wooded canyons and steep canyons. In forested habitat, uneven-aged stands with a high canopy closure, high tree density, and a sloped terrain appear to be key habitat components. They can also be found in mixed conifer and pine oak vegetation types. They generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type. Nests are found in live trees, snags, and on canyon walls, with elevations ranging between 1,249 to 2,743 m (4,100 to 9,000 ft).

The historical range extended from the southern Rocky mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona, New Mexico, and far western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau.

Currently it inhabits a range thought to be similar to historical range. Populations in Arizona are patchily distributed and occur in all but the arid southwestern portion of the state or much of the lowland riparian zones.

Threats to the species include alteration of prey species habitat, stand-replacing wildfires, and destruction and loss of nesting habitat. Those allotments listed below constitute the action area for this species' analysis.

Guidance criteria for the Mexican spotted owl states:

No Effect:

1. No livestock grazing or livestock management activities will occur within protected and restricted habitats, as defined by the species' recovery plan.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Livestock grazing or livestock management activities will occur within PACs, but no human disturbance or construction actions associated with the livestock grazing will occur in PACs during the breeding season.

2. Livestock grazing and livestock management activities within protected and restricted owl habitats will be managed for levels that provide the woody and herbaceous vegetation necessary for cover for rodent prey species, the residual biomass that will support prescribed natural and

ignited fires that would reduce the risk of catastrophic wildfire in the Forest, and regeneration of riparian trees.

3. In mountain meadows (subject to seasonal livestock use May-October), which are owl foraging areas, livestock grazing will be at a level that maintains a minimum cover height of 4 in. of herbaceous vegetation, providing cover for the owls' prey species. The 4 in. stubble height minimum will be met 10 days after the onset of summer rains or August 1, whichever comes first, and maintained through the end of the grazing season.

We concur with your effect determination on 72 allotments that the proposed project may affect, but is not likely to adversely affect, this species. The allotments are:

Chiricahua EMA: Barboot, Big Bend, Boss, Bruno, Cave Creek, Cienega, Cochise Head, East Whitetail, Horseshoe, Hunt Canyon, Jackwood, Lower Rock Creek, Lower Rucker, Oak, Paradise, Pedregosa, Pine, Pinery, Price Canyon, RAK, Rough Mountain, Sanford, Sulpher Draw, Tex Canyon, Turkey Creek, Upper Rock Creek, West Whitetail, and Willie Rose.

Peloncillo EMA: Clanton/Cloverdale, Deer Creek, Fairchild, Geronimo, Graves, Guadalupe, Juniper Basin, Maverick, Outlaw Mountain, Robertson, Skeleton Canyon, and Walnut Canyon.

Santa Rita EMA: Aqua Caliente, Alto, Apache Springs, Fort, McBeth, and Temporal.

Tumacacori EMA: Bear Valley, Marstellar, Pena Blanca, and Ramanote.

Huachuca EMA: Ash Canyon, Bender, Harshaw, Lone Mountain/Parker, Miller Canyon, and Weiland.

Whetstone EMA: Mescal.

Galiuro EMA: Bass Canyon, Bull Tank, Deer Creek, and High Creek.

Pinaleno EMA: Bonita, O Bar O, Seventy Six, and Stockton Pass.

Santa Teresa EMA: South Goodwin.

Winchester EMA: Riley Peak and Rockhouse.

Santa Catalina EMA: American Flag/Interocean, Bellota, Canada Del Oro, and Finley Springs.

We based our concurrence on the following:

1. Livestock management activities (range improvements, construction, human-caused actions) do not occur within PACs during the breeding season.

2. Key habitat areas are being established in riparian locations and are being monitored.

3. Fencing in riparian areas excludes livestock.

Northern aplomado falcon (Falco femoralis septentrionalis)

We listed the northern aplomado falcon as endangered in a Federal Register notice (51 FR 6686), dated January 25, 1986, without critical habitat. We completed a recovery plan in June 1990.

Adults are characterized by rufous (rust) underparts, a gray back, a long, banded tail, and a distinctive black and white facial pattern. Juveniles differ from adults in three respects: 1) the color of the upper breast and face is deep cinnamon; 2) dark, broad streaks obscure most of the breast; and 3) fleshy parts are bluish, not yellow. Aplomado falcon are smaller than peregrine falcon and larger than kestrel. Other birds compose the bulk of their food, with insects, small snakes, lizards, and rodents serving as supplements. Aplomado falcon are often seen hunting in pairs, cooperatively, especially when hunting birds. Eggs are laid between March and June with both parents sharing incubation duties. The fledgling period is 4 to 5 weeks, with fledglings remaining in their natal areas for at least a month.

Their habitat consists of open grassland terrain with scattered trees, relatively low ground cover, an abundance of small to medium-sized birds, and a supply of suitable nesting platforms, particularly yuccas and mesquite. Typical habitat ranges in elevation between 1,189 to 2,743 m (3,500 to 9,000 ft). Woody vegetation, fence posts, and telephone poles serve as perches.

Its historical range in the U.S. was limited to southeastern Arizona (Cochise and Santa Cruz counties, Arizona), southern New Mexico, and southern Texas. It was also found throughout most of Mexico south to Tierra del Fuego.

It has more limited distribution today. In 1992, breeding populations in Chihuahua, Mexico, approximately 80 mi south and 50 mi west of the U.S. border (Big Bend, Texas) were confirmed. Since then, several reliable sightings have been reported in areas west of the initial breeding population. The discovery of breeding aplomados in northern Chihuahua may be the source of aplomados recently observed in southern New Mexico and west Texas. Numerous sightings of aplomados have occurred over the years.

In Arizona, the last confirmed records of the species were from the Sulphur Springs Valley (1939), near Saint David (1940), and the border area near Rodeo, New Mexico, in 1977. None of the relatively frequent reports since then has been confirmed (Arizona Game and Fish Department 1996). A breeding pair of falcons was observed near Deming, New Mexico, in 2000. In 2002, a breeding pair was confirmed in southern New Mexico.

Aplomado falcon was listed as endangered as a result of habitat degradation due to brush encroachment fostered by overgrazing and fire suppression, over-collecting; and reproductive failure caused by organochlorine pesticide use, namely DDT. Those allotments listed below constitute the action area for this species' analysis.

Guidance criteria for the northern aplomado falcon states:

No Effect (must meet one of the criteria):

1. No livestock grazing occurs on the allotment.

2. Based on surveys conducted within the last year, no suitable or potential aplomado falcon habitat occurs on the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Livestock grazing occurs within occupied, suitable or potential aplomado falcon habitat only in concert with a monitoring program to determine responses of the habitat and the falcon to livestock grazing.

2. Areas of savannahs with yucca and scattered trees are being maintained for prey production and nesting habitat, including protecting all nesting substrate from adverse effects of livestock grazing and rubbing.

You determined that livestock grazing on 33 allotments is not likely to adversely affect this species. The allotments are:

Peloncillo EMA: Robertson and Walnut Canyon.

Santa Rita EMA: Aqua Caliente, Alto, Fort, Gardner Canyon, McBeth, Oak Tree I, Oak Tree II, Proctor, Squaw Gulch, Temporal, and Thurber.

Tumacacori EMA: Fresnal and Jarilllas.

Huachuca EMA: Blacktail, Campini, HQ, Lone Mountain/Parker, Manila, San Rafael, and Sycamore.

Galiuro EMA: Bottle Canyon, Bull Tank, Harrison Canyon, High Creek, and North Ash Creek.

Pinaleno EMA: Bonita, Gillman, O Bar O, and Seventy Six.

Santa Teresa EMA: Cedar Springs and Rockhouse.

We base our concurrence on the following:

1. While aplomado falcons are not documented on the Forest, they are being recorded in nearby southwestern New Mexico.

2. You are managing allotments that support potential foraging or nesting habitat to maintain grassland and nesting components for the species.

<u>FISH</u>

Gila chub (*Gila intermedia*) with critical habitat (Conference)

We proposed to list the Gila chub as endangered in a Federal Register notice (67 FR 51948), dated August 9, 2002, with critical habitat.

Detailed information on species description, habitat, range, etc., is contained in the Gila chub section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for Gila chub states:

No Effect (must meet one of the criteria):

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into threatened and endangered species habitat.

2. Livestock grazing on the allotment will be excluded from threatened and endangered species habitat, in order to sustain all life stages of threatened and endangered species, the subwatershed is in satisfactory condition, and there will no be effects such as:

a. Sedimentation (sediment traps occur between the allotment and threatened and endangered species habitat).

b. Evidence of active erosion caused by livestock or livestock management activities.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by yearlong exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

We remain concerned with the static and downward trends for the three allotments listed below. Grazing utilization levels are permitted to 45 percent, but soils range from 50 percent to 100 percent unsatisfactory. We recommend corrective measures should be considered and implemented to improve these conditions and trends.

You determined that livestock grazing on three allotments is not likely to adversely affect, the species. The allotments are:

Huachuca EMA: Lyle Canyon, Manila, and Sycamore.

We based our concurrence on the following:

1. The allotments do not drain directly into critical habitat.

The prohibitions against taking the species found in section 9 of the Act do not apply until the species is listed. Detailed information is contained in our Section 7 Handbook and discussed in the Incidental Take Statement for the Gila chub in this BO.

Gila topminnow (*Poeciliopsis occidentalis occidentalis*)

We listed the Gila topminnow as endangered in a Federal Register notice (32 FR 4001), dated March 11, 1967, without critical habitat.

Detailed information on species description, habitat, range, etc., is contained in the Gila Topminnow section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for Gila topminnow states:

No Effect (must meet one of the criteria):

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into threatened and endangered species habitat.

2. Livestock grazing on the allotment will be excluded from threatened and endangered species habitat, in order to sustain all life stages of threatened and endangered species, the subwatershed is in satisfactory condition, and there will no be effects such as:

   a. Sedimentation (sediment traps occur between the allotment and threatened and endangered species habitat).

   b. Evidence of active erosion caused by livestock or livestock management activities.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Threatened and endangered species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by yearlong exclusion of livestock from threatened and endangered species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and threatened and endangered species habitats demonstrate that effects will be insignificant or discountable.

You determined that livestock grazing on three allotments is not likely to adversely affect the species. The allotments are:

Tumacacori EMA: Bear Valley and Mariposa.

Huachuca EMA: A Draw.

We based our concurrence on the following:

1. Gila topminnow are not present on the allotments, but do occur in the subwatersheds; direct effects are not occurring.

2. Subwatershed (uplands) are slowly improving with management. We do not anticipate a worsening of upland conditions due to management actions.

<u>MAMMALS</u>

Jaguar (*Panthera onca*)

We listed the jaguar as a U.S. population, endangered in a Federal Register notice (62 FR 39147), dated July 22, 1997, without critical habitat. We listed the non-U.S. population as endangered in a Federal Register notice (37 FR 6476), dated March 30, 1972.

The largest species of cat native to the Western Hemisphere, the jaguar is muscular, with relatively short, massive limbs, and a deep-chested body. It is cinnamon-buff in color with many black spots, and weights range widely from 40 to 135 kg (90 to 300 lb), with lengths from 2.4 m (7.8 ft) from head to tail tip.

Found near water in the warm tropical climate of savannah and forest, jaguar are rarely found in extensive arid areas. Individuals located in Arizona have been found in Sonoran desert scrub up through subalpine conifer forest vegetation types.

Its historical range was from the southwestern United States (including California, Arizona, New Mexico, Louisiana, and south through Texas) and into central South America. In Arizona, it was observed in mountainous areas in portions of eastern Arizona to the Grand Canyon.

Current range is thought to be from central Mexico and into central South America, as far south as northern Argentina. There are no known breeding populations in the U.S. Individuals may cross into Texas, New Mexico, and Arizona. The most recent, clearly documented individual in Arizona was observed in southern Arizona in December 2001.

Threats include loss and modification of habitat, poaching and shooting by humans, and predator control activities. Those allotments listed below constitute the action area for this species' analysis.

Guidance criteria for jaguar state:

No Effect:

1. No State-accepted sightings reported for the mountain range or drainage corridors in the allotment since 1970.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria):

1. State-accepted sightings have been reported for the mountain range or drainage corridors in the allotment since 1970.

2. Grazing and livestock management activities will not reduce cover within riparian areas.

3. Livestock management activities will not permanently disrupt connectivity corridors within the U.S. and between the U.S. and Mexico.

We concur with your effect determination on 73 allotments that the proposed project may affect, but is not likely to adversely affect, the species. The allotments are:

Chiricahua EMA: Barboot, Big Bend, Boss, Bruno, Cave Creek, Cienega, Cochise Head, East Whitetail, Horseshoe, Hunt Canyon, Jackwood, Lower Rock Creek, Lower Rucker, Oak, Paradise, Pedregosa, Pine, Pinery, Price Canyon, RAK, Rough Mountain, Sanford, Sulpher Draw, Tex Canyon, Turkey Creek, Upper Rock Creek, West Whitetail, and Willie Rose.

Peloncillo EMA: Clanton/Cloverdale, Deer Creek, Fairchild, Geronimo, Graves, Guadalupe, Juniper Basin, Maverick, Outlaw Mountain, Robertson, Skeleton Canyon, Skull Canyon, and Walnut Canyon.

Santa Rita EMA: Aqua Caliente, Alto, Apache Springs, Box Canyon, Debaud, Fort, Gardner Canyon, Greaterville, Helvetia, McBeth, Oak Tree I, Oak Tree II, Proctor, Rosemont, Squaw Gulch, Stone Springs, Temporal, and Thurber.

Tumacacori EMA: Bear Valley, Calabasas, Carrizo, Cross S, Fresnal, Jarillas, Mariposa, Marstellar, Murphy, Oro, Blanco, Pena Blanca, Ramanote, Rock Corral, Sardina, and Sopori.

We based our concurrence on the following:

1. Recent sightings indicate the species documented in Arizona may be wandering or migratory cats; a resident population may not exist in the state.

2. Livestock management is not reducing riparian canopy cover, or permanently disrupting travel corridors the species might use.

3. Riparian exclosures may enhance riparian corridors for the species.

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) (LLNB)

We listed the lesser long-nosed bat as threatened in a Federal Register notice (53 FR 38456), dated September 30, 1998, without critical habitat.

Detailed information on species description, habitat, range, etc., is contained in the Lesser long-nosed Bat section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for LLNB states:

No Effect (must meet one of the criteria):

1. Allotment is not located within the range of the species (see map, Figure 14).

2. All known, suitable, or potential roost sites within the allotment will be protected from disturbance or modification, and no bat food plants *(Agave palmeri, A. parryi, A. deserti, A. schottii*, saguaros) occur in portions of the allotment grazed by livestock.

May Affect, Not Likely To Adversely Affect (must meet all of the criteria):

1. Livestock grazing occurs on allotment and all known, suitable, or potential roosts will be protected from disturbance or modification.

2. The livestock grazing program will not facilitate public access to known, suitable, or potential roosts.

3. Livestock management activities located within the range of the species will not damage or destroy more than 1 percent of bat food plants within 0.5 miles of the project site.

4. Within the range of the bat, livestock grazing will not occur between April 1 and June 15 to allow agave bolts to reach a height where livestock grazing on agaves is unlikely to occur.

5. Within the range of the bat, in saguaro communities, annual livestock grazing utilization will not be greater than 30 percent of all palatable species to ensure that saguaro populations continue to exist and/or thrive on the allotment (Holecheck 1988). (Note: per Holecheck [1988], utilization rates recommended for semidesert scrub and shrubland are between 30 and 40 percent).

You determined that livestock grazing on 27 allotments is not likely to adversely affect the species. The allotments are:

Chiricahua EMA: Hunt Canyon, Lower Rock Creek, Tex Canyon, and Upper Rock Creek.

Peloncillo EMA: Fairchild and Skeleton Canyon.

Santa Rita EMA: Alto, Debaud, Rosemont, and Stone Springs.

Huachuca EMA: Ash Canyon, Canelo, and Carr Canyon.

Whetstone EMA: Coal Mine.

Galiuro EMA: Paddy's River and Willow Creek.

Pinaleno EMA: Gillman, Hawk Hollow, Redtail, and Two Troughs.

Santa Teresa EMA: Laurel Canyon/South Reef, North Reef, and VJ.

Santa Catalina EMA: Canada del Oro, Rincon, Rock Pile, and Samaniego.

We based our concurrence on the following:

1. You committed and continue to protect known roosts from livestock management activities.

2. Livestock and range improvements will not impact greater than one percent of bat food plants within 0.5 mile of a project site.

Mexican long-nosed bat (Leptonycteris nivalis)

We listed the Mexican log-nosed bat as endangered in a Federal Register notice (53 FR 38456), dated September 30, 1988.

Detailed information on species description, habitat, range, etc., is contained in the Mexican long-nosed Bat section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria does not address this species, but we have assumed that its needs are generally similar to those of the lesser long-nosed bat. Those allotments listed below constitute the action area for this species' analysis.

We concur with your effect determination for two allotments that the proposed project may affect, but is not likely to adversely affect, the species. The two allotments are:

Peloncillo EMA: Fairchild and Skeleton Canyon.

We based our concurrence on the following:

1. You committed and continue to protect known roosts from livestock management activities.

2. Livestock and range improvements will not impact greater than one percent of bat food plants within 0.5 mile of a project site.

PLANTS

Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*)

We listed the Huachuca water umbel as endangered in a Federal Register notice (67 FR 3), dated January 6, 1997, with critical habitat.

Detailed information on species description, habitat, range, etc., is contained in the Huachuca water umbel section of this BO. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for Huachuca water umbel states:

No Effect (must meet one of the criteria):

1. Livestock grazing will not occur within any subwatershed on the allotment containing suitable or occupied habitat of any listed plant species.

2. Threatened and endangered species and their habitat in the allotment will be excluded from livestock grazing by topography or other physical barriers.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Herbivory to individual plants from livestock grazing is not likely to occur.

2. Trampling of individual plants by livestock is not likely to occur.

3. Suitability and sustainability of the habitat to support the plant will not be altered.

4. Potential habitat will not be prevented from becoming suitable habitat for the plant by changes in plant community composition or deterioration of subwatershed/soil stability.

5. Plants and/or their habitats will not be physically disturbed and potential habitat will not be prevented from becoming suitable habitat by adverse effects from livestock management activities.

You determined that livestock grazing on one allotment is not likely to adversely affect the species. The allotment is:

Huachuca EMA: Papago/Z-Triangle.

We based our concurrence on the following:

1. The populations are protected from direct grazing effects.

Pima pineapple cactus (*Corypantha scheeri* var. *robustispina*)

We listed the Pima pineapple cactus as endangered in a Federal Register notice (58 FR 49875), dated September 23, 1993, without critical habitat.

The Pima pineapple cactus is an attractive hemispherical plant, the adults measuring 10-46 cm (4-18 in.) tall and 7.5-18 cm (3-7 in.) in diameter. The spines appear in clusters with one strong, usually hooked central spine and 6-15 straight radial spines. The spines are very stout, usually straw-colored, but become black with age. The plants can be single-stemmed, multiheaded, or can appear in clusters. The flowers are silky yellow (rarely white) in color and appear in early July with the summer rains. Flowering continues until August. The fruit is green, ellipsoid, succulent and sweet.

This cactus grows in alluvial basins or on hillsides in semi-desert grassland and Sonoran desertscrub in southern Arizona and northern Mexico. Soils range from shallow to deep, and silty to rocky, with a preference for silty to gravely deep alluvial soils. The plant occurs most commonly in open areas on flat ridge tops or areas with less than 10 to 15 percent slope.

Pima pineapple cactus is found from 700 to 1,400 m (2,300 to 4,500 ft) in elevation in Pima and Santa Cruz counties, Arizona and in northern Sonora, Mexico. The range extends east from the Baboquivari Mountains to the western foothills of the Santa Rita Mountains. The northernmost boundary is near Tucson.

Potential habitat for this species is difficult to estimate due to its habitat requirements and the topographic complexity within its range. Threats to this species include illegal collection, habitat degradation due to recreation and historical and present overuse of the habitat by livestock, habitat loss due to mining, agriculture, road construction, urbanization, aggressive nonnative grasses, and range management practices to increase livestock forage. Those allotments listed below constitute the action area for this species' analysis.

The guidance criteria for Pima pineapple cactus states:

No Effect (must meet one of the criteria):

1. Livestock grazing will not occur within any subwatershed on the allotment containing suitable or occupied habitat of any listed plant species.

2. Threatened and endangered species and their habitat in the allotment will be excluded from livestock grazing by topography or other physical barriers.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

1. Herbivory to individual plants from livestock grazing is not likely to occur.

2. Trampling of individual plants by livestock is not likely to occur.

3. Suitability and sustainability of the habitat to support the plant will not be altered.

4. Potential habitat will not be prevented from becoming suitable habitat for the plant by changes in plant community composition or deterioration of subwatershed/soil stability.

5. Plants and/or their habitats will not be physically disturbed and potential habitat will not be prevented from becoming suitable habitat by adverse effects from livestock management activities.

You determined that livestock grazing on four allotments may affect, but is not likely to adversely affect this species. The allotments are:

Santa Rita EMA: Proctor.

Huachuca EMA: Santa Cruz.

Tumacacori EMA: Sopori.

We based our concurrence on the following:

1. You conduct annual monitoring of PPC on these allotments.

2. Current knowledge appears to show the species can coexist with well-managed livestock grazing.

3. Your road signing informs drivers to remain on Forest roads to avoid resource damage.

APPENDIX B

REVISED GRAZING GUIDANCE CRITERIA

APRIL 15, 2002

GUIDANCE CRITERIA
for
DETERMINING THE EFFECTS OF
ON-GOING GRAZING
AND ISSUING TERM GRAZING PERMITS
on
SELECTED THREATENED AND ENDANGERED SPECIES, AND SPECIES PROPOSED FOR LISTING
and
PROPOSED AND DESIGNATED CRITICAL HABITAT

REGION 3

WILDLIFE, FISHERIES, AND RARE PLANTS
USDA FOREST SERVICE

APRIL 15, 2002

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INTRODUCTION

The purpose of these guidance criteria is to streamline consultation under section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq*.) (ESA). This document contains guidance in the form of criteria for use in making ESA section 7 effects determinations for selected threatened, endangered, and proposed (TEP) species and/or proposed or designated critical habitat for livestock grazing activities in the U.S. Forest Service's Southwestern Region (FS). These guidance criteria do not constitute an amendment to forest plans nor do they require a modification of grazing permits; these guidance criteria are not intended to provide allotment management direction. The criteria described in this document can also be used by qualified FS fish and wildlife biologists and botanists to assist in preparing regional grazing consultation forms for each grazing allotment containing federally listed or proposed species and/or proposed or designated critical habitat as required under section 7(a)(2) of the ESA.

The use of these criteria will result in **one of three ESA effects determinations**: 1) no effect, 2) may affect, not likely to adversely affect, or 3) may affect, likely to adversely affect. Consultation under ESA is not required if no TEP species or their habitat, or critical habitat, occur on the allotment or would be affected by the grazing activity directly or indirectly. In that situation, all that is required is a notation to the file or to the appropriate NEPA document. Biological assessments resulting in a determination of **"no effect"** do not require consultation with the U.S. Fish and Wildlife Service (FWS). The ESA conclusion of "no effect is appropriate when a TEP species and/or critical habitat is present in the affected area and it is determined that the proposed action will not affect proposed or listed species and/or proposed or designated critical habitat.

Biological assessments that result in a determination of "may affect, not likely to adversely affect **require concurrence from the FWS**, and that concurrence concludes informal consultation. The ESA determination of **"may affect, not likely to adversely affect** is appropriate when effects to TEP species and/or critical habitat are expected to be insignificant, discountable, or completely beneficial. **Beneficial effects** are contemporaneous positive effects without any adverse effects to the species. **Insignificant effects** relate to the size of the impact and should <u>never</u> reach the level where take occurs. **Discountable effects** are those effects that are extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.

For both the "no effect and the "may affect, not likely to adversely affect determination to remain in effect for the life of the term permit (up to 10 years), **annual confirmation** throughout the lifetime of the permit must take place to ensure the criteria for those findings continue to be met. **This requires each user/Forest to prepare an annual report for the FS regional office.**

Biological Assessments, which result in a determination of **"may affect, likely to adversely affect** will require formal section 7 consultation with the FWS. A determination of "may affect, likely to adversely affect is appropriate if any adverse effect to listed species and/or designated critical habitat may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effects are not discountable, insignificant, or completely beneficial. If both adverse and beneficial effects are anticipated to occur, the appropriate determination is **"may affect, likely to adversely affect** .

A **"conference** is required when an action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat; however, Federal action agencies may request a conference on any action that may affect proposed species or proposed critical habitat. The FWS can request a conference after reviewing available information suggesting an action is likely to jeopardize proposed species or destroy or adversely modify proposed critical habitat.

For documentation purposes, use of the **regional grazing consultation forms** is recommended. These forms are intended to aid in documenting the appropriate information necessary for FWS concurrence. They do not provide a “short cut in the consultation process. Specific documentation supporting the determination of effects is always required. A **point-by-point** discussion of how management on the allotment is specifically consistent with the appropriate determination for a given species is mandatory. Discussion of resource background should be sufficiently detailed for the FWS to adequately analyze the environmental baseline and assess project effects. Range condition and watershed data should be less than 10 years old. Watershed data, older than 10 years, must be validated by appropriate resource specialists, to ensure that the data is still an accurate reflection of current conditions.

The guidance criteria are divided into **four sections**: 1) a plant section for vascular plants and their habitats, 2) an aquatic section for fish, amphibians, and their habitats, 3) a terrestrial mammals section for carnivores, bats and their habitats, and 4) a birds section for birds and their habitats. The discussion for each species includes information on its ESA status, where it occurs on FS lands, and basic biological information on the species and/or its designated critical habitat. The application of these criteria is mandatory unless there is detailed site-specific information available on species needs, habitat conditions, and/or grazing activities that would allow the field unit to make a determination of effect outside these criteria. If the field unit chooses to make a determination outside these criteria, then standard ESA section 7 consultation procedures should be followed.

DEFINITIONS

ALLOTMENT: A designated area of land available for livestock grazing.

EMBEDDEDNESS: The degree to which larger particles (boulder, rubble, or gravel) are surrounded or covered by fine sediment in a water channel. This allows evaluation of channel substrate suitability for fish spawning and egg incubation, and channel habitats for aquatic invertebrates and young fish.

ENDANGERED SPECIES: Any species in danger of extinction throughout all or a significant portion of its range.

ENVIRONMENTAL BASELINE: The past and present impacts of all Federal, State, or private actions and other human activities in an action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process.

FORAGE UTILIZATION: The portion or degree of the current year's forage production that is consumed or destroyed by animals (including insects). The term may refer to a single plant species, a group of species, or to the vegetation community as a whole (must be measured at the end of the growing season for the species or vegetation community for which utilization is being determined).

INDIRECT EFFECTS: Those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur.

INCIDENTAL TAKE: Take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant.

LIVESTOCK MANAGEMENT ACTIVITIES: Any activity or program designed to improve production of forage including treatments or facilities constructed or installed for the purpose of improving the range resource or the management of livestock. This includes non-structural improvements, which are practices and treatments undertaken to improve range condition. Structural improvements are permanent features designed to facilitate management and control distribution and movement of livestock. Some examples of structural improvements are dams, impoundments, ponds, pipelines, fences, corrals, wells, and trails. Some examples of non-structural improvements are cutting, chaining, planting, and herbicide applications.

PROPOSED SPECIES: Any species of fish, wildlife, or plant that is proposed in the Federal Register to be listed under section 4 of the ESA.

QUALIFIED FISHERIES BIOLOGIST: A qualified fisheries biologist may be: 1) a person currently classified at a GS-482 grade 11 or 12, or 2) a person classified at below the GS-482 grade 11 who has extensive field experience and knowledge of fish habitat needs as determined by the FS's Regional Director of Wildlife, Fisheries and Rare Plants.

TAKE: To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. Harm is further defined by FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by FWS as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

TEP SPECIES: Species designated by the FWS as endangered or threatened and those species that are proposed for listing as endangered or threatened under provisions of the ESA.

TEP SPECIES HABITAT: For the purposes of these criteria, TEP species habitat includes occupied habitat, unoccupied suitable habitat, unoccupied potential habitat, and/or proposed and designated critical habitat.

THREATENED SPECIES: Any species, which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

STREAMBANK: That portion of the channel cross-section that restricts lateral movement of water. The bank usually has a gradient steeper than 45º and exhibits a distinct break in slope from the stream bottom. An obvious change in stream bottom substrate may be a reliable delineation of the bank.

STREAM CHANNEL: That portion of the channel cross-section containing the stream that is obviously distinct from the surrounding area due to breaks in the general slope of the land, lack of terrestrial vegetation, and changes in the composition of the substrate materials. The stream bottom or active channel is that portion of the channel between the banks where annual bedload transport occurs.

SUBWATERSHED: Subwatershed means a 5th code watershed. These typically range from 5,000 ac to greater than 100,000 ac in size. Natural Resources Conservation Service (NRCS) Hydrologic Unit Code (HUC) maps entitled “Conservation Needs Inventory Watersheds form our reference.

PLANTS

In determining and analyzing effects to any plant species, refer to the threats identified in the proposed or final listing rule and any recovery plans. This will provide a species-specific context for the following general criteria and will be helpful in determining direct or indirect effects, as well as effects from interdependent and interrelated actions.

KUENZLER HEDGEHOG CACTUS (*Echinocereus fendleri* var. *kuenzleri*)

Endangered Species Act Status:	Endangered (October 26, 1979)
Forest Occurrence:	Lincoln
Recovery Plan:	1985
Critical Habitat:	No

Description. Stems have 9-12 ribs, solitary or up to 8 clustered branches, dark green, conical to short-cylindrical, 10-15 cm tall; spine clusters with central spines usually absent, the 5-7 radial spines are white to straw-colored, bulbous at the base, slightly fused, and bent backward toward the stem; flowers are bright magenta, large, and showy.

Life History. Plants live 20+ years. They reproduce only from seeds that germinate anytime in the spring, summer, or fall with sufficient rainfall. Seedlings require 3-5 years to reach flowering. Flower buds appear in April with flowering in early May. Bees, and to a lesser degree, beetles and butterflies, are the primary pollinators. Fruits ripen in July-August. Rainfall, ants, and rodents disperse the seeds.

Habitat. Kuenzler hedgehog cactus occurs from 5,800-7,000 feet in elevation in open pinyon-juniper woodlands grading into blue grama grasslands. Plants prefer gentle, usually south facing, slopes where they grow in the cracks of limestone outcrops or in gravelly limestone soils.

Distribution. Plants are found at scattered locations along the southern side of the Capitan Mountains, eastern and northern lower sides of the Sacramento Mountains, and northern end of the Guadalupe Mountains in Chaves, Eddy, Lincoln, and Otero counties, New Mexico (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. Plants grow mostly on rocky slopes away from areas of greatest livestock forage production; however, there is speculation that overgrazing may reduce the thermal cover that helps reduce winter frost damage to these plants. Trampling can damage plants, so the placement of water tanks and other livestock improvements needs to avoid populations and prime habitat. The long-term effects of fire on populations are unknown but the short-term responses are negative. Controlled burns need to be planned to avoid damage to known populations.

Recovery Status/Needs. The status of this variety has improved through discovery of additional populations that have increased the known distribution and abundance. Limited illegal collecting has recently been documented at some roadside sites; monitoring and enforcement of collecting prohibitions are needed (U.S. Fish and Wildlife Service 1985).

SACRAMENTO PRICKLY POPPY (*Argemone pleiacantha* ssp. *pinnatisecta*)

Endangered Species Act Status:	Endangered (August 24, 1989)

Forest Occurrence: Lincoln
Recovery Plan: 1994
Critical Habitat: No

Description. Robust, herbaceous perennial, with 3-12 branching stems, 0.5-1.5 m tall; leaves blue-green, 10-15 cm long, divided; the sinuses broad and square; margins, midribs, and veins armored with stout yellow spines; stem and leaf latex white; flowers large and showy; 2-3 sepals, caducous, prickly, each with a subterminal horn; petals 6 white, 3-4 cm long, 8-9 cm wide; stamens numerous, anthers yellow; capsule with many fine spines, none branched; seeds round, black, 2.5 mm in diameter.

Life History. Plant life span can be up to 15 years. Flowering begins in May and continues through the fall depending on elevation and moisture conditions. The large, open flowers attract a variety of visitors including bees, beetles, flies, and butterflies. Seeds fall from the fruiting capsule near the parent plant and are mostly transported by rainfall, but ants have been observed carrying seeds. Germination requires cold stratification and is enhanced by scarification of the seed coat. Seedlings are susceptible to desiccation or being washed out by floods. Established plants develop deep taproots that appear resistant to drought, mechanical injury, and small floods.

Habitat. Plants are found in loose gravelly soils of open disturbed sites in canyon bottoms, on slopes, and sometimes along roadsides at 1,300-1,200 m (4,200-7,100 feet) in elevation.

Distribution. Plants occur in 10 canyons on the western slope of the Sacramento Mountains from Fresnal Canyon to Escondido Canyon in Otero County, New Mexico (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. Livestock grazing is generally not considered a threat to this subspecies. Some light grazing has been documented on early spring foliage, but plants readily recover. Livestock avoid mature plants that have stiff spines and bitter-tasting latex. This subspecies is adapted to disturbed habitats and may benefit from the disturbance of livestock grazing activities.

Recovery Status/Needs. In the late 1980s, the known number of plants was about 1,300. The number of plants appears to have declined in recent years. The reasons for this decline are unknown. It is speculated that plant establishment is very episodic. This rare subspecies appears to be secondary successional. Individual plants are necessary to maintain seed production, but disturbance within the habitat may benefit populations in the long run (U.S. Fish and Wildlife Service 1994).

SACRAMENTO MOUNTAINS THISTLE (*Cirsium vinaceum*)

Endangered Species Act Status: Threatened (June 16, 1987)
Forest Occurrence: Lincoln
Recovery Plan: 1993
Critical Habitat: No

Description. Stout rhizomatous biennial with a robust basal rosette; stem 1.0-1.8 m tall; with many ascending, brown-purple branches; basal leaves green, glabrous, 3-5 dm long, up to 2 dm wide, ragged-edged, divided nearly to the midrib, the divisions tipped with slender yellow spines; stem leaves sessile, similar to basal leaves but reduced in size; flower heads numerous, solitary at the ends of branches, campanulate, 5 cm in diameter and almost as high; involucral bracts in several ranks, deep red-purple, reflexed at about the middle, narrowly lanceolate, tipped with short yellowish spines; flowers rose-purple; achenes obovate, brown, glabrous, with a tawny plumose pappus 15-20 mm long.

Life History. Plants are biennial and reproduce by seeds or vegetatively by rhizomes. Plants flower from July to September. Hummingbirds, bees, beetles, flies, and moths are the pollinators. Seeds ripen in the fall and are wind-dispersed.

Habitat. Wet soils at springs, seeps, and along streams in meadows or forest margins at 2,300-2,900 m (7,500-9,500 ft). The water is high in calcium carbonate that precipitates out to form large travertine mounds at some of the springs. Plants may grow in almost pure stands on some of these mounds.

Distribution. Plants occur in six large eastern-sloping drainages in the southern part of the Sacramento Mountains in Otero County, New Mexico. Plants can be very abundant in their limited habitat due to rhizomatous reproduction that can produce dense, pure stands. There are about 20 known populations (62 sites) on about 30 ha (75 ac) (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. The Sacramento Mountains thistle is eaten by livestock and may be preferred forage at some times of the year. Most sites have been protected from grazing, but the populations are now expanding beyond the exclosures and livestock have access to these plants. Because plants grow at wetlands sites, they may provide some of the only available green forage during a drought. Contingency plans need to be developed and implemented during droughts to prevent adverse effect to the species.

Recovery Status/Needs. Populations are stable to increasing. Many sites have been protected with fencing. Control of teasel (*Dipsacus sylvestris*) and musk thistle (*Carduus nutans*) is needed. These introduced exotics are increasing in the Sacramento Mountains and directly compete with Sacramento Mountains thistle at some sites. In the long-term, there is concern that springs with Sacramento Mountains thistle could be diverted for domestic uses (U.S. Fish and Wildlife Service 1993).

TODSEN'S PENNYROYAL (*Hedeoma todsenii*)

Endangered Species Act Status:	Endangered (January 19, 1981)
Forest Occurrence:	Lincoln
Recovery Plan	2001
Critical Habitat	January 19, 1981

Description. Rhizomatous, perennial herb, the rhizomes slender and unbranched; stems several, unbranched, clustered, somewhat woody at the base, 10-20 cm tall; leaves opposite, 8-15 mm long, 2.5-5.0 mm wide, sessile, oblong-lanceolate, tip rounded to acute, margins entire, lower surface glandular-dotted; flowers one to a few per stem, arising from the upper leaf axils; calyx 13 mm long, tubular, bilabiate, the teeth narrowly acute; corolla up to 3.6 cm long, tubular, bilabiate, red-orange to rarely yellow, red markings on the inner lip; fertile stamens 2; fruit of 4 nutlets with usually only 1 or 2 developing to maturity.

Life History. Todsen's pennyroyal populations contain hundreds to thousands of separate clumps, each clump composed of 1-20 stems. Slender unbranched rhizomes connect many of the clumps. Potentially, an entire population genetically could be one individual. Plants flower from

June to September with most flowering in August and September in conjunction with summer rains. Flowering effort is low with less than 20 percent of the clumps flowering per season. Fruit set is also low with about 25 percent of the flowers setting fruit. Seed viability was determined to be 33 percent in one test. Fruits remain enclosed in the dried flower parts and are probably dispersed by water. Low sexual reproduction gives Todsen's pennyroyal low dispersal potential. Asexual reproduction appears to be maintaining the species.

Habitat. Plants grow in loose, gypseous-limestone soils associated with or positioned immediately below the Permian Yeso Formation; usually on steep north or east-facing slopes in piñon-juniper woodland at 1,900-2,300 m (6,200-7,400 feet) in elevation. Critical habitat for this species is designated in New Mexico on the White Sands Missile Range.

Distribution. This species is known from 3 sites in the San Andres Mountains and from 15 sites on the western slope of the Sacramento Mountains in Sierra and Otero counties, New Mexico (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. The populations on National Forest lands are on steep fragile wooded slopes that have been closed to grazing. Surveys were done for this species in other potentially suitable habitats on the Forest and no more plants were found. Most of these habitats, although correct for soils, were found to be too dry for the species. Most of these habitats are also outside of grazing areas.

Recovery Status/Needs. Populations have remained stable, but this species has little potential to increase its range due to limited suitable habitat and the near absence of seed production. There are few activities in this species' habitat, which is on steep fragile wooded slopes. The response of this species to fire is unknown (U.S. Fish and Wildlife Service 2001).

ZUNI FLEABANE (*Erigeron rhizomatus*)

Endangered Species Act Status:	Threatened (April 26, 1985)
Forest Occurrence:	Cibola
Recovery Plan:	1994
Critical Habitat:	No

Description. Herbaceous perennial with creeping rhizomes; stems 2.5-4.5 dm tall, sparsely branching from near the base, growing in clumps to about 3 dm in diameter; leaves alternate, oblong, about 1.0 cm long, glabrous except for occasional ciliate hairs on the margins; flower heads solitary terminating the branches, 13-16 mm wide, involucral bracts in several series; ray flowers 25-45, white or tinged with blue-violet, 6-7 mm long and 1.3-1.5 mm wide; disk flowers yellow; achenes five-six-nerved, nearly glabrous, pappus 25-35 fragile bristles with a few short outer setae.

Life History. Reproduction in Zuni fleabane is predominately asexual from narrow subterranean rhizomes. Plants generally flower from mid-May into early June and mature fruits are produced by the end of July. The fruits have a crown of bristles that likely facilitate dispersal by wind, water, or attachment to animal fur. One study has shown that only about 10 percent of the flowers in a head produce mature seeds. Seedling plants are rarely seen.

Habitat. Plants grow on nearly barren detrital clay hillsides with soils derived from shales of the Chinle or Baca formations (often seleniferous); most often on north or east-facing slopes in open piñon-juniper woodlands at 2,200-2,400 m (7,300-8,000 ft) in elevation.

Distribution. This plant is know from 3 locations in the Zuni Mountains near Fort Wingate, 28 locations (probably more) in the Sawtooth and northwestern Datil mountains, and 1 location in the Red Valley/Cove area on the Navajo Indian Reservation in Arizona. It occurs in Catron and McKinley counties, New Mexico, and in Apache County, Arizona (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. This species is unpalatable to livestock and grows on nearly barren slopes with little other forage. Plants could be trampled if they are close to watering facilities, salting stations, or within holding pastures.

Recovery Status/Needs. The known populations of Zuni fleabane have remained stable within their limited habitat. The distribution of this species is associated with the distribution of uranium deposits in west-central New Mexico. Many of the sites for this plant occur at historical or current mining claims that are uneconomical at present uranium prices. This could change with a greater demand for uranium (U.S. Fish and Wildlife Service 1988).

HOLY GHOST IPOMOPSIS (*Ipomopsis sancti-spiritus*)

Endangered Species Act Status:	Endangered (March 23, 1994)
Forest Occurrence:	Santa Fe
Recovery Plan:	1999 (Draft)
Critical Habitat:	No

Description. Biennial to short-lived monocarpic perennial, erect, 3-8 dm tall; stems mostly solitary, occasionally branched from the base; basal leaves in a rosette, senescent at flowering; basal leaves ovate in outline, 3-5 cm long, pinnatifid in 9-15 linear divisions, 3-11 mm long; stem leaves gradually reduced in size; inflorescence in terminal and 6-11 lateral cymose clusters, restricted to the upper half of the stem, the lateral cymes 5-50 mm long when in fruit; calyx 5-6 mm long, cylindrical, 5-lobed, the lobes 1-2 mm long; corolla pink, tube 15-18 mm long, subsalverform, 5-lobed, the lobes spreading to slightly reflexed, 6-8 mm long, 3-4 mm wide; stamens 5; anthers and stigma included; fruit is a capsule.

Life History. Plants spend 1-3 years as vegetative rosettes before they flower once and then die. Flowering is from July to September. Butterflies and moths are the pollinators. Plants are self-compatible, but will not set fruit without a pollinator's visit. Fruit capsules ripen from August to October. Capsules split open and the seeds fall near the parent plant; there are no special dispersal mechanisms. Seeds have no dormancy mechanism. Seedlings can be found throughout the summer germinating in response to rainfall.

Habitat. Plants grow on relatively dry, steep, west to southwest-facing slopes in open ponderosa pine or mixed conifer forest at 2,400-2,500 m (7,730-8,220 ft) in elevation. The geologic substrate is partly weathered Terrero limestone. Plants appear to grow best in bare mineral soils with the highest density of plants on disturbed sites such as road cuts.

Distribution. Holy Ghost ipomopsis is found in only one canyon in the upper Pecos River drainage of the southern Sangre de Cristo Mountains in San Miguel County, New Mexico (New Mexico Rare Plants Technical Council 1999).

Effects Analysis. The area where this plant occurs is closed to livestock grazing. Deer and elk graze this plant lightly so presumably it is also palatable to cattle. Although untested, some grazing disturbance likely would not adversely affect and may even benefit Holy Ghost ipomopsis due to the species' preference for disturbed habitats.

Recovery Status/Needs. The sole location for this plant is along a road to a campground in a canyon developed for summer homes. Road maintenance, recreation, and catastrophic forest fire are immediate management concerns. In the long term, present land uses in the area influence management away from frequent disturbances that produce the early successional habitats to which this plant is best adapted (U.S. Fish and Wildlife Service 1999).

ARIZONA AGAVE (*Agave arizonica*)

Endangered Species Act Status:	Endangered (May 18, 1984)
Forest Occurrence:	Tonto
Recovery Plan:	No
Critical Habitat:	No

Description. Arizona agave is a succulent perennial with attractive rosettes (ca. 20-35 cm high, 30-40 cm broad) of bright green leaves with dark mahogany margins. Yellow flowers, 25-32 mm long, are borne on stalks 2.5-4 m tall, in close-set clusters of 10-20. The capsules are 15-22 mm long, elliptic to obovoid, strongly beaked. Seeds are 4.5 mm long, 3.3 mm wide (Hodgson 1999).

Life History. Arizona agave is of recent hybrid origin. This agave reproduces primarily by asexual reproduction through the vegetative production of offsets. This species is monocarpic (dies after sexual reproduction). Individuals occur as isolated plants or clusters of plants in close proximity to its putative parents, *A. chrysantha* and *A. toumeyana* var. *bella*. It flowers in May-June.

Habitat. Arizona agave occurs in the Interior Chaparral community on shallow, rocky soils derived from granite, schist, gneiss, quartzite, tuff, and limestone (Brown 1994). Elevations range from 1,100-1,750 m.

Distribution. The majority of known plants occur on land administered by the Tonto NF in the New River Mountains. A few plants occur on private property. There are fewer than 100 clones known (U.S. Fish and Wildlife Service 1999).

Effects Analysis. Threats to the species include habitat degradation by livestock grazing, inflorescence herbivory, the possibility of illegal collection, and loss of individuals from livestock management activities (*i.e.* fence placement) (U.S. Fish and Wildlife Service 1984).

ARIZONA HEDGEHOG CACTUS (*Echinocereus triglochidiatus* var. *arizonicus*)

Endangered Species Act Status:	Endangered (October 15, 1979)
Forest Occurrence:	Tonto and possibly Apache-Sitgreaves
Recovery Plan:	No
Critical Habitat:	No

Description. The Arizona hedgehog cactus is a large succulent perennial. Mature stems average 8-10 cm in diameter. Young plants have a single stem and mature plants can have up to 10 stems. There are 1-3 gray or pinkish central spines, the largest deflexed, and 5-11 shorter radial spines per spine cluster. Flowers are bright red, produced along the side of the stem, and appear in April through mid-May.

Life History. This species is extremely difficult to distinguish from other closely related species. Current taxonomic work will define the populations in the Miami-Superior area as belonging to this species, and all other cacti from around the Safford area as belonging to an unlisted species (Baker, pers. comm. 2001). This will make the plants on the Apache-Sitgreaves NFs a species other than Arizona hedgehog cactus.

Habitat. This cactus occurs in the Interior Chaparral community at elevations of 1,000-1,400 m. They are often found on relatively open, rocky slopes and steep fissured cliffs, although they may occur in fairly dense chaparral. They seem to be associated with Schultze Granite and Apache Leap Tuff, both igneous in origin (Tonto NF 1996).

Distribution. Known from Pinal and Gila counties on the Tonto NF and possibly private lands.

Effects Analysis. The effects of livestock grazing on the cactus are unknown.

ARIZONA CLIFF-ROSE (*Purshia subintegra*)

Endangered Species Act Status:	Endangered (May 29, 1984)
Forest Occurrence:	Tonto, Coconino
Recovery Plan:	1994
Critical Habitat:	No

Description. Arizona cliffrose is a low straggling shrub usually 1-2 m tall and generally taller than wide. New shoots tend to be red-brown and pubescent; older branches have shaggy light gray bark. The foliage is not sticky, although some resin glands may be present. The leaves are narrow and short (ca. 8 mm long and 3 mm wide). The leaf margins curl down (revolute). The typical flower has 3-7 pistils and 5 white to pale yellow petals (ca. 10 mm long). As the fruits develop, the style remains attached and forms a short, white, feathery plume (U.S. Fish and Wildlife Service 1994).

Life History. Arizona cliffrose is a rare Arizona edaphic endemic, restricted to nutrient deficient calcareous soils (Anderson 1986, 1993). Arizona cliffrose begins blooming in late March and continues through early May. Fruit dispersal occurs throughout the summer.

Habitat. The species grows only on Tertiary limestone lakebed deposits. The distinctive white color of the deposits make the sites quite noticeable.

Distribution. There are four locations of this species in Arizona. All occur in central Arizona below the Mogollon Rim. The locations are Burro Creek drainage, Horseshoe Lake (Tonto NF), Verde Valley (Coconino NF), and the San Carlos Indian Reservation.

Effects Analysis. Threats to the species include livestock and feral burro damage, mineral exploration and development, poor reproduction, off-road vehicle use, urbanization, pesticides and inundation. Monitoring conducted by the BLM on the effects of livestock grazing on the Burro Creek population determined that browsing activity resulted in 65 percent utilization of cliffrose. This level of utilization may result in reduced plant vigor and fecundity, along with reduced levels of seedling establishment.

Recovery Status/Needs. A recovery plan for the species was completed in 1994. One of the recovery actions is to protect all populations from the adverse effects of livestock grazing. Livestock utilization of Arizona cliffrose should be permitted only if the combined use by livestock and wildlife does not exceed 20 percent of current year's growth for any individual. Livestock use should only be in the fall and early winter (October through January) and should not be allowed more frequently than every 2 years in pastures containing Arizona cliffrose.

PIMA PINEAPPLE CACTUS (*Coryphantha scheeri* var. *robustispina*)

Endangered Species Act Status:	Endangered (September 23, 1993)
Forest Occurrence:	Coronado
Recovery Plan:	No
Critical Habitat:	No

Description. The Pima pineapple cactus is single or multi-stemmed, 10-46 cm tall, and 7.5-18 cm in diameter. Spine clusters have 6-15 straw-colored radial spines that darken with age and usually 1 strongly hooked central spine. Tubercles have a groove on the abaxial (upper) surface. The flowers are yellow and appear in late June-early July, usually corresponding with the start of summer rains. The fruits are produced in late summer (Benson 1969).

Habitat. This cactus grows in southeastern Arizona in alluvial basins or on terraces in semi-desert grassland or the ecotone with Sonoran desertscrub. Soils are usually deep alluvial silts to gravels. Plants are usually found below 1,219 m in relatively low densities across appropriate habitat.

Distribution. Restricted to Pima and Santa Cruz counties and probably northern Sonora, Mexico. Several small populations occur on the Coronado NF.

Effects Analysis. The effects of livestock grazing on this species are unknown. The major threats are urban development leading to destruction and fragmentation of existing habitat. An indirect effect from livestock operations may be the introduction of exotic grasses, like Lehmann lovegrass (*Eragrostis lehmanniana*). The invasion of this non-native grass into the desert grassland plant community has altered the fire regime. Pima pineapple cacti growing in stands of Lehmann lovegrass are usually killed by fire (Roller and Halvorson 1997).

Recovery Status/Needs. There is a need to monitor cacti growing in areas grazed by livestock to determine if there is an effect on seedling establishment, trampling of young plants, or other vegetation changes that could affect the cactus.

HUACHUCA WATER-UMBEL (*Lilaeopsis schaffneriana* ssp. *recurva*)

Endangered Species Act Status:	Endangered (January 6, 1997)
Forest Occurrence:	Coronado
Recovery Plan:	No
Critical Habitat:	July 12, 1999

Description. Huachuca water-umbel is an aquatic perennial with slender, hollow leaves that grow from the nodes of creeping rhizomes. The leaves are segmented, 1-3 mm in diameter and 2.5-23 cm long, depending on water depth. The inflorescence is a tiny 3-10-flowered umbel 1.2-5 cm long that arises from the root nodes in May-June. The petals are tinged purple.

Life History. Plants can be seen throughout the year, but may die back during winter freezes. The plant can withstand some level of disturbance, but needs to be located in a relatively calm reach of the stream in order to avoid high velocity floods.

Habitat. It is found in cienegas and streams at elevations of 1,210-1,970 m. The plant needs some level of disturbance to remove competing vegetation, but will disappear from the stream if the velocity is too high or too frequent. It can persist in dense vegetation at very low densities. The plants require perennial water, saturated soils, and gentle stream gradients.

Distribution. Plants are known from Santa Cruz, Cochise and Pima counties in Arizona and Sonora, Mexico. Critical habitat includes 83.2 km of streams and rivers in Cochise and Santa Cruz counties, Arizona. Critical habitat on the Coronado NF is located in Scotia, Sunnyside, Lone Mountain, Rattlesnake, and Bear canyons (U.S. Fish and Wildlife Service 1999).

Effects Analysis. Habitat for the species can be affected by livestock grazing. Plants can be trampled, bank stability can be compromised, plants can be grazed, stream hydrology can be affected by poor watershed conditions, and spring developments can dewater occupied or suitable habitat. Plants can probably withstand light use levels in the dormant season (U.S. Fish and Wildlife Service 1997).

CANELO HILLS LADIES'-TRESSES (*Spiranthes delitescens*)

Endangered Species Act Status:	Endangered (January 6, 1997)
Forest Occurrence:	Coronado
Recovery Plan:	No
Critical Habitat:	No

Description. This plant is a slender, erect, terrestrial orchid. Plants have 5-10 basal grass-like leaves up to 18 cm long and 1.5 cm wide. The inflorescence is a spike about 50 cm tall that may contain up to 40 tiny white flowers borne in a spiral.

Life History. Plants may remain dormant in a subterranean state or remain vegetative for more than one consecutive year. This makes monitoring population stability very difficult.

Habitat. This plant occurs in cienegas and slow moving waters at elevations below 1,525 m. Plants must be in saturated, finely grained, organic soils.

Distribution. Known from only 5 locations in southeastern Arizona (Santa Cruz and Cochise counties). There is one location on the Coronado NF (U.S. Fish and Wildlife Service 1997).

Effects Analysis. The effect of livestock grazing on this species is unknown. The location on the Forest is protected from livestock use.

DETERMINATIONS FOR ALL PLANTS DESCRIBED ABOVE

No Effect (must meet one of the criteria)

1. Livestock grazing will not occur within any subwatershed on the allotment containing suitable or occupied habitat of any listed plant species.

2. TEP species and their habitat in the allotment will be excluded from livestock grazing by topography or other physical barriers.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria)

1. Herbivory to individual plants from livestock grazing is not likely to occur.

2. Trampling of individual plants by livestock is not likely to occur.

3. Suitability and sustainability of the habitat to support the plant will not be altered.

4. Potential habitat will not be prevented from becoming suitable habitat for the plant by changes in plant community composition or deterioration of subwatershed/soil stability.

5. Plants and/or their habitats will not be physically disturbed and potential habitat will not be prevented from becoming suitable habitat by adverse effects from livestock management activities.

AQUATIC SPECIES

Many streams in the Southwest are degraded because small, annual effects have accumulated to become major detriments to native fisheries. Relationships of southwestern fishes with their habitats are complex and not easily understood. Effects of land management practices on riparian ecosystems and aquatic habitats are far-reaching, oftentimes subtle, and require a thorough knowledge and understanding of the fishes and their uses of the water column and land-water interface. All surface-disturbing activities, in subwatersheds (upstream and downstream of) containing species habitat will be analyzed by a fisheries biologist and other appropriate resource specialists.

From a fisheries standpoint, the watershed is the planning unit and it must be managed through both space and time and as an integrated whole to maintain healthy riparian systems and productive fish habitat. Activities in an upper watershed not in close proximity to a stream, can have impacts on lower reaches of the stream and its fisheries resource. Effects of activities not related to livestock grazing, such as wildlife herbivory (i.e. such as elk grazing), should be considered in the evaluation.

BEAUTIFUL SHINER (*Cyprinella formosa*)

Endangered Species Act Status:	Threatened (August 31, 1984)
Forest Occurrence:	Gila (extirpated)
Recovery Plan:	1995
Critical Habitat:	August 31, 1984

Description. The beautiful shiner has a compressed body with a pointed snout and an oblique mouth. Non-breeding body color is tan to olivaceous dorsally, metallic silver laterally, and usually lighter ventrally. Breeding color in males is yellowish-orange to orange on the caudal and lower fins, with the dorsal fin dark. The body is bluish, often masked with a wash of orange, pink, or yellow. The top of the head is red to orange, with the sides of the head brassy to brassy-orange (Minckley 1973).

Life History. This shiner feeds mostly on algae, insects, and detritus. Growth to maturity is rapid, often within the first summer of life. Spawning continues throughout the warmer months, with greater activity in spring. Reproductive potential is high and large populations develop quickly from a few adults.

Habitat. Beautiful shiners live in deeps pools in creeks, scoured areas of cienegas, and other stream-associated quiet waters. The shiner seeks cover in daylight, especially in undercut banks and around accumulated debris. In ponds, adults tend to occupy the lower part of the water column and seek shade. The young occupy near-shore zones, often near the lower ends of riffles. Critical habitat for the shiner is designated in all aquatic habitats on the San Bernardino National Wildlife Refuge in Cochise County, Arizona.

Distribution. The beautiful shiner formerly occurred throughout the Rio Yaqui Basin in the U.S. and Mexico. Its distribution and numbers were reduced primarily as a result of habitat loss and degradation due to overgrazing (late 1800s, early 1900s), erosion, water diversion, and aquifer pumping. The shiner historically occurred in the San Bernardino Valley of Arizona and the Mimbres River in New Mexico. Its range in Mexico included the Rio Yaqui system, Guzman Basin (rios del Carmen, Santa Maria, and Casas Grandes), and the much smaller Bavicora and Sauz basins. The shiner is no longer extant in the wild in the U.S. It was last collected in New

Mexico in 1950. In Arizona, the shiner was fairly common before 1968 and has not been seen since 1970. The shiner was extirpated from the U.S. between 1969 and 1970 when an artesian well in the San Bernadino Valley, which supplied water for the last remaining populations, was capped (Hendrickson *et al.* 1980). Breeding stock were collected from Mexico in 1989 and placed at Dexter National Fish Hatchery in New Mexico. In 1990, beautiful shiners from the hatchery were reintroduced on San Bernadino National Wildlife Refuge and survive as self-sustaining populations in three ponds (Haynes and Schuetze 1997). The shiner is suffering from a range reduction in Mexico due to changes in land and water uses and the impact of non-indigenous fishes, particularly the red shiner (*Cyprinella lutrensis*).

Recovery Status/Needs. Threats to the shiner include ephemeral stream flows, especially downstream of Dwyer (Grant County, New Mexico), resulting from drought conditions and diversion of water from the river for agriculture purposes; aquifer pumping; water diversion; drought; and predation and competition with nonnative fishes (Sublette *et al* 1990, Arizona Game and Fish Department 1996). In Arizona, management needs include: protecting San Bernardino aquifers and Leslie Creek and San Bernardino Creek watersheds to ensure adequate perennial flow; identifying priority management waters; ameliorating effects of nonnative fishes in management waters; re-establishing self-sustaining populations in San Bernardino and Leslie Canyon National Wildlife Refuges; and stabilizing and protecting populations in Mexico (U.S. Fish and Wildlife Service 1995, Arizona Game and Fish Department 1996). Reintroduction efforts should also include perennial, spring-fed stock tanks.

CHIHUAHUA CHUB (*Gila nigrescens*)

Endangered Species Act Status:	Threatened (October 11, 1983)
Forest Occurrence:	Gila
Recovery Plan:	1986
Critical Habitat:	No

Description. The Chihuahua chub is a member of the minnow family, averaging 5-6 in. at maturity with a maximum length that can exceed 12 in. It is dusky brown above and whitish below. During the breeding season, the chub develops a deep shiny black color with blue and orange fins, with males exhibiting two horizontal black stripes (Minckley 1973, Sublette *et al.* 1990).

Life History. Spawning occurs in late April or May. Individuals of both sexes appear mature in their first year at about 80 mm standard length. Eggs are scattered randomly over sandy or silty substrates. Each ripe female is attended by several males and produce thousands of eggs. The young seek quiet backwaters and may form schools. The chub is an opportunistic carnivore, taking a variety of invertebrates and possibly some small fish. The chub feeds mainly by lurking under cover and consuming drifting insects and other invertebrates.

Habitat. The chub is almost always associated with instream cover, such as uprooted trees and deep pools with adjacent rapid velocity water. It is usually associated with heavy cover of undercut banks, debris piles, and aquatic vegetation.

Distribution. The Chihuahua chub has declined significantly throughout it native range, and until recently there were only 100 fish left. In Chihuahua, Mexico, the chub is found mainly in remote stream reaches free of human modification. Chubs are being reared at the Dexter National Fish Hatchery and some offspring of these fish have been released into the Mimbres River and nearby McKnight Creek.

Historically, the chub was found in the Guzman Basin streams in Mexico and New Mexico. This Mexican fish species occurs in the U.S. only in the Mimbres basin of New Mexico, where it was reduced to fewer than 100 adults occupying a reach of about 7.5 km of the river (Propst *et al.* 1991). The chub population now ranges from 200-300 adults. Currently, the chub is found in about three miles of the Mimbres River upstream from the town of Mimbres, generally between Allie and Sheppard Canyons in Grant County, New Mexico. The Nature Conservancy has recently acquired the Archuleta/Moreno Spring near the Mimbres River, which is inhabited by the chub.

Recovery Status/Needs. The primary reason for the decline of the Chihuahua chub has been loss of habitat due to dewatering for irrigation and channelization for flood control. The decline of the chub in the Mimbres River appears to be primarily related to loss of habitat, recently accelerated by action of landowners and governmental agencies to prevent flooding, including river channelization and levee construction to contain floodwater.

Addition detrimental changes in the river can be attributed to overgrazing in the drainage which, in turn, exacerbates flooding; irrigation diversions that have reduced the quantity and quality of water in the river; and repeated stream modification by local landowners. The introduction of exotic fish species such as rainbow trout, longfin dace, and largemouth bass have undoubtedly led to detrimental predation and competition with the chub (U.S. Fish and Wildlife Service 1986).

GILA TOPMINNOW (*Poeciliopsis occidentalis occidentalis*)

Endangered Species Act Status:	Endangered (March 11, 1967)
Forest Occurrence:	Coronado, Prescott, Tonto
Recovery Plan:	1984
Critical Habitat:	No

Description. Gila topminnow is a small member of the livebearer family, Poeciliidae. Males seldom exceed 1.5 in. in length and females 2.5 in. It is very similar in appearance to western mosquitofish, *Gambusia affinis*. Gila topminnow coloration is tan to olive on the body and usually white on the belly. Scales on the dorsum are darkly outlined, and the fin rays are outlined with melanophores, although lacking in dark spots. Breeding males are blackened.

Life History. The mode of reproductive in poeciliid fish is internal fertilization and development of the young, which are then born alive. The onset of breeding, as well as brood size, are affected by water temperature, photoperiod, food availability, and predation. In natural, constantly warm-temperature springs, breeding takes place year-round; in naturally fluctuating habitats, breeding occurs from April to August. Females can store sperm packets for later fertilization of eggs. Brood size is 10-15 young, and the female carries two broods simultaneously, one much further developed than the other. Gestation period is 24-28 days. Topminnow life span is approximately 1 year. Young produced early in the breeding season may reach sexual maturity in a few weeks to several months. Gila topminnow food habits are generalized and include bottom debris, vegetative materials, amphipod crustaceans, and insect larvae, including mosquitoes.

Habitat. Habitat requirements of Gila topminnow are broad; it prefers shallow, warm, and quiet waters, but can adjust to a wide range of conditions, living in quiet to moderate currents, depths to 3 ft, and water temperatures from a constant 80º F springs to streams that naturally fluctuating from 43-99º F. Topminnows can live in a wide variety of waters such as springs, cienegas, marshes, permanent or interrupted streams, and along the edges of large rivers. Preferred habitat contains dense mats of algae and debris, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic mud and debris. Topminnows can withstand a wide range of water chemistries, with recorded pHs of 6.6-8.9 in existing habitats, dissolved oxygen readings of 2.2-11 ppm, and salinities that range from tap water to seawater.

Distribution. Gila topminnow was one of the most common fish in southern Arizona in the 1940s, and was found throughout the Gila River system up to 5,000 ft in elevation. Pumping water, dams, stream diversions, and unrestricted livestock grazing reduced habitat throughout the range of topminnow, and the introduction of mosquitofish and other non-native species eliminated topminnow from much of the remaining range. The topminnow was reduced to only 15 naturally occurring populations (U.S. Fish and Wildlife Service 1984). Presently, only 12 of the 15 Gila topminnow populations are considered extant (Weedman 1999). Only three of these populations (Cienega Creek, Monkey Spring, and Cottonwood Spring) have no non-native fish present. There have been at least 175 wild sites stocked with Gila topminnow, however, topminnow persist at only 18 of these localities. Of the 18, one site is outside topminnow historic range and four now contain non-native fish (Weedman 1999). Today Gila topminnow is gone from all major riverine locations in Arizona and New Mexico.

Effects Analysis. Management activities that affect water quality, water level, or riparian conditions can result in local disappearance of populations. Land management activities such as mining, grazing, fuel wood cutting, logging, and other disturbances should be evaluated in relation to site-specific characteristics, as these activities can have either a positive and/or negative effects on Gila topminnow populations due to timing, intensity, or other activity-related factors. Where possible, non-native fishes, particularly the western mosquitofish (*Gambusia affinis*), should be removed.

Recovery Status/Needs. Species status is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists in no more than 30 known locations (12 natural and 18 stocked). The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing non-native fishes (Miller 1961, Minckley 1985). Natural and stocked populations have been eliminated due to desiccation and floods, inappropriate management activities, and invasion by non-native fish. Gila topminnow are highly vulnerable to adverse effects from non-native aquatic species (Johnson and Hubbs 1989), including non-native crayfish (Fernandez and Rosen 1996) and bullfrogs. Predation and competition from non-native fishes have been a major factor in their decline and continue to be a major threat to the remaining populations (Meffe *et al*. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman 1999). It has been documented that mosquitofish can eliminate a population of topminnow within a few years. The spread of mosquitofish has continued virtually unchecked since their introduction to Arizona in 1926. The Gila topminnow should be reintroduced into New Mexico.

GILA TROUT (*Oncorhynchus gilae*)

Endangered Species Act Status:	Endangered (March 11, 1967)
Forest Occurrence:	Apache-Sitgreaves, Gila, Tonto
Recovery Plan:	1993 (3rd Edition under review)
Critical Habitat:	No

Description. Gila trout are distinguishable from other trout by the presence of mustard- to watery-yellow slash marks on either side of the lower jaw. Their general body coloration is deep golden yellow to silvery yellow or with a golden sheen below the lateral line and blue reflections dorsally. Parr marks are apparent on all but the largest individuals. The dorsal, anal, and pelvic fins are white-tipped. Body spotting is mostly above the lateral line, and is extremely fine and profuse, extending onto the dorsal, adipose, and caudal fins (Sublette *et al.* 1990).

Life History. Spawning occurs in the spring, when water temperature exceeds about 45º F and stream flow recedes. Spawning begins in early April at the lowest elevations and continues through June at the highest elevations. Fish select spawning sites (redds) based on substrate and depth of water. Redds are constructed in water 3-6 in. deep in substrates of small pebbles (1.5 in) or finer material, and range from 1.0-21.5 ft in size. Fecundity ranges from 75-150 eggs. Fry emerge from their redds about 8-10 weeks later at lengths of 0.6-0.8 in. At the end of their first year, Gila trout are 3-4 in. long, and at the end of the second year may be almost 6 in. long. The growth of Gila trout is strongly influenced by the abundance or density of all fishes in the stream, and there is considerable variation in growth rates in fish in different streams and in different years. Maximum size of Gila trout in occupied habitat is generally 10-11 in., although individuals over 13 in. have been found (U.S. Fish and Wildlife Service 1993).

Like many salmonids, Gila trout are opportunistic insectivores, consuming a large variety of aquatic and terrestrial insects entrained in the stream drift. Gila trout feed during the day, with peak feeding occurring before noon.

Habitat. Gila trout occur in small headwater streams where water temperatures seldom exceed 70º F. Stream gradients are often 2 percent or greater, and stream morphology is a consequence of valley topography. Pools are typically formed from boulders, root wads, or large, downed trees. Riffles are gravel-dominated and generally free from sand or finer particles. Stream banks are stable and usually vegetated with a diverse array of riparian grasses, shrubs, and trees. Boulders, deep pools, large root wads, and trees provide hiding and resting cover for Gila trout (New Mexico Department of Game and Fish 1988, Haynes and Schuetze 1997) .

Distribution. The Gila trout is endemic to the Verde River drainage of Arizona and the upper Gila basin of New Mexico. Prior to the 1900s, Gila trout were found throughout cool and cold-water reaches of the Gila River system in New Mexico, from about the confluence of Mogollon Creek upstream, and in tributaries of the San Francisco River. Because of a lack of pre-1950 collections, the original distribution of the Gila trout is not clearly defined (Rinne 1990). By the 1960s, Gila trout were present in only five small isolated headwater streams in the Gila and Aldo Leopold Wildernesses in the Gila NF of New Mexico, a range reduction of more than 95 percent. Populations persisted in Main Diamond, South Diamond, Iron, and McKenna creeks in the Gila River system and Spruce Creek in the San Francisco River drainage (U.S. Forest Service 1995). In addition, transplanted populations have been established as follows: Gila drainage--Little Creek (Catron County), Sheep Corral Creek (Grant County), and Trail Canyon (Grant County); San Francisco drainage--Big Dry Creek (Catron County); and Mimbres drainage--McKnight Creek (Grant County). A re-established population existed in Gap Creek on the Prescott NF in Arizona until 1990. In the 1990s, the Payson Ranger District’s Dude fire near the rim on the Tonto NF removed all of the non-native trout and left the creek fishless for years. This provided an ideal situation for Gila trout reintroduction in 1999 (Arizona game and Fish Department 1999). In 2000, Gila trout were reintroduced in Raspberry Creek on the Apache NF in Arizona.

Effects Analysis. Gila trout were replaced in most of their native range by introduction of non-native predatory and competitive fishes, specifically brown and rainbow trout. Management activities (such as construction or upland watershed changes) that affect riparian conditions also contributed to the species decline (Arizona Game and Fish Department 1996). Current distribution of Gila trout in tiny headwater streams makes them highly vulnerable to catastrophic events such as wildfire or floods that can eliminate entire populations (Rinne 1990, Propst 1994). Recovery efforts for Gila trout include monitoring of native and reintroduced populations, re-establishment in selected streams, and hatchery propagation.

Recovery Status/Needs. The Gila trout will be reclassified as threatened when populations in Main Diamond, South Diamond, McKenna, Iron, and Spruce Creeks are considered secure (U.S. Fish and Wildlife Service 1993). The population in Main Diamond Creek was destroyed by the Divide wildfire in 1989, but was re-established in 1994. The Main Diamond Creek population is replicated in Sheep Corral and McKnight Creeks. The population in South Diamond Creek was severely reduced (also by the Divide Fire), but is replicated in Trail Canyon and Upper Mogollon Creeks. The population in McKenna Creek and its replicate, Little Creek, may be hybridized with rainbow trout, and investigations on its genetic status are ongoing. Brown trout are still found in Iron Creek and continue to be removed. Gila trout from Iron Creek were stocked into Sacaton Creek and recently into White Creek. The Spruce Creek lineage was replicated into Big Dry Creek; however the proximity of those drainages makes both populations susceptible to a single catastrophic event. The Spruce Creek lineage was also replicated into Dude and Raspberry creeks.

LOACH MINNOW (*Rhinichthys cobitis*)

Endangered Species Act Status:	Threatened (October 28, 1986)
Forest Occurrence:	Apache-Sitgreaves, Coconino, Gila, Prescott, Tonto
Recovery Plan:	1991
Critical Habitat:	April 25, 2000

Description. The loach minnow is a small, slender, elongate fish rarely exceeding 60 mm (2.4 in) long (Minckley 1973). The eyes are directed upward and the mouth is terminal with no barbels. Loach minnow have an olivaceous coloration that is highly blotched with darker pigment. Whitish spots are present at the origin and insertion of the dorsal fin as well as the dorsal and ventral portions of the caudal fin base. Breeding males develop bright red-orange coloration at the bases of the paired fins, on adjacent fins, on the base of the caudal opening, and often on the abdomen. Breeding females become yellowish in color on their fins and lower body (Minckley 1973).

Life History. The first spawn of loach minnow generally occurs in their second year, primarily from March through May (Britt 1982, Propst *et al*. 1988). Loach minnow may also spawn in autumn (Vives and Minckley 1990). Spawning occurs in the same riffles occupied by adults during the non-spawning season. The adhesive eggs of the loach minnow are attached under the downstream side of a rock that forms the roof of a small cavity in the substrate. The number of eggs per rock ranges from 5 to more than 250, with an average of 52-63 (Propst *et al*. 1988). Eggs incubated at 18-20 EC hatched in 5-6 days. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al*. 1988,Vives and Minckley 1990). Longevity is typically 15 months to 2 years, although loach minnow can live as long as 3 years (Britt 1982, Propst *et al*. 1988, Propst and Bestgen 1991).

Loach minnow feed exclusively on aquatic insects (Abarca 1987, Barber and Minckley 1983, Britt 1982). Loach minnow are opportunistic benthic insectivores, feeding primarily on riffledwelling larval emphemeropterans, simulids, and chironomid dipterans. They actively seek their food on bottom substrates, rather than pursuing food items in the drift.

Habitat. The loach minnow is found in turbulent, rocky riffles of rivers and tributaries up to about 2,200 m (7,200 ft) in elevation. Loach minnow are bottom-dwelling inhabitants of shallow, swift waters flowing over gravel, cobble, and rubble substrates in mainstream rivers and tributaries (Rinne 1989, Propst and Bestgen 1991). Most growth occurs during the first summer. Loach minnow use the spaces between, and in the lee of, larger substrates for resting and spawning (Propst *et al*. 1988, Rinne 1989). The species is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991).

Distribution. The loach minnow is endemic to the Gila River basin of Arizona and New Mexico, and Sonora, Mexico. Its historic range included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al*. 1990). The species is believed to be extirpated from Mexico. During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout its range (Propst *et al*. 1988). Extant populations are geographically isolated and inhabit the upstream ends of their historic range.

Historically in Arizona, the loach minnow occupied up to 1,400 stream miles (2,250 km), but it is now found in less than 140 mi (225 km) (Propst *et al*. 1988). The loach minnow is generally rare to uncommon where it is found in the following areas: Aravaipa Creek (Pinal and Graham counties); limited reaches of the White River (Gila County) and the North and East forks of the White River (Navajo County); Three Forks area of the Black River; throughout the Blue River; Campbell Blue Creek; sporadic in Eagle Creek; and in the San Francisco River between Clifton and the New Mexico border (Greenlee County) (Marsh *et al*. 1990; Velasco 1994; Bagley *et al*. 1995, 1996).

In New Mexico, the loach minnow historically occupied about 205 stream miles (330 km); now it is found in about 160 stream miles (258 km). The loach minnow has become very rare in substantial portions of this remaining range. The species is extant in the upper Gila River, including the East, Middle, and West forks, the San Francisco and Tularosa rivers, and Dry Blue Creek. Recent biochemical work on this species indicates that there are substantial differences in genetic makeup between the remnant loach minnow populations that occupy isolated fragments of the Gila River basin (Tibbets 1992).

Critical habitat for the loach minnow was redesignated on April 25, 2000 (U.S. Fish and Wildlife Service 2000). The redesignated critical habitat includes a total of 1,448 km (898 mi) of rivers and creeks. Critical habitat includes portions of the Gila, San Francisco, Blue, Black, Verde, and San Pedro rivers, and some of their tributaries, in Apache, Cochise, Gila, Graham, Greenlee, Pima, Pinal, and Yavapai counties in Arizona; and Catron, Grant, and Hidalgo counties in New Mexico. Critical habitat includes the stream channels within the identified stream reaches and areas within these reaches potentially inundated by high flow events.

Effects Analysis. Activities that affect water quality, such as removal of riparian cover, sedimentation, or control of water levels, can adversely affect loach minnow habitat quality. Dams and reservoirs appear to eliminate loach minnow for many miles upstream and downstream. Spread of non-native predators, especially flathead catfish and channel catfish, can also directly reduce loach minnow populations.

Recovery Status/Needs. During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout the species' range (Propst *et al*. 1988).

Competition and predation by non-native fish and habitat destruction have reduced the historic range of the loach minnow by about 85 percent (Miller 1961; Hendrickson and Minckley 1984; Williams *et al*. 1985; Marsh *et al*. 1989; U.S. Fish and Wildlife Service 1986, 1994). Both historic and present landscapes surrounding loach minnow habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, recreation, development, or impoundments (Hendrickson and Minckley 1984; Belsky *et al*. 1999). These activities degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion and thus sedimentation, and adding contaminants to streams and rivers (Belsky *et al*. 1999). As a result, these activities may affect loach minnow through direct mortality, interference with reproduction, and reduction of invertebrate food supplies.

Competition with non-native fishes is often cited as a major factor in the decline of loach minnow (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968; Minckley 1973). The red shiner out-competes loach minnow for food items and habitat; and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). Channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*) frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed (Propst 1999) and may prey on loach minnow. In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui)*, green sunfish (*Lepomis cyanellus*), and introduced trout (Salmonidae) may co-occur and prey on loach minnow. These non-native fish may also impact loach minnow populations through competition for food and space.

SPIKEDACE (*Meda fulgida*)

Endangered Species Act Status:	Threatened (July 1, 1986)
Forest Occurrence:	Apache-Sitgreaves, Coconino, Gila, Prescott, Tonto
Recovery Plan:	1991
Critical Habitat:	April 25, 2000

<u>Description</u>. Adult spikedace are 2.5-3.0 in. (63-75 mm) long (Sublette *et al*. 1990). The eyes are large, the snout fairly pointed, and the mouth is slightly subterminal with no barbels present. The species is slender, somewhat compressed anteriorly. Scales are present only as small deeply embedded plates. The first spinous ray of the dorsal fin is the strongest and most sharp-pointed. Spikedace are olive-gray to light brown above with brilliant silver sides and black specks and blotches on the back and upper side. Breeding males have bright brassy yellow heads and fin bases, with yellow bellies and fins (Minckley 1973, Page and Burr 1991).

<u>Life History</u>. Spikedace can live up to 24 months, although few survive more than 13 months (Propst *et al*. 1986). Reproduction occurs primarily in one-year-old fish (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). Spawning extends from mid_March into June and occurs in shallow (less than 15 cm [5.9 in] deep) riffles with gravel and sand bottoms and moderate flow (Barber *et al*. 1970, Anderson 1978, Propst *et al*. 1986). By mid-May, most spawning has occurred, although in years of high water flows, spawning may continue into late May or early June (Propst *et al*. 1986).

Reproduction is apparently initiated in response to a combination of declining stream discharge and increasing water temperature. The ova are adhesive and demersal and adhere to the substrate. The number of eggs produced varies from 100 to over 800, depending on the size of the individual. The young grow rapidly, attaining a length of 1.4-1.6 in. (35-40 mm) by November of the year spawned.

Spikedace feed primarily on aquatic and terrestrial insects (Barber and Minckley 1983, Marsh *et al*. 1989, Propst *et al*. 1986). In addition, Barber *et al*. (1970) reported that spikedace feed on food items in the drift including some fish fry. Diet composition is largely determined by type of habitat and time of year (Minckley 1973).

Habitat. Spikedace occupy mid-water habitats usually less than 1 m deep, with slow to moderate water velocities over sand, gravel, or cobble substrates (Propst *et al*. 1986, Rinne and Kroeger 1988). Adults often aggregate in shear zones along gravel-sand bars where rapid water borders slower flow, quiet eddies on the downstream edges of riffles, and broad shallow areas above gravel-sand bars (Propst *et al*. 1986). The preferred habitat of the spikedace varies seasonally and with maturation (Propst *et al*. 1986). In winter, the species congregates along stream margins with cobble substrates. The erratic flow patterns of southwestern streams that include periodic spates and recurrent flooding are essential to the feeding and reproduction of the spikedace by scouring the sands and keeping gravels clean (Propst *et al.* 1986). Spikedace larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or fine gravel substrates, but will also occupy backwater habitats. The young typically occupy stream margin habitats, where the water velocity is less than 0.16 ft/sec (5 cm/sec) and the depth is less than 1.96 in (5 cm).

Distribution. Since the 1800s, the spikedace has declined markedly in distribution and abundance throughout its range (Propst *et al.* 1986, U.S. Fish and Wildlife Service 1986). By 1996, the spikedace had been eliminated from over 85 percent of its historic range (New Mexico Department of Game and Fish 1996). Recent taxonomic and genetic work on spikedace, indicate there are substantial differences in morphology and genetic makeup among remnant spikedace populations.

The spikedace is native to the Gila River drainage, including the San Francisco drainage, except in the extreme headwaters (Propst *et al.* 1986). The spikedace currently persists only in the upper Verde River and Aravaipa Creek in Arizona and portions of the Gila River in New Mexico (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Barrett *et al.* 1985, Bestgen 1985, Jakle 1992, Marsh *et al.* 1990, Sublette *et al.* 1990). The species is generally absent from the Gila River from the confluence of the West and East forks downstream to the mouth of Turkey Creek, and occurs irregularly downstream from the mouth of the Middle Box of the Gila River to the Arizona/New Mexico state line (Propst *et al.* 1986).

Critical habitat for the loach minnow was redesignated on April 25, 2000 (U.S. Fish and Wildlife Service 2000). The redesignated critical habitat includes a total of 1,448 km (898 mi of rivers and creeks. Critical habitat includes portions of the Gila, San Francisco, Blue, Black, Verde, and San Pedro rivers, and some of their tributaries in Apache, Cochise, Gila, Graham, Greenlee, Pima, Pinal, and Yavapai counties in Arizona; and Catron, Grant, and Hidalgo counties in New Mexico. Critical habitat includes the stream channels within the identified stream reaches and areas within these reaches potentially inundated by high flow events.

Effects Analysis. Distribution and abundance of spikedace has declined due to riparian degradation, water diversion, and groundwater pumping. Introduction and spread of non-native predatory and competitive fishes also contributed to its decline. Resource activities that affect water quality, such as removal of riparian vegetation, sedimentation, or control of water levels, can affect spikedace habitat quality and should be avoided or corrected.

Recovery Status/Needs. Habitat destruction, and competition and predation from introduced non-native fish are the primary causes of the species' decline (Miller 1961). Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968, Minckley 1973). The red shiner is a very competitive species that out-competes spikedace for food items and habitat and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). Non-native fish such as channel catfish and flathead catfish frequent riffles occupied by spikedace, especially at night when catfish move onto riffles to feed (Propst 1999) and may prey on spikedace. In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

LITTLE COLORADO SPINEDACE *(Lepidomeda vittata)*

Endangered Species Act Status:	Threatened (September 16, 1987)
Forest Occurrence:	Apache-Sitgreaves, Coconino
Recovery Plan:	1997
Critical Habitat:	September 16, 1987

<u>Description</u>. The Little Colorado spinedace is a member of the tribe Plagopterini, a small group of minnows whose members are all disappearing. Individuals are generally less than 4 in. long with a silvery appearance that is darker above (olivaceous to bluish to lead-gray) and lighter below. Black pigmentation overlying the silvery sides can give a pepper-like appearance. The mouth is moderately oblique, the second spine of the dorsal fin is strong, and there is little sexual dimorphism. The distinguishing difference between the sexes is the pectoral fin, which is noticeably larger in males and consistently extends beyond the pelvic fin insertion. The pectoral fin in females usually falls short of the pelvic insertion. The bases of paired fins in breeding males are described as turning an intense reddish-orange and those of breeding females a watery reddish-orange or yellow.

<u>Life History</u>. Populations of Little Colorado spinedace appear naturally cyclical, with their range and abundance increasing during favorable water years and decreasing during periods of drought. Modifications to their habitats from stream diversions, impoundments, use of ichthyotoxins, and the introduction of non-native species, have resulted in declining populations. These modifications pose an even greater threat during dry cycles when populations are naturally depressed. Spinedace consume a variety of foods, shifting primarily between aquatic and terrestrial insects depending on prey availability.

Spinedace mature when about 2.5 in. long and are prolific spawners. Spawning primarily occurs in spring and early summer and can occur sporadically throughout the summer and fall. Spawning behavior includes groups from seven to 15 males following and nipping at the vent of gravid females. Females lay 650-5,000 eggs and may spawn more than once a year. Spawning products are broadcast over the bottom or on aquatic vegetation or debris. Growth is rapid, with individuals reaching 2.5 in. (size at sexual maturity) within 3 months.

<u>Habitat.</u> Spinedace are found in water 0.5-4.3 ft deep, but appear most abundant in depths of about 1.9 ft. Spinedace are most common in slow-to-moderate water currents that flow over fine gravel bottoms. They avoid deep, heavily shaded pools and shallow, open areas, preferring unshaded pools with rocks or undercut banks for cover. Temperatures where populations exist generally range from 58-79° F. Young of the year are most abundant on uniformly turbulent riffles 3.9-9.8 in. deep. Spinedace appear quite capable of tolerating relatively harsh environments that undergo dramatic fluctuations in pH, dissolved gases, and water temperatures.

Their populations are believed to be declining due to alteration of habitat through reduced streamflow and predation and/or competition with non-native fishes. Predation occurs mainly from rainbow trout and green sunfish.

Designated critical habitat includes 31 mi of East Clear Creek (Coconino County, Arizona) from its confluence with Leonard Canyon upstream to Blue Ridge Reservoir, and from the upper end of Blue Ridge Reservoir to Potato Lake; 8 mi of Chevelon Creek (Navajo County, Arizona) from the confluence with the Little Colorado River upstream to the confluence of Bell Cow Canyon; and 5 mi of Nutrioso Creek (Apache County, Arizona) from the Apache-Sitgreaves NFs' boundary upstream to Nelson Reservoir Dam. Critical habitat designation includes only the stream course. The primary constituent elements of critical habitat include clean, permanent flowing water with pools and a fine gravel or silt-mud substrate (U.S. Fish and Wildlife Service 1997).

Distribution. The Little Colorado spinedace is endemic to the Little Colorado River and its northern-flowing tributaries. The historical distribution is similar to the current distribution with the exception that the species may have possibly occurred in the Zuni River watershed south of Gallup, New Mexico (Sublette 1990). In the mid-1980s, Little Colorado River spinedace were taken from 11 localities in the Little Colorado River mainstem, East Clear Creek and associated tributaries, Chevelon Creek, and Nutrioso Creek. Additional sites have included Silver Creek, Show Low Creek, Leonard Canyon and tributaries, and Rudd Creek. Surveys in the late 1990s in Silver Creek and Show Low Creek documented spinedace in Silver Creek just upstream of its confluence with the Little Colorado River. Spinedace were not collected in Show Low Creek.

Effects Analysis. The cyclical nature of spinedace populations makes it difficult to determine population trends. During good water years and with larger populations, range and abundance of the species presents the facade of good condition; however, during poor water years, the range and abundance can shrink dramatically. The lack of spinedace collections at sites where spinedace were historically collected indicates a decrease in their range.

Spinedace are able to tolerate a wide range of conditions, so water quantity may be a more important factor in their management than water quality. Activities that impair water infiltration and storage and summer baseflows may affect populations during dry years. Road construction, timber harvest operations, stream gravel removal, and chemical treatment of streams have been known to limit spinedace populations. Additional limiting factors and concerns include decreased streamflow, water impoundment, dewatering, and predation and competition by and with non-native fishes. Predation by rainbow trout is an important factor in the success and distribution of Little Colorado spinedace (U.S. Fish and Wildlife Service 1997).

SONORA CHUB (*Gila ditaenia*)

Endangered Species Act Status:	Threatened (April 30,1986)
Forest Occurrence:	Coronado
Recovery Plan:	1992
Critical Habitat:	April 30, 1986

Description. Sonora chub is a stream-dwelling member of the minnow family, Cyprinidae, and can achieve total lengths of 200 mm (7.8 in) (Hendrickson and Juarez-Romero 1990). The mouth is inferior and almost horizontal. The body is moderately chubby and dark-colored, with two prominent, black, lateral bands above the lateral line and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

Life History. Sonora chub spawn at multiple times during spring and summer, most likely in response to floods or freshets during spring and summer rains (Henderickson and Juarez-Romero 1990). Bell (1984) suggested that post-flood spawning is a survival mechanism evolved by this species. During spawning, chub apparently broadcast their eggs onto fine gravel substrates in slowly flowing water where the eggs develop and hatch. There are no nests built nor parental care given.

Habitat. Although Sonora chub are regularly confined to pools during arid periods, they prefer riverine habitats. In lotic waters in Mexico, Henderickson and Juarez-Romero (1990) commonly found the chub in pools less than 0.6 m (2 ft) deep, adjacent to or near areas with a fairly swift current, over sand and gravel substrates. It was also common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept at exploiting small marginal habitats, and can survive under severe environmental conditions. They can also maneuver upstream past small waterfalls and other obstructions to colonize newly wetted habitats (Carpenter and Maughan 1993). Larvae likely use shallow habitats at pool margins where they feed on microscopic organisms and algae.

Distribution. Sonora chub is locally abundant in Sycamore Creek, although the habitat is limited in areal extent (Minckley and Deacon 1968,). In Mexico, it is found in the rios Magdalena and Altar where it is considered relatively secure (Henderickson and Juarez-Romero 1990). In 1995, the Arizona Game and Fish Department found Sonora chub in California Gulch (AGFD 1995). The overall estimated current chub habitat is 16.1 km (10 mi) in Sycamore Creek and California Gulch. Sonora chub currently exist only in the lower 3.2 km (2.0 mi) of California Gulch. The species is restricted to further movement upstream to suitable and potential habitat by a concrete dam. The overall suitable habitat currently available is 6.4 km (4 mi) including the habitat, which is occupied below the dam. From the international border upstream to the road and confluence with Schumaker Spring Canyon, 583 chub were recorded during 1995. In 1997, Arizona Game and Fish Department surveys in California Gulch documented 123 chub; no young-of-the-year were found. From December 1998 to October 2000, the Coronado NF staff did ocular surveys, and young-of-the-year and adults were observed.

Critical habitat was designated at the time of listing to include Sycamore Creek, extending downstream from and including Yank Spring (= Hank and Yank Spring) to the International border. Also designated was the lower 2.0 km (1.2 mi) of Penasco Creek and the lower 0.4 km (0.25 mi) of an unnamed stream entering Sycamore Creek from the west, about 2.4 km (1.5 mi) downstream from Yank Spring. Critical habitat includes a 12 m- (39.3 ft) wide riparian area along each side of Sycamore and Penasco Creeks.

Recovery Status/Needs. Potential threats to Sonora chub are related to additional watershed development. Grazing and mining operations in upstream watersheds could result in increased siltation and runoff, increased water demand and withdrawal, and introduction of pollutants into the stream. Cattle have regularly gained access to California Gulch through an unmaintained section of fence along the international border. Mining is active in California Gulch (U.S. Fish and Wildlife Service 1986). The FS has received proposals for expansion of tailing ponds and other related developments in that area. Predation by nonnative vertebrates is also a threat to populations of Sonora chub. Green sunfish is a known predator on native fishes in Arizona (Minckley 1973), and has been implicated in population changes in other lotic fish communities (AGFD 1988).

APACHE TROUT (*Oncorhynchus apache*)

Endangered Species Act Status:	Threatened (March 11, 1967)
Forest Occurrence:	Apache-Sitgreaves
Recovery Plan:	1983
Critical Habitat:	No

Description. Distinguishing characteristics of Apache trout include a deep and compressed body with a large dorsal fin. Body spots are often uniformly spaced and are roundish in outline, medium-sized, and appear slightly smaller than most subspecies of interior cutthroat trout. These spots are more like typical cutthroat trout than the Gila trout. The colors of the body are yellowish-gold, and the tip of the head and back are dark olive. There are dark bold spots on the dorsal and tailfins. Dorsal, pelvic, and anal fins have conspicuous cream or yellowish tips. A yellow cutthroat mark is usually present under the lower jaw.

Life History. Apache trout spawn from March through mid-June constructing their spawning nests (redds) at downstream ends of pools in a variety of depths, velocities, and gravel compositions, and only after water temperatures reach 46.4° F. Eggs hatch in 30 days. Fry emerge from redds after another 30 days, moving downstream at night (Haynes and Schuetze 1997). Apache trout feed on terrestrial insects and adult and nymph stages of aquatic insects such as caddis flies, mayflies, midges, and beetles (Haynes and Schuetze 1997).

Habitat. Apache trout prefer cool, clear, high-elevation streams and rivers, although they may have historically ranged down into larger streams. Large individual trout live in pools, while smaller ones prefer cover and structure such as overhanging trees or brush in runs and riffles (Haynes and Schuetze 1997).

Distribution. The Apache trout is one of two trout native to Arizona. It now occupies less than 5 percent of its historic Arizona range, occurring in Apache, Graham, and Greenlee counties. This major reduction in range is attributable to habitat alteration and species competition with brown and brook trout species. The Apache trout is found in the White Mountains of southeastern Arizona, where it is restricted to streams of the upper Salt, Blue, and Little Colorado drainages. The Apache trout has been introduced and established outside of its range in several streams in the Pinaleno Mountains in southeastern Arizona and in the North Canyon on the Kaibab Plateau in northern Arizona (Haynes and Schuetze 1997).

Recovery Status/Needs. Hybridization with rainbow trout is the most serious threat to the Apache trout, but the species has also experienced losses due to predation by, and competition with brook and brown trout species. Dam construction, water diversion, channelization, groundwater pumping, and mining (and associated activities) contribute to declines of stream habitats and populations of Apache trout. Regional watershed hydrology has been so altered that in Arizona, 80 percent of mainstream river habitats have been altered physically or chemically, or have been completely lost through drying actions such as dams, dewatering, and groundwater pumping. Increased erosion and siltation in streams due to logging and grazing operations increase habitat degradation for this and all other native fishes (Rinne and Fletcher 1994). Management needs include: delineating specific management waters, maintaining and/or enhancing habitats, ameliorating effects of nonnative fishes, and reintroducing Apache trout into suitable habitats. Recovery efforts underway include habitat renovation and reintroductions.

DETERMINATIONS FOR ALL FISH DESCRIBED ABOVE

The following criteria are to be used by a fisheries biologist to determine the effects that the proposed livestock grazing and management activities will have on the previously described fish species.

No Effect (must meet one of the criteria)

1. Livestock grazing on the allotment will not occur within any subwatershed that drains into TEP species habitat.

2. Livestock grazing on the allotment will be excluded from TEP species habitat, in order to sustain all life stages of TEP species, the subwatershed is in satisfactory condition, and there will not be effects such as:

    a. Sedimentation (sediment traps occur between the allotment and TEP species habitat),

    b. Evidence of active erosion caused by livestock or livestock management activities.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria)

1. TEP species or their habitats are present within the allotment or the subwatershed that drains the allotment.

2. Direct effects will be avoided by yearlong exclusion of livestock from TEP species habitats.

3. The subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and TEP species habitats demonstrate that effects will be insignificant or discountable.

CHIRICAHUA LEOPARD FROG (*Rana chiricahuensis*)

Endangered Species Act Status:	Proposed Threatened (June 14, 2000)
Forest Occurrence:	Gila, Coronado, Tonto, Apache-Sitgreaves, Coconino (possibly the Cibola)
Recovery Plan:	No
Critical Habitat:	No

Description. The Chiricahua leopard frog is distinguished from other members of the *Rana pipiens* Complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and oftentimes green coloration on the head and back. The species also has a distinctive call consisting of a relatively long snore of 1-2 sec in duration. Snout-vent lengths of adults range from approximately 2.1-5.4 in (54-139 mm).

Habitat. Leopard frogs as a group are habitat generalists that can adapt to a variety of wetland situations. Suitable Chiricahua leopard frog habitat includes lakes, rivers, streams, springs, ponds, and man-made structures such as reservoirs, stock tanks, and acequias (Sredl and Jennings, in press). This frog is found at elevations of 1,000-2,710 m (3,281-8,890 ft). It is occasionally found in livestock drinkers, irrigation sloughs and acequias, wells, abandoned swimming pools, backyard ponds, and mine adits. On the Coronado NF, this species occurs at elevations of 3,281-6,600 ft (1,000-2,013 m). On other Arizona NFs, the frog occurs at elevations of 3,540-8,280 ft (1,080-2,525 m). The frog uses permanent or nearly permanent pools and ponds for breeding. Most sites that support populations of this frog will hold water yearlong in most years. Time from hatching to metamorphosis is shorter in warm water than in cold water; water permanency is probably more important at higher elevations and in the northern portion of the species' range. The species is rarely found in aquatic sites inhabited by non-native fish, bullfrogs, or crayfish. In complex systems or large aquatic sites, this species may occur in the presence of low densities of non-native predators.

Potential habitat are those aquatic systems (within the historic range of the frog) that are damaged or degraded from natural perturbations or chronic stressors (such as improper livestock grazing) but have the appropriate hydrological and ecological components, which are capable of being restored to suitable habitat. Aquatic habitats may become unsuitable for Chiricahua leopard frogs, due to increased amounts of sediments, longer or more frequent periods if intermittency, reduce flows, dewatering of ponds or bank chiseling. In certain situations, altering livestock grazing practices may help restore aquatic habitats.

In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994 to 1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks. In Arizona, slightly more than half of historic localities were natural lotic systems, a little less than half were stock tanks, and the remainder, were lakes and reservoirs. Currently, 63 percent of extant populations in Arizona occupy stock tanks. Occupied habitat includes sites where the frog is known to occur or where it was present within the last 10 years, but no follow-up surveys have been conducted confirming its absence and suitable habitat is present.

Likely to be occupied habitat includes: 1) currently suitable habitat where the frog has been documented within the last 10 years, but is apparently now absent or 2) suitable habitat that is (a) within 1 mi overland of occupied habitat, (b) within 3 mi along an ephemeral or intermittent drainage from occupied habitat, or (c) within 5 mi along a perennial stream from occupied habitat. Most of the Forests have been surveyed extensively for ranid frogs within the last 10 years. If in doubt, assume presence of likely to be occupied habitat.

<u>Distribution</u>. The Chiricahua leopard frog is found in central and southeastern Arizona and in west-central and southwestern New Mexico. In Mexico, the species is found in northern Sonora, the Sierra Madre Occidental of Chihuahua, and northern Durango. The species was historically widely distributed on the Coronado, Gila, and Apache-Sitgreaves NFs. The largest number of extant localities is on the Coronado NF. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the Chiricahua leopard frog.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. In August 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 mi (5.5 km) away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that consecutively supported large populations of non-native predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They believed the likely source of these animals was populations 1.2-4.3 mi (2-7 km) distant. In the Dragoon Mountains of Arizona, Chiricahua leopard frogs breed at Halfmoon Tank, but frogs occasionally turn up at Cochise Spring (0.8 mi [1.3 km]) down the canyon from Halfmoon Tank in an ephemeral drainage), and in Stronghold Canyon located 1.1 mi (1.7 km) down the canyon from Halfmoon Tank. Breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon does not exist, thus it appears observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from the Silver Creek stock tank after the tank dried up, but frogs then began to appear in Cave Creek, which is about 0.6 mi (1.0 km) away, again suggesting immigration. Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Displaced northern leopard frogs will "home and apparently use olfactory, auditory, and possibly celestial orientation as guides (Dole 1968, 1972). Rainfall or increased ambient humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

<u>Effects Analysis</u>. Threats to this species include predation by non-native bullfrogs, fishes, and crayfish; disease; drought; floods; degradation and destruction of habitat; water diversions and groundwater pumping; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; fire regimes altered due to livestock grazing and fire suppression; and environmental contamination. Chytridiomycosis is a disease affecting amphibian populations globally and has been found in Chiricahua leopard frogs in Arizona and New Mexico.

Maintenance of viable populations of Chiricahua leopard frogs is thought to be compatible with well-managed livestock grazing. Grazing occurs in most of the habitats occupied by this frog. One large and healthy population of Chiricahua leopard frogs co-exists with cattle and horses on the Tularosa River in New Mexico (Randy Jennings, Western New Mexico University, pers. comm. 1995). Throughout their range, Chiricahua leopard frogs are often found living in dirt stock tanks (created by mounding dirt around a drainage site by bulldozer). These tanks are heavily used by livestock, especially cattle. Poorly managed livestock grazing activities can negatively impact this species and its habitats.

Livestock grazing effects on ranid frog populations are not well studied. Munger *et al.* (1994) found that sites that supported adult Columbia spotted frogs (*Rana luteiventris*) had significantly less grazing pressure than sites that did not support spotted frogs. In a subsequent survey, Munger found no differences between the two types of use in these types of areas (Munger *et al.* 1996). Bull and Hayes (2000) evaluated reproduction and recruitment of the Columbia spotted frog in 70 ponds used by cattle and 57 ponds not used by cattle. Significant differences were not found in the number of egg masses or recently metamorphosed frogs in grazed and ungrazed sites in this study. Seventeen percent of the sites were livestock tanks. The California red-legged frog (*Rana aurora draytonii*) co-exists with managed livestock grazing in many places in California. Ponds created as livestock waters have created habitats for red-legged frogs, and livestock may help maintain habitat suitability by reducing coverage by cattails, bulrush, and other emergent vegetation (U.S. Fish and Wildlife Service 2000). In another study, exclusion of cattle from the Simas Valley (Contra Costa County, California), corresponded with re-establishment of native trees and wetland herbs, re-establishment of creek pools, and expansion of red-legged frog populations (Dunne 1995).

Livestock grazing effects on Chiricahua leopard frog habitat include both creation of habitat and loss and degradation of habitat (Sredl and Jennings, in press). Construction of stock tanks for livestock water has created leopard frog habitat, and in some cases has replaced destroyed or altered natural wetland habitats (Sredl and Saylor 1998). Sixty-three percent of extant Chiricahua leopard frog localities in Arizona are stock tanks, versus only 35 percent of extirpated localities (Sredl and Saylor 1998), suggesting Arizona populations of this species have fared better in stock tanks than in natural habitats. Stock tanks provide small patches of habitat that are often dynamic and subject to drying and elimination of frog populations. However, Sredl and Saylor (1998) also found that stock tanks are occupied less frequently by non-native predators (with the exception of bullfrogs) than natural sites.

Adverse effects to the Chiricahua leopard frog and its habitat as a result of livestock grazing and management actions may occur under certain circumstances. These effects include: facilitating dispersal of non-native predators; trampling of egg masses, tadpoles, and frogs; deterioration of watersheds; erosion and/or siltation of stream courses; elimination of undercut banks that provide cover for frogs; loss of wetland and riparian vegetation and backwater pools; and spread of disease (U.S. Fish and Wildlife Service 2000, Belsky *et al.* 1999, Ohmart 1995, Hendrickson and Minckley 1984, Arizona State University 1979, Jancovich *et al.* 1997). Creation or maintenance of livestock waters in arid environments may provide the means for non-native predators such as bullfrogs and crayfish to move across landscapes that would otherwise serve as barriers to their movement. Increased erosion in the watershed caused by livestock grazing can accelerate sedimentation of deep pools used by frogs (Gunderson 1968). Sediment alters primary productivity and fills interstitial spaces in streambed materials with fine particulates that impede water flow, reduce oxygen levels, and restrict waste removal (Chapman 1988). Eggs, tadpoles, and metamorphosing Chiricahua leopard frogs are probably trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartlett 1998, U.S. Fish and Wildlife Service 2000). Juvenile and adult frogs can probably avoid trampling when they are active. However, leopard frogs are know to hibernate on the bottom of ponds (Harding 1997), where they may be subject to trampling during the winter months. Cattle can remove bankline vegetation that provides escape cover for frogs and a source of insect prey. However, dense shoreline or emergent vegetation in the absence of grazing may favor some predators, such as garter snakes (*Thamnophis* spp.), and the frogs may benefit from some open ground for basking and foraging. At a tank in the Chiricahua Mountains of southeastern Arizona, Sredl *et al.* (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die-off of Chiricahua leopard frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die off occurred (U.S. Fish and Wildlife Service 2000).

Chytrid fungus can survive in wet or muddy environments and could conceivably be spread by livestock carrying mud on their hooves and moving among frog habitats. Personnel working at an infected tank or aquatic site and then traveling to another site, thereby transferring mud or water from the first site could also spread this disease. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, nets, boots, or other equipment. Chytrids cannot survive complete drying; if equipment is allowed to thoroughly dry, the likelihood of disease transmission is greatly reduced. Bleach or other disinfectants can also be applied to tools and vehicles and will kill chytrids (Loncore 2000).

Another transfer of chytrids could be during intentional introductions of fish or other aquatic organisms. Maintenance of roads and tanks needed for livestock grazing could provide fishing opportunities and facilitate tank access by anglers, hunters, or other recreationists. These people (and possibly their dogs) may inadvertently introduce chytrids from other locales, or may intentionally introduce non-native predators for angling or other purposes. Such activities would also facilitate introduction of non-native predators with which the Chiricahua leopard frog cannot co-exist.

DETERMINATIONS FOR THE CHIRICAHUA LEOPARD FROG

No Effect (must meet criteria 1a and 1b or must meet criteria 2)

1. a. No livestock grazing or livestock management activities on the allotment will occur in suitable or potential habitat. **and**

1.b. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will not degrade watershed condition and livestock grazing is not proposed in areas that contribute to unsatisfactory watershed condition. This **does not apply** to stock tanks, irrigation sumps, acequias, mine adits, backyard ponds, or other suitable man-made habitats that are typically not affected by watershed condition.

2. Based on surveys conducted using FWS protocol no Chiricahua leopard frogs are present on or within 5 miles of the allotment or there is no potential or suitable habitat on or within 5 miles of the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria)

1. No livestock use or livestock management activities will occur in occupied or likely to be occupied aquatic habitat.

2. Proposed livestock grazing and livestock management activities in subwatersheds that contain suitable or potential habitat will contribute to the improvement of the subwatershed or will not contribute to a continued decline in subwatershed condition. Indicators of watershed health and Chiricahua leopard frog habitats demonstrate that effects from grazing and livestock management activities will be insignificant and discountable. This **does not apply** to stock tanks, irrigation sumps, acequias, mine adits, backyard ponds, or other suitable man-made habitats that are typically not affected by watershed condition.

3. Proposed livestock management activities will not result in increased public access to aquatic sites occupied or likely to be occupied by Chiricahua leopard frogs, or increase the likelihood that non-native predators or chytrid fungi will colonize or be introduced to such aquatic sites.

TERRESTRIAL MAMMALS

MEXICAN GRAY WOLF *(Canis lupus baileyi)*

Endangered Species Act Status:	Endangered (April 28, 1976)
Forest Occurrence:	Apache-Sitgreaves, Gila
Recovery Plan:	1982
Critical Habitat:	No

Life History. Wolf groups (or packs), usually consist of a set of parents (alpha pair), their offspring, and other non-breeding adults. Wolves begin mating when they are two to three years old, sometimes establishing lifelong mates. Wolves usually rear their pups in dens for the first six weeks. Dens are often used year after year, but wolves may also dig new dens or use some other type of shelter such as a cave. An average of five pups are born in early spring and are cared for by the entire pack. They depend on their mother's milk for the first month, then are gradually weaned and fed regurgitated meat brought to them by other pack members. By 7-8 months of age when they are almost fully grown, pups begin traveling with the adults. Often, after 1 or 2 years a young wolf leaves and tries to find a mate and form its own pack. Lone dispersing wolves have traveled as far as 500 mi in search of a new home.

Wolf packs usually live within a specific territory. Territories range in size from 50 mi^2 to greater than 1,000 mi^2, depending on how much prey is available and their seasonal movements. Packs use a traditional area and defend it from strange wolves. Their ability to travel over large areas to seek out vulnerable prey makes wolves good hunters. Wolves may travel as far as 30 mi in a day.

Habitat. Habitat types used are primarily Madrean evergreen forests and woodlands, including pine, oak woodlands, pinyon-juniper woodlands, riparian areas, and grasslands at elevations above 4,500 ft.

Distribution. Mexican gray wolves are the southernmost occurring, rarest, and most genetically distinct gray wolf in North America. They historically occurred in the mountainous regions of the Southwest from throughout portions of southern Arizona, New Mexico, and Texas into central Mexico. Mexican gray wolves were extirpated in the United States by aggressive predator control programs. Ongoing field research has not confirmed that this species of gray wolf continues to occur in Mexico.

On January 12, 1998, the FWS published an ESA section 10(j) rule on the Mexican gray wolf that provided for the designation of specific populations of listed species in the United States as "as experimental populations . Under 10(j), a population of a listed species re-established outside its current range but within its probable historic range may be designated as an experimental population. Nonessential experimental populations located outside of National Wildlife Refuges or National Park lands are treated as if they are proposed for listing. This means that under section 7 of the ESA, Federal agencies are under obligation to confer with the FWS, as opposed to consult, on their proposed actions that are likely to jeopardize the continued existence of the species. The reintroduced Mexican gray wolf population has been designated a non-essential experimental population, providing for greater management flexibility to address the concerns of local residents.

In March 1998, the FWS released three Mexican gray wolf packs into the designated Blue Range Wolf Recovery Area. This area encompasses 6,854 mi^2 (17,752 km^2) of the Apache-Sitgreaves NFs in southeastern Arizona and the Gila NF in southwestern New Mexico. Reintroductions will continue for 3-5 years with the goal of establishing 100 Mexican gray wolves in eastern Arizona and western New Mexico.

Per the 10(j) rule, "disturbance-causing land use activity means any land use activity that the FWS determines could adversely affect reproductive success, natural behavior, or survival of Mexican gray wolves. These activities may be temporarily restricted within a 1-mile radius of release pens, active dens, and wolf rendezvous sites. Such activities may include, but are not limited to, timber or wood harvesting, management-ignited fire, mining or associated actions, camping occurring outside designated campgrounds, livestock trailing and drives, off-road vehicle use, hiking, hunting, and any other use or activity with the potential to disturb wolves. The following activities are specifically excluded from this definition: 1) legally permitted livestock grazing and use of water sources by livestock; 2) livestock trailing or drives (only if no reasonable alternative route or timing exists); 3) vehicle access over established roads to private property and to areas on public land where legally permitted activities are ongoing (only if no reasonable alternative route exists); 4) use of lands within the national park or national wildlife refuge systems as safety buffer zones for military activities; 5) prescribed fire and associated management actions (except in the vicinity of wolf release pens); and 6) any authorized, specific, land use that was active and ongoing at the time wolves chose to locate a den or rendezvous site nearby.

Effects Analysis. Livestock grazing and associated activities that directly or indirectly effect the survival and productivity of the species should be carefully considered for all possible effects to the species. Livestock carcasses that occur in proximity to den sites may habituate wolves to more often choosing livestock as a preferred food source. Livestock, especially young calves on early spring range in proximity to pack activities may also create a food source wolves may begin to choose.

DETERMINATIONS FOR THE MEXICAN GRAY WOLF

The reintroduced Mexican gray wolf population has been designated as a non-essential experimental population. By definition, a nonessential experimental population is not essential to the continued existence of the species. Therefore, no proposed action impacting a population so designated could lead to a jeopardy determination for the entire species. Therefore, proposed livestock grazing and livestock management activities in or near areas with Mexican gray wolves are **not likely to jeopardize** the continued existence of the wolf. In instances where proposed livestock grazing and livestock management activities may adversely affect the wolf, the following **recommendations** should be implemented:

1. In an area occupied by Mexican gray wolves, livestock carcasses are rendered unpalatable, destroyed, or removed within three days after the FWS notifies the FS of the carcass.

2. The timing and location of livestock calving does not result in a significant amount of calf depredation (depredation that is other than incidental) by Mexican gray wolves already residing in a specific reintroduction area.

3. Livestock forage utilization is documented at levels that do not alter the distribution, behavior, and availability of the prey base of the Mexican gray wolf.

BLACK-FOOTED FERRET *(Mustela nigripes*)

Endangered Species Act Status:	Endangered (March 11, 1967)
Forest Occurrence:	Apache-Sitgreaves, Carson, Cibola, Coconino, Gila, Kaibab, Sante Fe
Recovery Plan:	1988
Critical Habitat:	No

Distribution. Black-footed ferret habitat is described as prairies, grassland plains, and surrounding mountain basins up to 10,500 ft (3,200 m) (U.S. Fish and Wildlife Service 1984). The historical range of the ferret is nearly identical to that of three prairie dog species, the Gunnison's prairie dog (*Cynomys gunnisoni*), the black-tailed prairie dog (*C. ludovicianus*), and the white-tailed prairie dog (*C. leucurus*) (U.S. Fish and Wildlife Service 1988). Ferrets depend almost exclusively on prairie dog colonies for food, shelter, and denning. Prairie dogs are the ferret's primary food source. In Arizona, the range probably coincided with that of the Gunnison's prairie dog north of the Mogollon Rim, and possibly that of the black-tailed prairie dog below the rim in Graham and Cochise counties (Hoffmeister 1986). Records of ferrets are known from the Coconino and Kaibab and near the Apache-Sitgreaves NFs. The black-tailed prairie dog was extirpated from southeast Arizona in about 1938. Hubbard and Schmitt (1984) mapped the distribution of prairie dogs in New Mexico. The Gunnison's prairie dog occupied most of the northwestern quadrant of the state and the black-tailed prairie dog was found in most of the eastern half of New Mexico. The potential historic range of the ferret probably included virtually all of the state of New Mexico, but historic ferret sightings were on or near the Carson, Santa Fe, Gila, and Cibola NFs, including the National Grasslands.

Effects Analysis. Livestock operators have historically considered prairie dogs as pests. Concerns include prairie dog burrows presenting a danger to humans and livestock that might trip in them, forage competition with livestock, and the possibility that prairie dogs may play a role in spreading sylvatic plague (Hubbard and Schmitt 1984). The law does not protect prairie dogs and livestock operators could employ prairie dog control techniques that may impact ferrets within the control area.

Recovery Status/Needs. The dependency of the ferret on the prairie dog is so great that the reduction in numbers of ferrets is directly related to the reduction in prairie dogs (Hoffmeister 1986). Reasons for decline are: 1) elimination of natural prey and den holes resulting from the prairie dog control; 2) destruction of native grasslands; and 3) disease (plague and distemper) (U.S. Fish and Wildlife Service 1973).

In 1996, ferrets were introduced into the Aubrey Valley in northwestern Arizona, near the Hualapai Indian Reservation. It is the only area proposed for ferret reintroductions in Arizona and New Mexico. The closest NFs are the Kaibab and Prescott. It is unlikely that the reintroduction effort will impact livestock grazing on NF lands. The plan designates the reintroduced ferret population as experimental and nonessential.

The FWS (1989) recommends that black-tailed prairie dog towns or complexes greater than 80 ac (32 ha), and white-tailed, including Gunnison's, prairie dog towns or complexes greater than 200 ac (80 ha), be surveyed to determine ferret presence. A prairie dog town is defined as a group of prairie dog holes whose density meets or exceeds 8 per ac (20 per ha). Prairie dog holes need not be active to be counted, but they should be recognizable and intact. A complex consists of two or more neighboring prairie dog towns each less than 4.3 mi (7 km) from each other. Management actions that affect ferrets include pesticides or toxicants used to control prairie dogs. When pesticides or toxicants are proposed, ferret surveys are recommended. The 1989 guidelines include additional specific details and recommendations regarding ferret surveys when pesticide or toxicant use are proposed.

DETERMINATIONS FOR THE BLACK-FOOTED FERRET

No Effect

1. Prairie dog control will not be part of the livestock management program.

May Affect, Not Likely to Adversely Affect

1. Prairie dog control will be part of livestock management activities and any required surveys for black-footed ferrets per the 1989 guidelines have been conducted and ferrets were not detected.

JAGUAR *(Panthera onca arizonensis)*

Endangered Species Act Status:	Endangered (1997)
Forest Occurrence:	Apache-Sitgreaves, Coronado, Gila
Recovery Plan:	No
Critical Habitat:	No

Description. The jaguar is the largest cat species native to the western hemisphere. Jaguars are muscular cats with relatively short massive limbs and a deep-chested body. They are cinnamon-buff in color with many black spots; melanistic forms are also known, primarily from the southern part of their range.

Life History. Jaguars breed year-round range-wide, but at the southern and northern ends of their range there is evidence of a spring breeding season. Gestation is about 100 days; litters range from one to four cubs (usually two). Cubs remain with their mothers for nearly 2 years. Females begin sexual activity at 3 years of age, males at 4 years. Studies have documented few jaguars over the age of 11. Jaguars take more than 85 species of prey but the two species most used are javelina and deer.

Distribution. The historic range of the jaguar includes the mountainous regions of eastern Arizona and southwestern New Mexico of the U.S., and northeastern Sonora, Mexico (Lange 1960). It may also have included lands encompassed by the Apache-Sitgreaves, Cibola, Coconino, Coronado, Gila, Lincoln, Prescott, and Tonto NFs. No breeding populations are known to exist in the United States at this time. Individuals occur in the Southwestern U.S. and may be from established populations in Sonora, Mexico. An adult jaguar was photographed in the Peloncillo Mountains of the Coronado NF, Arizona, in March of 1996. Another documented sighting was an adult jaguar photographed in the Baboquivari Mountains southwest of Tucson, Arizona, in August of 1996. The last confirmed report of a jaguar in Arizona prior to 1996 was in 1987 (Girmendonk 1994). For Arizona, the total number of jaguar records (known specimens, killings reported, and credible sight records) since 1848 is now 84 (Lange 1960, Brown 1983, Girmendock 1994). The last reported sighting of a jaguar in New Mexico was in 1937 (Halloran, 1946). In January of 2002 a jaguar was photographed in Sycamore Gulch on the Coronado National Forest. Border cameras set out by Jack Childs caught the big cat on film. Although additional cameras were set out no other evidence of this cats activities in the United States has been obtained.

Habitat. Jaguars are known from a variety of habitats. They show a high affinity for lowland wet habitats; typically swampy savannas or tropical rain forests. They also historically occurred in upland habitats in warmer regions of North and South America. In Arizona, jaguars have been sighted in a variety of ecological communities from Sonoran desert scrub through subalpine conifer forest. Most records are from Madrean evergreen-woodland, shrub-invaded semidesert grassland, and along rivers (Brown 1983).

Effects Analysis. In the past, the primary threat to jaguars in the U.S. was from shooting (59 FR 35675) and possibly the reduction in understory vegetation density in riparian areas. In Arizona, the decline of the species was concurrent with predator control that was associated with land settlement and development of the livestock industry (Brown 1983, U.S. Fish and Wildlife Service 1990). Shooting remains a threat to jaguars. At least 64 jaguars have been killed in Arizona since 1900 (Brown 1991), one as recently as 1986 (Girmendonk 1994).

Other impacts are clearing of preferred habitat, alteration and destruction of riparian areas, fragmentation or blocking of corridors that jaguars may use to move between Mexico and the U.S., and any trapping or animal control activities that target jaguars or other large predators (59 FR 35675).

Recovery Status/ and Needs. Movement and hunting cover, security from humans (noise and shooting), adequate prey base, water, large habitat areas and connectivity to these areas, and movement corridors are important considerations for managing effects of livestock grazing and management practices on jaguars (Povilitis 1999). A source population stills exists 135 mi south of the Mexican border (Valdez 2001). The borderlands remain important linkages to the source population in Mexico.

JAGUARUNDI *(Felis yagouaroundi)*

Endangered Species Act Status:	Endangered (June 14, 1976)
Forest Occurrence:	Coronado, Gila
Recovery Plan:	1990 (included with ocelot)
Critical Habitat:	No

Description. The jaguarundi is a small slender-bodied, reddish to gray to black unmarked weasel-like cat inhabiting dense thickets and forest (Tewes and Everett 1986). They have short legs and long tails and are somewhat larger than an alley cat. Two color phases predominate, the grayish phase with underparts grizzled, salt and pepper gray, underparts slightly paler, more black in winter pelage, and the red phase with upper parts reddish intermixed with blackish, head and legs brown, with white throat and lips. Adult males are about 3.5 ft (1.1m) long with 22 in. (57 cm) tails and weigh 8-16 lbs (3.6-7 kg); females are smaller.

Life History. Jaguarundi live 16-22 years. Two to four kittens (three are normal) are born twice a year (summer and winter). Dens are usually associated with fallen trees and ground cover. Jaguarundi are nocturnal but move around somewhat during the day especially for water. They tend to hunt on the ground and are good swimmers. They are solitary except during the breeding seasons. Their food consists of rats, mice, birds, lizards, and rabbits, with birds being their primary food source. They have been known to spring as high as 5 ft (1.5 m) in the air to catch food.

Habitat. Jaguarundi are denizens of the dense, thorny thickets that exist in the lower Rio Grande river valley where cacti, mesquite, cat claw, granjeno, and other spine-studded vegetation predominate. There, jaguarundi live in relative safety because these thickets are impenetrable to dogs and man. Jaguarundi spend most of their time on the ground although are good climbers and do hunt in trees and bushes. The availability of water is very important to jaguarundi survival.

Distribution. The species is extirpated from Arizona and probably Texas (Tewes and Everett 1986). The historical range for this species is very sketchy and all accounts compiled through 1994 by the Arizona Game and Fish Department are considered questionable (Girmendock 1994). Historical range has not been defined, but southern portions of the Gila and Coronado NFs are considered historical habitat for the purposes of this document. A Coronado NF employee submitted an unconfirmed but reliable sighting report in 1991 from the Dragoon Mountains in Cochise County, Arizona. The report could not be confirmed through additional fieldwork. That jaguarundi may have been a transient from Mexico.

Effects Analysis. The primary threat to the jaguarundi is the loss of habitat by brush clearing and loss of connectivity between large blocks of habitat. Highway and traffic-related deaths account for a large percentage of the mortality in Texas.

Recovery Status/Needs. The FWS listed the U.S. population of the jaguarundi in Texas and Arizona as endangered in 1976. The listing was based on threats resulting from destruction, modification, or curtailment of its habitat or range (loss of habitat through brush clearing). In Arizona the species was never abundant and predator control operations contributed to extirpation (Girmendock 1994). Changes to habitat from land use practices over the last 50 years have also hindered recovery.

OCELOT *(Felis pardalis)*

Endangered Species Act Status:	Endangered (March 28, 1972)
Forest Occurrence:	Coronado, Gila
Recovery Plan:	1990 (with jaguarundi)
Critical Habitat:	No

Description. The ocelot is a medium sized spotted and blotched cat with a moderately long tail. It is about the size of a bobcat but the spots are much larger and the tail much longer. Under parts are white and upper parts are grayish or buff with black spots on the tail. Males average 44 in. (1.1 m) in length and weigh 22-33 lbs (10-15 kg).

Life History. Ocelots are crepuscular and nocturnal, spending the day in heavy brush (Tewes and Everett 1982, Grzimek 1975, Leopold 1959). Their prey consists of mammals, birds, reptiles, fish, and invertebrates (Grzimek 1975, Morris 1965). Males range more widely than females, and one male's territory may overlap more than one females' range. Adult male ranges are exclusive while females may also exclude other females (Tewes and Everett 1986). First estrus may be as early as 8 months, but 2 years is the average (Seager and Demorest 1978). Polyestrus is common. Births occur year-around. Gestation is approximately 80 days and usually two kittens are born. Age at weaning has not been determined.

Distribution. The last confirmed report of an ocelot in Arizona was in 1964 (Girmendonk 1994). Currently, the species is considered extirpated from Arizona. All recent reported sightings of ocelot in Arizona are considered questionable according to the Arizona Game and Fish Department (Girmendock 1994). Transient individual cats from Mexico may occur rarely and on a sporadic basis in Arizona (Hall 1981). The proximity of the Coronado NF to Mexico provides some potential for future re-colonization by animals crossing the borderlands.

About 20-80 individual ocelots currently reside in the Lower Rio Grande Valley of Texas. A portion of this population lives on or near the Laguna Atascosa National Wildlife Refuge near Harlingen, Texas. The rest of the Texas population inhabits fragmented native brushlands held in private ownership (Tewes and Everett 1986).

In the final rule for listing of this species it was determined that only those populations in the Lower Rio Grande Valley of Texas were viable; that is, able to exist as a self-sustaining ocelot population. Any ocelot that may be located in Arizona today would most likely be a wandering cat that crossed the borderlands from nearby Mexico. Historical records for the ocelot in Arizona are unclear, but likely occurred along the Verde and Salt rivers, based on reports by Girmendonk (1994) and Hoffmeister (1986).

Effects Analysis. The habitat across much of the species' range has undergone irreversible changes that may inhibit ocelot from occupying the area. Brush clearing for agriculture is the main threat to continued occupation in the U.S. population. Ocelots are vulnerable to traffic-related mortality.

Recovery Status/Needs. The listing of the ocelot as endangered was primarily because of threats resulting from destruction, modification, or curtailment of its habitat or range. Livestock grazing and hunting lease operations occurring on 20,000 ac of privately owned ocelot-occupied habitat in Texas were also identified as a threat to the continued existence of the species. It is not known whether the ocelot was or was not firmly established historically in Arizona, but it is believed predator control operations contributed to its extirpation in the state.

DETERMINATIONS FOR THE JAGUAR, JAGUARUNDI, AND OCELOT

No Effect

1. No state-accepted sightings reported for the mountain range or drainage corridors in the allotment since 1970.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria)

1. State-accepted sightings have been reported for the mountain range or drainage corridors in the allotment since 1970.

2. Grazing and livestock management activities will not reduce cover within riparian areas.

3. Livestock management activities will not permanently disrupt connectivity corridors within the U.S. and between the U.S. and Mexico.

LESSER LONG-NOSED BAT *(Leptonycteris curasoae yerbabuenae)*

Endangered Species Act Status:	Endangered (September 30, 1988)
Forest Occurrence:	Apache-Sitgreaves, Coronado, Tonto
Recovery Plan:	1995
Critical Habitat:	No

Description. The lesser long-nosed bat is a medium-sized bat, about 70-95 mm (2.8-3.8 in) in length.

Life History. Suitable day roosts and associated concentrations of food plants are crucial for the lesser long-nosed bat (U.S. Fish and Wildlife Service 1995). Caves and mines are used as day roosts. Factors that make roost sites useable have not yet been identified. The species seems sensitive to human disturbance and alternate roost sites may be critical when disturbance occurs. There is potential for routes maintained as part of the grazing program to facilitate public access to roosts. Recreationists or others that access active roosts can displace bats, temporarily or permanently.

The lesser long-nosed bat flies long distances from roosts to forage. Night flights from maternity colonies to food have been documented in Arizona at 24 km (15 mi), and in Mexico at 40 km (25 mi) and 61 km (38 mi) one way (Dalton *et al.* 1994; V. Dalton, Tucson, pers. comm. 1997; Y. Petryszyn, University of Arizona, pers. comm. 1997). A substantial portion of the lesser long-nosed bats at the Pinacate Cave in Sonora fly 40-50 km (25-31 mi) each night to forage in Organ Pipe Cactus National Monument (U.S. Fish and Wildlife Service 1995). Horner *et al.* (1990) found that these bats flew 48-58 km (30-36 mi) round trip between an island maternity roost and the mainland in Sonora; the authors suggested the bats regularly flew at least 80-100 km (50-63 mi) each night.

The lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by columnar cacti. The agaves include Palmer's agave (*Agave palmeri*), Parry's agave (*A. parryi*), desert agave (*A. deserti*), and amole (*A. schotti*). Amole is considered to be an incidental food source. The cacti include saguaro (*Carnegiea giganteus*) and organ pipe cactus (*Stenocereus thurberi*). If forage resources are limiting at certain times or places, it is anticipated that numbers of bats may be reduced or bats may have to fly farther from roosts to obtain sufficient resources.

Distribution. This migratory bat is found throughout its historic range from southern Arizona and extreme southwestern New Mexico through western Mexico and south to El Salvador. In southern Arizona, lesser long-nosed bat roosts have been found from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Individuals have been observed from the vicinity of the Pinaleno Mountains (Graham County) and as far north as Phoenix and Glendale (Maricopa County). This bat is also known from far southwestern New Mexico in the Animas and Peloncillo Mountains (Hidalgo County). It arrives in Arizona in early April and leaves in mid-September to late October (Cockrum and Petryszyn 1991, Sidner 1999). It resides in New Mexico from mid-July to early September (Hoyt *et al.* 1994).

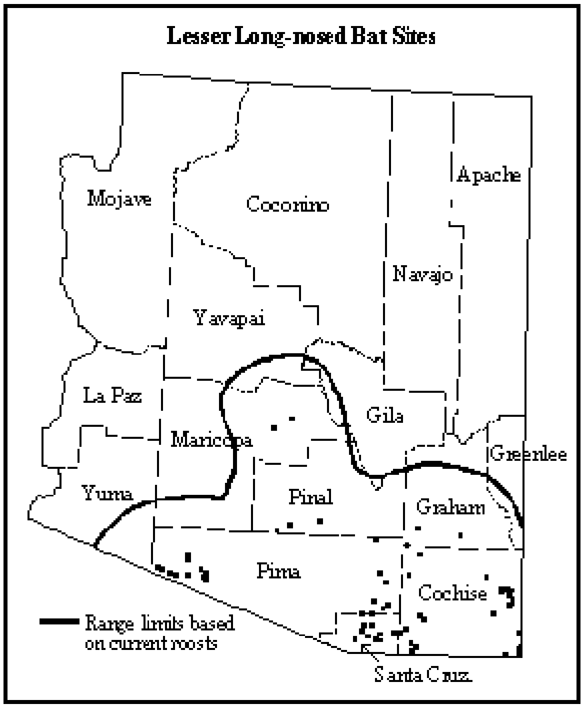
Lesser long-nosed bat roosts have been documented on the Coronado NF. No records exist on the Tonto NF, but records from Phoenix and Glendale suggest the species occurs at least as a transient on the Tonto. What may have been one or more lesser long-nosed bats were observed recently in a mine in the McDowell Mountains a few miles west of the New River Allotment and the western boundary of the Tonto (T. Snow, Arizona Game and Fish Department, Phoenix, pers. comm. 1999). Bats day roosting in the McDowell Mountains could easily forage and night roost on the Tonto NF, which is only a few miles to the east. Foraging may occur on the Apache-Sitgreaves NFs.

Effects Analysis. Livestock over-grazing in areas with bat food plants may adversely affect the long-nosed bat. However, no long-term investigation has quantitatively documented the effect of grazing on agave mortality or flowering stalk herbivory. Widmer and McClaran (2001) are conducting a study of the effect of livestock grazing on *A. palmeri*. Their preliminary results are: 1) overall herbivory on agave stalks was 56 percent, 2) 1/3 of emerging inflorescence were grazed at 70 percent of the sites, and 3) herbivory on agave stalks was 29 percent greater on sites grazed by livestock during the agave bolting season. Intense grazing can result in trampling of young agaves and cacti, soil compaction, erosion, alteration of plant community species composition and abundance, and changes in the natural fire regime. Agaves flower only once and then die. Livestock and wild herbivores feed on young agave stalks, which precludes the plant from flowering. By July, an agave inflorescence is too high to be grazed by cattle (L. Slauson, Desert Botanical Garden, pers. comm. 2000). Cattle have been known to "walk down" agave flowering stalks (T. Cordery, Bureau of Land Management, pers. comm. 1998). Agave stalks are rich in carbohydrates, and as they begin to bolt are particularly palatable to domestic livestock and wild herbivores (Howell 1996; M. Hawks, University of Arizona, pers. comm. 1997; Hodgson, Desert Botanical Garden, pers. comm., 1997). The desirability of these stalks in early spring is likely influenced by availability of quality forage in the area. Under conditions of inadequate precipitation to facilitate a spring green-up, especially when high levels of utilization are reached or following range fires, cattle as well as local wildlife may seek out agave stalks (T. Roller, FWS, pers. comm. 1997).

Saguaros are dependent on nurse plants to provide cover during their sensitive seedling stage. Livestock grazing may affect the density and distribution of nurse plants, increasing the mortality of saguaro seedlings. Benson (1982) noted that grazing destroyed seedbeds of saguaros. Neiring *et al.* (1963) found that enhanced reproduction of saguaros on slopes was correlated with reduced localized levels of grazing.

Agaves are most numerous where they occur as large clones in steep, rocky habitats largely unsuitable for livestock grazing. In lower gradient areas frequented by livestock, plants are found in smaller clones or as individual plants. The individual plants are low density, scattered throughout the landscape, and extremely susceptible to livestock herbivory. These plants likely provide connectivity for bats within and between mountain ranges. They also may provide an important mechanism that enables bats to effectively utilize and access high-density agave patches many miles from day roosts. Their presence may determine the amount of habitat available for bats and may be a key limiting factor in the recovery of populations.

Based on Ober's work on the foraging ecology of lesser long-nosed bats on Ft. Huachuca, the high energy demands of the bat coupled with the small amount of nectar per flower forces bats to visit many flowers per night (Ober *et al.* 2000). The daily expenditure of energy for lesser long-nosed bats may be 1.5-2 times as high as previously reported and thus the amount of food needed to support the bat population in SE Arizona may be greater than previously thought. Therefore, maintaining sufficient numbers of agaves as a food source is very important. It is estimated that one *A. palmeri* produces enough nectar to support 1.5 bats throughout the time they are in southeast Arizona. Ober et. al. (2000) also found evidence that bats select areas with both high resource abundance and evidence of high resource abundance in previous years, suggesting that site fidelity may play a role in the bat's foraging behavior. A reduction in or fragmentation of *A. palmeri* populations could have serious effects on bat populations by increasing energy demands with resulting reductions in reproductive success and adult recruitment. It could also force them to roost in substandard areas or compete with one another for food at remaining plants. These negative effects would be even more noticeable during years of low flower production. The density of flowering agaves on her study areas on Ft. Huachuca varied from 3.5 (1988) to 0.8 (1999) plants/ac within the bat's home range (Ober *et al.* 2000). Only horses have grazed Ft. Huachuca since about 1950.



DETERMINATIONS FOR THE LESSER LONG-NOSED BAT

No Effect (must meet one of the criteria)

1. Allotment is not located within the range of the species (see map).

2. All known, suitable, or potential roost sites within the allotment will be protected from disturbance or modification, and no bat food plants (*Agave palmeri*, *A. parryi*, *A. deserti*, *A. schottii*, saguaros) occur in portions of the allotment grazed by livestock.

May Effect, Not Likely to Adversely Affect (must meet all of the criteria)

1. Livestock grazing occurs on allotment and all known, suitable, or potential roosts will be protected from disturbance or modification.

2. The livestock grazing program will not facilitate public access to known, suitable, or potential roosts.

3. Livestock management activities located within the range of the species will not damage or destroy more than 1 percent of bat food plants within 0.5 miles of the project site.

4. Within the range of the bat, livestock grazing will not occur between April 1 and June 15 to allow agave bolts to reach a height where livestock grazing on agaves is unlikely to occur.

5. Within the range of the bat, in saguaro communities, annual livestock grazing utilization will not be greater than 30 percent of all palatable species to ensure that saguaro populations continue to exist and/or thrive on the allotment (Holecheck 1988). (Note-Per Holecheck [1988] utilization rates recommended for semidesert scrub and shrubland is 30-40 percent.

MEXICAN LONG-NOSED BAT (*Leptonycteris nivalis*)

Endangered Species Act Status:	Endangered (September 30, 1988)
Forest Occurrence:	Coronado
Recovery Plan:	1994
Critical Habitat:	No

Description, Life History, Effects Analysis, and Recovery Status. Background on this bat is similar to that of the lesser long-nosed bat described above.

Habitat. The Mexican long-nosed bat occurs in woodlands dominated by oaks and pines, with the species also ranging into lower-elevation communities. Characteristic vegetation in these areas includes agaves (*Agave* spp.), junipers (*Juniperus* spp.), oaks (*Quercus* spp.), and Mexican piñon (*Pinus cembroides*) (New Mexico Department of Game and Fish 1996). The roosting habitats of the species are poorly known. However, Mexican long-nosed bats have been observed roosting in caves, mines, hollow trees, and even in man-made structures in Mexico; some sites apparently serve only as temporary night-roosts (Hall and Dalquest 1963, Novick 1963, New Mexico Department of Game and Fish 1996).

Distribution. The range of the Mexican long-nosed bat occurs mainly from the southern Trans-Pecos region of Texas to Guatemala (U.S. Fish and Wildlife Service 1994). The species has been collected in 15 Mexican states. In the U.S., they are found in southwestern Texas (Mollhagen 1973) and southwestern New Mexico (Arita and Humphrey 1988). The presence of this species in the Animas Mountains was reconfirmed in 1992 (Hoyt *et al*. 1994). A single animal was captured and released in September 2000, about 20 mi north of Lordsburg, Grant County, New Mexico, along the Gila River (L. Lewis, FWS, pers. comm. 2001). Mexican long-nosed bats from southwestern New Mexico may represent summer migrants from western Mexico (Hoyt *et al*. 1994, New Mexico Department of Game and Fish 1996).

DETERMINATIONS FOR THE MEXICAN LONG-NOSED BAT

No Effect (must meet one of the criteria)

1. Allotment does not occur in Hidalgo County, New Mexico or within the Peloncillo Mountains in Cochise County, Arizona.

2. All known, suitable, or potential roost sites within allotment will be protected from disturbance or modification and no bat food plants (*Agave palmeri*, *A. parryi*, *A. deserti*, *A. schottii*) occur in portions of the allotment grazed by livestock.

May Effect, Not Likely to Adversely Affect (must meet all of the of the criteria)

1. Livestock grazing occurs on the allotment and all known, suitable, or potential roosts will be protected from disturbance or modification.

2. Grazing and livestock management activities will not facilitate public access to known, suitable, or potential roosts.

3. Livestock management activities located within the range of the bat will not damage or destroy more than 1 percent of bat food plants within 0.5 mi of the project site.

4. Within the range of the bat, livestock grazing will not occur between April 1 and June 15 to allow agave bolts to reach the height where livestock grazing on agaves is unlikely to occur.

BIRDS

BALD EAGLE *(Haliaeetus leucocephalus)*

Endangered Species Act Status:	Threatened (July 12, 1995)
Forest Occurrence:	All
Recovery Plan:	1982
Critical Habitat:	No

Background: Breeding bald eagles in Arizona stay in their nesting area year-round (New Mexico is unknown), while juvenile eagles migrate north (Pacific northwest, northern California, Greater Yellowstone area, and Canada). Juvenile eagles return to Arizona in the fall and along with wintering migrants wander throughout the state during the winter and into early spring (Hunt *et al*. 1992). During the first 3-4 months of the year, winter migrants, Arizona breeding/incubating eagles, itinerant Arizona adult eagles, and Arizona juvenile/immature eagles all exist within the state.

Eagles in Arizona primarily nest and forage in the central part of the state in the Sonoran Desert along the Salt, Verde, Gila, Agua Fria, and Bill Williams drainages and along Tonto, Tangle, Cibecue, and Canyon creeks. Eagles use a variety of aquatic systems relying on solely or in combination free-flowing rivers, regulated rivers (below dams), and impoundments. Eagles build their nests on cliff ledges, pinnacles, and in live cottonwood, willow, sycamore, juniper, and piñon trees or snags. Three nest areas or breeding areas exist at higher elevations in ponderosa pine (Luna and Dupont breeding areas) or grassland habitat (Becker breeding area) in the central or east-central forests and plains of Arizona. In all, 40 breeding territories are currently recognized in Arizona. Additional historic nest sites are known, but have not been active in recent history. Of the 40 nest sites, 19 are associated with NF lands in Arizona (Arizona Game and Fish Department 2000).

Two active nests have been monitored in New Mexico since the 1980s. Both nests are located in large cottonwoods. Fledgling success has been good at both locations. A third nest in New Mexico was confirmed in 1998.

New Mexico provides important wintering habitat for 500-600 bald eagles. Eagles winter on the Lincoln, Gila, Cibola, Santa Fe, and Carson NFs and on the McClelland, Lake Marvin, and Black Kettle National Grasslands.

Arizona provides wintering habitat for eagles statewide. Of the 300 birds detected annually in Arizona, most occur on the Coconino NF and west along the Mogollon Rim to the White Mountains (Apache-Sitgreaves NFs) (Arizona Game and Fish Department 2000).

Large fish such as suckers, channel catfish, and carp are the preferred prey during the eagle's breeding season. Eagles tend to exploit prey resources, which become the most available to them during the season (spawning suckers, spawning mortality of bass, waterfowl in the winter, *etc*.). Upland prey and carrion are used to a lesser extent; however, during times of high water turbidity on free-flowing rivers, such use can increase.

Threats. Much of the early decline in bald eagle populations was attributed to pesticide induced reproductive failure, ingestion of lead-poisoned waterfowl, and shooting. Riparian habitat degradation was also a factor, primarily as it related to replacement of nest and perch trees and habitat for prey species. Restrictive control of pesticides and increased habitat protection and enhancement are credited for the recent population increases in the bald eagle.

In Arizona, increasing human populations and associated needs, recreational use pressures, and development in or near the best bald eagle breeding habitats are increasing. Mercury is present at levels sufficiently high to cause failure in eggs along the Verde, Salt, and Gila Rivers. Loss of native fish on the upper Salt River may have lowered eagle productivity. Mortality in the adult segment of the population seems unreasonably high. Shooting of eagles persists. Rivers and riparian habitat are threatened by development, groundwater extraction, surface water diversion, dam management, cattle grazing, bank stabilization, and other land use practices. Fishing line has been detected and removed from nests in 19 different breeding areas consisting of 62 separate instances (two birds have died).

The bald eagle throughout the lower 48 states was proposed for delisting by the FWS in 1999, but a final rule has not been published. The Arizona Game and Fish Department has drafted a Conservation Strategy and Assessment (Arizona Game and Fish Department 2000) to address the continued management needs of the eagle post-delisting.

<u>DETERMINATIONS FOR THE BALD EAGLE</u>

No Effect (must meet one of the criteria)

Livestock grazing will not occur within any subwatershed that drains any identified bald eagle nesting habitat (upper Verde and Salt rivers and Tonto Creek in Arizona) or roost site.

Livestock management activities (beyond presence of livestock) on the allotment will not occur within 0.25 miles of a bald eagle roost or nest site during any time of occupation by bald eagles.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria)

Livestock grazing that occurs in riparian areas will not reduce long-term roost and nest tree regeneration.

Livestock management activities (beyond presence of livestock) that occur within 0.25 mi of a bald eagle nest or roost site will not occur during the season of bald eagle occupation.

3. Subwatershed condition, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and TEP species habitat demonstrate that any effects will be insignificant or discountable.

NORTHERN APLOMADO FALCON *(Falco femoralis septentrionalis)*

Endangered Species Status:	Endangered (March 27, 1986)
Forest Occurrence:	None (Gila and Coronado are potential)
Recovery Plan:	1989
Critical Habitat:	No

<u>Habitat</u>. Habitat for the northern aplomado falcon is variable over its range, but generally consists of open terrain with scattered trees or shrubs (U.S. Fish and Wildlife Service 1990). In Mexico, reported habitat includes palm and oak savannas, open tropical deciduous woodlands,

wooded fringes of extensive marshes, various desert grassland associations, and upland pine parklands (U.S. Fish and Wildlife Service 1990). The Chihuahuan Desert habitat includes open grasslands with scattered mesquite and/or yuccas (*Yucca torreyi* and *Y. elata*).

Existing data suggests that ecological status of Chihuahuan Desert grasslands currently occupied by aplomados is high seral to potential natural community or climax with significant basal cover of grass species. Montoya *et al*. (1997) reported occupied (nesting) habitat as having basal ground cover ranging from 29-70 percent with a mean of 46 percent. Woody plant density ranged from 5-56 plants/ac, with a mean of 31 plants/ac. Dominant woody plant species were Mormon tea, soaptree yucca, sacahuista, mesquite, senecio, creosotebush, and baccharis comprising 74 percent of the community.

Montoya *et al*. (1997) found breeding season ranges of radio-telemetered birds in Chihuahua to be 16-21 km^2 (3,953-5,189 ac or 6.1-8.1 sections). In the Northern Aplomado Falcon Recovery Plan (U.S. Fish and Wildlife Service 1990), Hector estimated aplomado home range requirements based on a regression of body weights and home ranges of other falcon species at approximately 34 km^2 (8,401 ac or 13.1 sections). Differences in nest site availability and prey abundance can cause differences in home range size. Hector suggested that 60 km^2 (14,826 ac or 23.1 sections) may be an upper limit of home range size. For the purposes of habitat management, an intermediate of these home range sizes might be applied. Hector's low range totaling 8,400 ac (13 sections) may be an appropriate measure. This home range estimate may be applied to habitat management by describing a circle with a radius of 2 mi from a specific feature such as a potential nest site to encompass a potential home or breeding season range.

Prey species of the aplomado are variable. The U.S. Fish and Wildlife Service (1990) reported that small birds accounted for 97 percent of the prey biomass, but that insects represented 65 percent of the prey individuals. Ligon (1961) suggested that aplomado food habits "consisted almost wholly of small reptiles, lizards, mice, other rodents, grasshoppers, and various other kinds of insects, rarely small birds except in winter when other food is lacking." Montoya *et al*. (1997) listed 82 species of small birds found as prey items. Of these, nine species comprised 76 percent of the diet. These species included meadowlarks, (the apparent preferred food item), common nighthawks, northern mockingbirds, western kingbirds, brown-headed cowbirds, Scotts oriole, mourning doves, cactus wrens, and pyrrhuloxia. The data suggest a preference for medium-size song birds.

The current understanding of the relationships of aplomados, their prey species, and their habitat use suggests that extremely high (by existing southern New Mexico standards) cover of grasses is required to support the preferred prey bird species. Several key prey species such as meadowlarks are sensitive to declines in cover within the habitat. Of further concern is a noted decline in migratory birds in New Mexico and the Chihuahuan Desert. A review of the North American Breeding Bird Survey Trend Data (Biological Resources Division 1998) suggests declines in the populations of 6 of 11 raptor prey species in New Mexico. Wintering birds likely comprise much of the winter diet of aplomados. Factors affecting habitat suitability for these migratory species may also affect the suitability of aplomado habitat affecting the potential for survival of aplomado falcons.

Aplomado nesting within Chihuahuan Desert Grasslands occurs in multi-stemmed yuccas and mesquite trees. Aplomados do not build their own nests; they use the nests constructed by other raptors such as Swainson's hawks and Chihuahuan ravens. It is suspected that aplomados line the nest with fine material from yucca stalks (Montoya and Zwank 1995). Suitable nesting substrates are dependent on available nesting structures and ongoing nest building of other raptors and corvids. Aplomados are dependent on nesting activities of other stick nest-building birds and their habitat requirements. Breeding in aplomado falcons is reported to occur from January through June in eastern Mexico (U.S. Fish and Wildlife Service 1990). Adults produce clutches throughout this period, with most clutches being produced in March to May. Incubation has occurred in mid-June, suggesting that some young aplomados may be dependent on their parents until August.

Potential habitat for the aplomado falcon in southern New Mexico is defined, until completion of the aplomado habitat study, as patches of any of the following desert grasslands mapping units:

Standard Habitat Sites: Grass Flat NM011
Grass RUP NM012
Salt Flat NM022

BLM Veg Type: Short Grass 1001
Mid Grass 1002
Tall Grass 1003

GAP Veg Type: Short Grass Steppe 5121
Great Basin Foothill Piedmont Grassland 5212
Chihuahuan Desert Grassland 5220
Chihuahuan Desert Foothill Piedmont Desert Grassland 5221
Chihuahuan Desert Lowland Swale Desert Grassland 5222

(Note: all areas mapped within these GAP vegetation types must be field checked to assure that the areas are in fact a grassland.) that are all of the following:

1) greater than 320 ac in size (areas of grassland contiguous to grasslands on public land are counted in the 320 ac.);

2) within any of these NRCS Hydrologic Units (HUCs):
13020203, 13020210, 13020211, 13030101, 13030102, 13030103, 13030201, 13030202, 13050003, 13050004, 13060011, 13070001, 13070002, 13070007, 15040002, 15040003, 15040006, 15080302, 15080303;

3) below 6,500 ft elevation; and

4) have adequate nest substrates (multi-stemmed yuccas and large mesquites or other trees) and nesting activity of other raptors and ravens.

Distribution. Until 1992, it was believed the distribution of the aplomado was restricted to eastern Mexico, from southern Tamaulipas south. In 1992, breeding populations in Chihuahua, Mexico, approximately 80 mi south and 50 mi west of the U.S. border (Big Bend, Texas) were confirmed. Since then, several reliable sightings have been reported in areas west of the initial breeding population. The discovery of breeding aplomados in northern Chihuahua may be the source of aplomados recently observed in southern New Mexico and west Texas. Numerous sightings of aplomados have occurred over the years.

The species was historically reported from most southern New Mexico counties. The last documented nesting pair of aplomados in New Mexico (and the U.S.) was in Luna County in 1952. Historic sightings are concentrated in the southwestern corner of New Mexico from Sierra and Doña Ana counties to the Bootheel Region. Historic sightings from Otero County east are few. Within Arizona, the aplomado occurred in the southeastern portion of the state (Cochise County). The last confirmed records of the species were from the Sulphur Springs Valley (1939), near Saint David (1940), and the border area near Rodeo, New Mexico, in 1977. None of the relatively frequent reports since then has been confirmed (Arizona Game and Fish Department 1996). A breeding pair of falcons was observed near Deming, New Mexico, in 2000.

Effects Analysis. If aplomado falcons recolonize or are augmented within their historic range on FS allotments and these allotments contain nests used by breeding pairs, livestock grazing could have adverse effects on nesting success and recovery of the species by direct destruction of nest trees. Disturbance effects of livestock management activities, beyond the presence of livestock, near nesting falcons could cause abandonment. Effects of over-utilization of forage on prey abundance, increases in desert shrub expansion into grasslands, yucca destruction, and direct disturbance caused by grazing livestock could also be a concern.

Recovery Status/Needs. The northern aplomado falcon was listed as endangered in 1986 due to its extirpation from the United States (U.S. Fish and Wildlife Service 1990) and evidence of population declines and high levels of pesticide contamination in Mexico (Kiff *et al*. 1978). Grassland habitat degradation was cited as the main factor responsible for the falcon's extirpation from the U.S. (U.S. Fish and Wildlife Service 1986). Recent confirmed observations of aplomados in south-central New Mexico and west Texas, the confirmation of two breeding populations in northern Chihuahua, Mexico (Montoya *et al*. 1997), and reintroduction efforts in south Texas have heightened interest in this species.

DETERMINATIONS FOR THE NORTHERN APLOMADO FALCON

No Effect (must meet one of the criteria)

No livestock grazing occurs on the allotment.

Based on surveys conducted within the last year, no suitable or potential aplomado falcon habitat occurs on the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria)

Livestock grazing occurs within occupied, suitable or potential aplomado falcon habitat only in concert with a monitoring program to determine responses of the habitat and the falcon to livestock grazing.

Areas of savannahs with yucca and scattered trees are being maintained for prey production and nesting habitat, including protecting all nesting substrate from adverse effects of livestock grazing and rubbing.

CACTUS FERRUGINOUS PYGMY-OWL *(Galaucidium brasilianus cactorum*)

Endangered Species Act Status:	Endangered (March 10, 1997)
Forest Occurrence:	Coronado, Tonto
Recovery Plan:	No
Critical Habitat:	No

Habitat. A variety of vegetation communities are used by pygmy-owls such as riparian woodlands, mesquite bosques (Spanish word for woodlands), Sonoran desert scrub, and semidesert grassland, as well as non-native vegetation within these communities. While plant species composition differs among these communities, there are certain unifying characteristics that include the presence of vegetation in a fairly dense thicket or woodland, the presence of trees or saguaros large enough to support cavity nesting, and elevations below 4,000 ft (Wilcox *et al.* 2000). Historically, pygmy-owls were associated with riparian woodlands in central and southern Arizona. Plants present in these riparian communities include cottonwood (*Populus* spp.), willow (*Salix* spp.), and hackberry (*Celtis* spp.). Cottonwood or other trees are suitable for cavity nesting, while the density of mid- and lower-story vegetation provides necessary protection from predators and an abundance of prey items for the pygmy-owl (Cartron and Finch 2000).

Over the past several decades, pygmy-owls have been primarily found in the Arizona Upland subdivision of the Sonoran desert, particularly Sonoran desert scrub (Wilcox *et al.* 2000). This community in southern Arizona consists of paloverde, ironwood, mesquite, acacia, bursage (*Ambrosia* spp.), and columnar cacti (Johnson and Haight 1985). Desert scrub communities have an abundance of saguaros, large trees and a diversity of plants that support a wide array of prey species and provide cover (Proudfoot 1996). However, over the past several years, pygmy-owls have also been found in riparian and xeroriparian habitats and semidesert grasslands.

Distribution. Historical records indicate that the pygmy-owl was once common throughout much of the southern half of Arizona (Gilman 1909). The species was generally associated with the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and their tributaries. The northernmost record was from New River, Arizona, about 55 km north of Phoenix. The pygmy-owl has declined throughout Arizona to the degree that it is virtually extirpated from the State. Surveys conducted in 1992 and 1993 found only three single pygmy-owls each year (Felley and Corman 1993, Collins and Corman 1995). All were in extreme southern Arizona in the general vicinity of Tucson. In 1994, a pair and single owl of unknown breeding status were located in northwest Tucson (Collins and Corman 1995). In 1995, the Arizona Game and Fish Department confirmed 5 adult pygmy-owls and one juvenile. In 1996, the Department found 12 pygmy-owls, including one known nesting pair and their 2 successful fledglings in the Tucson Basin (the area bounded to the north by the Picacho Mountains, to the east by the Santa Catalina and Rincon Mountains, to the south by the Santa Rita and Sierrita Mountains, and to the west by the Tucson Mountains). Three additional pygmy-owls and 3 other unconfirmed reports were recorded at Organ Pipe Cactus National Monument in 1996 (U.S. Fish and Wildlife Service 1997). In 1997, the Department located 5 pygmy-owls in the Tucson Basin. Of these owls, 1 pair successfully fledged 2 young. Two adult males were also located at Organ Pipe. In 1998, 35 pygmy-owls were confirmed in Arizona. In 1999, 41 adult pygmy-owls were found in Arizona at 28 sites (*i.e.* nests and resident locations)(U.S. Fish and Wildlife Service 1999). Of these sites, 11 had nesting confirmed.

Surveys in 2000 confirmed 34 adult pygmy-owls at 24 sites and several other unconfirmed sites. Nesting was documented at 7 sites and 23 fledglings were confirmed; however, as in 1999, over a 50 percent fledgling mortality was documented. Surveys in 2001 resulted in 47 adult pygmy-owls confirmed at 29 sites in Arizona. There were also several other unconfirmed sites not included in these totals. Nesting was documented at 17 sites.

The following regions of the state are currently known to have pygmy-owls: Tucson Basin (northwest Tucson and southern Pinal County), Altar Valley, Organ Pipe Cactus National

Monument, Cabeza Prieta National Wildlife Refuge, Ajo Block, and 5 other sites documented elsewhere in southern Arizona (U.S. Fish and Wildlife Service 1999).

Effects Analysis. Potential effects to the pygmy-owl that are that are associated with livestock grazing center on the impacts to the owl's habitat. Impacts to cottonwood and cottonwood/willow vegetative types by improper livestock management are well documented. A more obscure manner in which improper grazing use may affect the species is in changes to pygmy-owl prey abundance. The change in the fire regime in the saguaro community due to introduced annual grasses and their interaction with livestock grazing may pose a challenge to the owl's recovery.

Under the Tonto NF Land and Resource Management Plan, allotments will be managed at level A; this means livestock grazing is excluded in order to protect other values or eliminate conflicts with other uses. Management that does not provide for recruitment of replacement nest and roost trees in suitable riparian habitat may adversely affect the pygmy-owl.

Recovery Status/Needs. The pygmy-owl is threatened primarily by past, present, and potential future destruction and modification of its habitat throughout a significant portion of its range in the U.S. Its current distribution in southern Arizona is in areas that have suffered considerable degradation, destruction, and modification attributed to urban and agricultural encroachment, woodcutting, water diversion, channelization, livestock overgrazing, groundwater pumping, and hydrologic changes resulting from various land-use practices (U.S. Fish and Wildlife Service 1997).

Historically, cutting of mesquite for fuel wood probably caused the greatest impact to habitat. As settlement increased, changes in the hydrologic regime that resulted from urban and agricultural water uses likely became the major impact to suitable habitat. Improper livestock grazing practices have likely been a continuing contributing factor in habitat degradation.

DETERMINATIONS FOR THE CACTUS FERRUGINOUS PYGMY-OWL

No Effect (must meet one of the criteria)

No livestock grazing in pygmy-owl habitat will occur within the allotment.

No suitable pygmy-owl habitat is present within the allotment.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria):

Livestock grazing will be at levels that maintain understory vegetation and provide for regeneration of any strata of desert scrub, xero-riparian, and riparian vegetation, and is limited to 30 percent forage utilization of all palatable species in desert scrub and xero-riparian areas.

Livestock gathering activities will not occur within 0.25 mi of an occupied pygmy-owl site or unsurveyed suitable habitat between February 1 and July 31.

MEXICAN SPOTTED OWL (*Strix occidentalis lucida*)

Endangered Species Act Status:	Threatened (March 16, 1993)
Forest Occurrence:	All

Recovery Plan: 1995
Critical Habitat: February 1, 2001

Description. The Mexican owl is distinguished from the California and northern subspecies chiefly by plumage and geographic distribution. The Mexican owl is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. The spots are larger and more numerous than in the other two subspecies, giving it a lighter appearance. Several thin white bands mark an otherwise brown tail. Unlike most owls, spotted owls have dark eyes. The Mexican subspecies has the largest geographic range of the three. It extends from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona and New Mexico, and discontinuously through the Sierra Madre Occidental and Oriental to the mountains at the southern end of the Mexican Plateau.

Life History. A detailed account of the taxonomy, biology, and reproductive characteristics of the spotted owl is found in the final rule listing it as a threatened species (U.S. Fish and Wildlife Service 1993) and in the Recovery Plan for the Mexican Spotted Owl (U.S. Fish and Wildlife Service 1995). Owls breed sporadically and do not nest every year. This owl's reproductive chronology varies somewhat across its range. In Arizona, courtship apparently begins in March with pairs roosting together during the day and calling to each other at dusk (Ganey 1988). Eggs are laid in late March or typically early April. Incubation begins shortly after the first egg is laid, and is performed entirely by the female (Ganey 1988). The incubation period for the owl is assumed to be 30 days (Ganey 1988). During incubation and the first half of the brooding period, the female leaves the nest only to defecate, regurgitate pellets, or receive prey from the male, who does all or most of the foraging (Forsman *et al.* 1984, Ganey 1988). Eggs usually hatch in early May, with nestling owls fledging 4-5 weeks later, and then dispersing in mid-September to early October (Ganey 1988).

Habitat. The owl's range covers much of the southwestern U.S. and Mexico, but owls do not occur uniformly throughout this area. They occur in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep rocky canyonlands. Surveys have revealed that the species has an affinity for older well-structured forests in what is otherwise a diverse array of landscapes.

Spotted owls nest, roost, forage, and disperse in an array of biotic communities. Mixed conifer forests are commonly used throughout most of the range. In general, these forests are dominated by Douglas-fir and/or white fir, with codominant species including southwestern white pine, limber pine, and ponderosa pine. The understory often contains the above coniferous species as well as broadleaved species such as Gambel oak, maples, boxelder, and New Mexico locust. In southern Arizona and Mexico, Madrean pine-oak forests are also used commonly. These forests are typically dominated by an overstory of Chihuahua and Apache pines in conjunction with species such as Douglas-fir, ponderosa pine, and Arizona cypress. Evergreen oaks are typically prominent in the understory (U.S. Fish and Wildlife Service 1995).

Habitat-use patterns vary throughout the range and with respect to owl activity (nesting, roosting, or foraging). In the northern part of the range, including southern Utah, southern Colorado, and far northern Arizona and New Mexico, owls occur primarily in steep-walled, rocky canyons. Along the Mogollon Rim in Arizona and New Mexico, habitat use is less restricted, and spotted owls occur in mixed-conifer forests, ponderosa pine-Gambel oak forests, rocky canyons, and associated riparian forests. South of the Mogollon Rim and into Mexico a still wider variety of habitat types are used, including mixed-conifer, Madrean pine-oak, and Arizona cypress forests, encinal oak woodlands, and associated riparian forests. Much of this regional variation in habitat use likely results from differences in regional patterns of habitat and prey availability (U.S. Fish and Wildlife Service 1995).

<u>Effects analysis.</u> Grazing in spotted owl habitat can affect habitat structure and composition, as well as the availability and diversity of food for the owl. The Recovery Plan for the Mexican Spotted Owl (U.S. Fish and Wildlife Service 1995) summarizes the effects of livestock grazing on Mexican spotted owls in four broad categories: 1) altered prey availability, 2) altered susceptibility to fire, 3) degeneration of riparian plant communities, and 4) impaired ability of plant communities to develop into spotted owl habitat.

Ward and Block (1995) indicate that under heavy livestock grazing in meadows, populations of voles would be expected to decrease and this would improve conditions for deer mice. Deer mice are associated with areas of little herbaceous cover and extensive exposed soil. Long-tailed and Mexican voles use sites with less exposed ground and greater herbaceous cover. Increases in deer mouse abundance in meadows would not offset decreases in vole numbers because voles provide greater biomass per individual and per unit area (Ward and Block 1995). Such decreases could negatively influence owls where voles are common prey or used as alternative food sources when other prey species are diminished (Ward and Block 1995).

Hayward *et al.* (1997) found that total abundance of small mammals differed significantly between grazed and ungrazed plots, with the mean abundance of small mammals per census about 50 percent higher on plots where livestock were excluded. The abundance of small mammals in the diet of spotted owls has been related to reproduction. Ward and Block (1995) suggested that the owl's reproductive success was not influenced by a single prey species, but by many species in combination. No one single group of prey significantly influenced owl reproductive success; Ward and Block concluded it was more likely that the owl's reproductive success was influenced by total prey biomass consumed in a given year, rather than by a single prey species. More MSO young were produced when moderate to high amounts of the three most common prey groups (woodrats, peromyscid mice, and voles) were consumed.

Grazing that significantly reduces herbaceous ground cover and increases shrubs and small trees can decrease the potential for beneficial low-intensity ground fires while increasing the potential for destructive high-intensity vertical fires. Low-intensity ground fires prevent fuel accumulation, stimulate nutrient cycling, promote grasses and forbs, discourage shrubs and trees, and perpetuate the patchiness that supports small mammal diversity. Catastrophic fire reduces or eliminates foraging, wintering, dispersal, roosting, and nesting habitat components (U.S. Fish and Wildlife Service 1995).

Excessive grazing in riparian areas can reduce or eliminate important shrub, tree, forb, and grass cover, all of which in some capacity support the owl or its prey. Excessive grazing can also physically damage stream channels and banks. Deterioration of riparian vegetation structure can allow channel widening. This event, in turn, elevates water and soil temperatures and thus evaporation and lowering of water tables, plus it significantly increase the potential for accelerated flood damage. These processes alter the microclimate and vegetative development of riparian areas, potentially impairing its use by spotted owls (U.S. Fish and Wildlife Service 1995).

Excessive grazing, sustained for long periods, can inhibit or retard an area’s ability to produce or eventually mature into habitat for the owl or its prey (U.S. Fish and Wildlife Service 1995).

Recovery Status/Needs. The recovery plan provides the following guidelines for managing livestock grazing in spotted owl protected and restricted habitat (U.S. Fish and Wildlife Service 1995).

1 Monitoring grazing by livestock and wildlife in "key grazing areas . Key grazing areas are primarily riparian areas, meadows and oak types. The intent is to maintain good to excellent range conditions in in key areas while accommodating the needs of the owl and its prey.

2 Implement and enforce grazing utilization standards that will attain good to excellent range conditions within the key grazing areas. Establish maximum allowable use levels that are conservative and that will expedite attaining and maintaining good to excellent range conditions. The purpose of establishing these use levels is to ensure allowable use of plant species to maintain plant diversity, density, vigor and regeneration over time.

3 Implement management strategies that will restore good conditions to degraded riparian communities as soon as possible.

DETERMINATIONS FOR THE MEXICAN SPOTTED OWL

No Effect

No livestock grazing or livestock management activities will occur within protected and restricted habitats, as defined by the species' recovery plan.

May Affect, Not Likely to Adversely Affect (must meet all of the criteria)

Livestock grazing or livestock management activities will occur within PACs, but no human disturbance or construction actions associated with the livestock grazing will occur in PACs during the breeding season.

Livestock grazing and livestock management activities within protected and restricted owl habitats will be managed for levels that provide the woody and herbaceous vegetation necessary for cover for rodent prey species, the residual biomass that will support prescribed natural and ignited fires that would reduce the risk of catastrophic wildfire in the Forest, and regeneration of riparian trees.

In mountain meadows (subject to seasonal livestock use May-October), which are owl foraging areas, livestock grazing will be at a level that maintains a minimum cover height of 4 in. of herbaceous vegetation, providing cover for the owls' prey species. The 4 in. stubble height minimum will be met 10 days after the onset of summer rains or August 1, whichever comes first, and maintained through the end of the grazing season.

SOUTHWESTERN WILLOW FLYCATCHER *(Empidonax traillii extimus)*

Endangered Species Act Status:	Endangered (March 29, 1995)
Forest Occurrence:	Apache-Sitgreaves, Cibola, Carson, Coconino, Gila, Prescott, Santa Fe, Tonto
Recovery Plan:	Yes (Draft April 2001)
Critical Habitat:	No

Description. The southwestern willow flycatcher is a small passerine bird about 5.75 in (15 cm) in length and weighing 0.4 oz (11 gm). Its song is a sneezy-fitz-bew or fit-za-bew, and the call is a repeated whit. Flycatchers typically produce these or variations of these calls when disturbed or agitated.

Life History. One of four currently recognized flycatcher subspecies (Phillips 1948, Unitt 1987), the southwestern willow flycatcher is a neotropical migrant that breeds in the southwestern United States and migrates to Mexico, Central America, and extreme northern South America during the nonbreeding season (Phillips 1948). This subspecies begins arriving on breeding grounds in Arizona and New Mexico in late April and early May (Maynard 1994, Sferra *et al.* 1995). Flycatchers generally leave the United States by mid-September. It is an insectivorous bird and hunts by perching on a branch and making short, direct flights, also called sallies, to capture flying insects. Nesting begins in late May and early June, and renesting attempts can continue into late July (with late fledging to mid-August). Flycatchers lay three to four eggs (smaller clutch sizes with successive renests) and incubate for 12-13 days. Fledging occurs in 12-15 days.

Habitat. The flycatcher is a riparian obligate, nesting along rivers, streams, and other wetlands where dense growths of willow (*Salix* spp.), baccharis (*Baccharis* spp.), buttonbush (*Cephalanthus occidentalis*), boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.) or other plants are present, often with a scattered overstory of cottonwood (*Populus* spp.) and/or willow. Historic nest locations of the flycatcher throughout its range are not well known. It is not known whether the habitats where they are located today are representative of all the different habitat types they could use for nesting. The flycatcher's use of dense salt cedar at the inflows or perimeter of human-made lakes in Arizona, along with canopy use of mature box elders along water ditches in southwestern New Mexico, are indicative of how this subspecies uses a variety of habitats. Understanding the full range of potential flycatcher habitats is complicated by human-caused watershed changes, patchy flycatcher distribution, and low flycatcher population numbers.

As populations recover, flycatchers could occupy riparian habitats that today might be considered marginal or unsuitable. Patches of dense, multi-storied vegetation found on broad portions of otherwise steep, narrow creeks, may become secondary habitat for nesting southwestern willow flycatchers after preferred habitats are occupied. Applying rigid requirements for flycatcher potential habitat based on current understanding may not be the most appropriate way to recover the species. The following habitat descriptions should be used as guidance, due to the need for further information about factors that lead to flycatcher site occupation.

Suitable Habitat

The flycatcher nests in dense riparian vegetation that is generally taller than 3-4 m, depending on elevation and vegetation types, with a high percentage of canopy cover, and often along rivers, streams, swamps, seeps, irrigation ditches, or other wetlands. Perennial flow, surface water, or saturated or moist soil is usually located in, adjacent to, or nearby nesting areas from April through September. The distance between the nest and these hydrologic conditions is documented to be as far as 120-150 m, especially when subsurface flow is keeping soils moist around the site. More typically, the nest is within 50-100 m of these hydrologic conditions. Farther distances have also been observed, especially in situations where reservoirs have receded.

Vegetation species composition and structure vary across the range of the flycatcher. The variation ranges from homogenous patches of one or several species with a single canopy layer to heterogeneous patches of numerous species with distinct under-, mid-, and over-stories. Canopy cover is consistently high (greater than 90 percent) throughout the range (Spencer *et al.* 1996, Cooper 1996). Flycatchers are known to nest in mature, dense coyote willow (*Salix exigua*) patches, sometimes with a sparse overstory of cottonwood, as well as habitat that is a mixture of native and nonnative riparian species, including tree willow (*Salix goodingii*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolia*), box elder (*Acer negrundo*), and various other species. Along the Gila River near Cliff, New Mexico, flycatchers nest in mature boxelder with a relatively open understory. At this site, nests are typically located much higher (20-60 ft) than the average range-wide nest height. Flycatchers have also been found in large stands of monotypic saltcedar in Arizona, Nevada, and California. Along the Rio Grande in New Mexico, nesting flycatchers have been found in predominantly saltcedar vegetation, with other nonnative species also occurring in the patch (D. Ahlers, Bureau of Reclamation, pers. comm. 1999). Many areas that are predominant or monotypic saltcedar or Russian olive in New Mexico have not yet been surveyed, as of 2000.

Channels associated with flycatcher-preferred streams are often wide and shallow, with a well-defined floodplain and broad valley. Many of the streams are either not or slightly entrenched, with well-defined meanders and riffle/pool bed features. Gradients are often less than 1 percent. Headwaters are usually not suitable unless they are low in gradient. Quiet water dominates, as in backwaters, pools, beaver ponds, or non-riffle stream stretches. Beaver ponds may be of particular importance in areas where the stream gradient is above 1 percent. In the case of wetlands and shorelines, water levels can fluctuate significantly. Water may recede from the nesting area by the end of the nesting season.

There are no observed patch-age requirements, but structure must meet perching and nesting needs for height and density. Song perches are necessary, but can be provided by snags or taller branches of a relatively even patch. Large overstory trees may be present and used for singing, hunting, and observation. Nests are built in shrubs or trees in willow thickets and deciduous woodlands along watercourses. Typically, nests are placed 1.5-8.5 m above ground level, most often in a branch fork, but occasionally on a horizontal branch (Sferra *et al.* 1995). Flycatcher nests have also been found as high as 19 m above ground level.

Distribution. The historical range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and the States of Sonora and Baja California Norte in extreme northwestern Mexico. Current known breeding distribution has a similar extent, and includes southern California and Baja California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, and southwestern Colorado (Unitt 1987). Using data collected between 1993 and 1999, estimated State totals throughout the current distribution included about 328 territories in New Mexico, 298 in Arizona, 173 in California, 54 in Colorado, 17 in Utah, and 44 in Nevada, for a total of about 914 territories range-wide (Paradzick *et al.* 2000; M. Sogge, U.S. Geological Survey, pers. comm. 2000; Williams and Leal 1999; Spencer *et al.* 1996; Sferra *et al.* 1995; Parker and Hull 1995; Maynard 1994; Whitfield 1994; Whitfield and Strong 1995; Holmgren, *in litt.*). The number of territories represents the approximate number of singing or displaying males located, but does not necessarily equal the number of breeding pairs. In 1998, applying the same data used to estimate the approximate number of territories, the estimated number of pairs of southwestern willow flycatchers was 550-650 (Sogge 1999).

In Arizona, the flycatcher historically ranged along major river systems and probably major tributaries. Historical records exist from the Colorado River near Lee's Ferry and near the Little Colorado River confluence (A. Phillips, pers. comm., cited in Unitt 1987), the Santa Cruz River near Tucson (Swarth 1914, Phillips 1948), the Verde River at Camp Verde (Phillips 1948), the Gila River at Fort Thomas (W.C. Hunter, pers. comm., cited in Unitt 1987), the White River, the upper and lower San Pedro River (Willard 1912, Phillips 1948), and the Little Colorado River headwaters area (Phillips 1948). Currently, resident flycatchers occur along 12 drainages in Arizona, including the Colorado, Bill Williams, Verde, Salt, Tonto Creek, Big Sandy, Gila, San Pedro, Santa Maria, Little Colorado, San Francisco, and Hassayampa drainages (Paradzick *et al.* 2000, Sferra *et al.* 1995, Spencer *et al.* 1996). The flycatcher occurs in Arizona on the Apache-Sitgreaves and Tonto NFs, and on private land near the Prescott and Coconino NFs.

In New Mexico, breeding flycatchers occur along major river systems, tributaries and creeks. Flycatchers are known to breed in eight major drainages, with records from the Rio Grande, Chama, Zuni, Coyote Creek, Gila, Rio Nutria, Bluewater Creek, and San Juan drainages (Hubbard 1987, Cooper 1996, Maynard 1994). Territorial males have also been located in the San Francisco River drainage (Williams and Leal 1999). Currently, the flycatcher occurs on the Carson, Cibola, and Gila NFs, and on non-FS land near the Santa Fe and Gila NFs in New Mexico.

<u>Effects Analysis</u>. In the final rule to designate the flycatcher as endangered, the FWS describes activities that could potentially harm the flycatcher and result in take of the subspecies. The activities listed that involve livestock grazing are: 1) livestock grazing that results in direct or indirect destruction of riparian habitat; and 2) activities such as continued presence of livestock and fragmentation of flycatcher habitat that facilitate brood parasitism by the brown-headed cowbird (U.S. Fish and Wildlife Service 1995a). On NF lands, the main cause of decline in flycatcher habitat can be attributed to the destruction, modification, and fragmentation of habitat. Livestock grazing has contributed to the destruction, modification, and in some cases, fragmentation of flycatcher habitat. Nest parasitism by brown-headed cowbirds (*Molothrus ater*) is also partly responsible for declines in flycatcher populations. Individual populations are threatened by small size, nest parasitism by brown-headed cowbirds, and nest predation. A critical season (April 1 through July 31), rather than the breeding season, has been delineated for situations in which brown-headed cowbird parasitism is a concern (Rob Marshall, FWS, pers. comm.; U.S. Fish and Wildlife Service 1995b). The removal of cowbird attracting activities by the beginning of the critical season in April allows a period of approximately one month for cowbirds to depart from the area before flycatchers arrive for breeding. Restricting activities until July 31 minimizes the presence of cowbirds during the egg-laying and incubation period (mid-June to end of July) and will decrease the potential for nest parasitism.

Livestock grazing in occupied areas may pose a direct threat to flycatchers by physically disturbing or damaging the nest, or spilling contents of the nest as they walk by (U.S. Fish and Wildlife Service 1993). This is especially true in single-story or regenerating stands. Livestock grazing in potential flycatcher habitat can retard the growth of woody vegetative species, slowing or arresting progression towards suitable habitat. Livestock overgrazing in suitable habitat may not allow for retention of vegetative characteristics needed for flycatcher nesting.

Livestock overgrazing in riparian areas indirectly affects the flycatcher through habitat degradation and modification of riparian areas (U.S. Fish and Wildlife Service 1993a). If given the opportunity, livestock can first overuse the herbaceous component and if they are not removed or redirected, they will begin feeding on riparian shrubs and young trees. This results in changes in plant structure and reduction of plant diversity and density (Bock *et al.* 1992). Year-round or summer livestock grazing appear to be particularly damaging to riparian habitats (Bock *et al.* 1992). During these periods, regeneration of critical tree species such as willow, boxelder, and cottonwood may be curtailed (U.S. Fish and Wildlife Service 1993a). In addition to direct herbivory of woody species, livestock can destroy riparian habitat by bedding, trampling, and trailing through it. These effects can be significant, especially if livestock concentrate in an area and the plants are small.

Other impacts that livestock overgrazing has on riparian habitats include compaction of surface soil that reduces infiltration and increases surface runoff, reduction of bank stability which leads to accelerated erosion and increased sedimentation, and removal of organic material due to reduction in plant vigor and density (Verde Natural Resources Conservation District 1993). These impacts result in increased susceptibility to destruction of a riparian area during heavy flow events. Livestock grazing during the sprouting and regeneration of the cottonwood/willow community after these flood events has led to increased fragmentation, reduced or eliminated recruitment, and ultimately, total degradation. As native plant species try to compete with non-natives, livestock's preference for native plants favors establishment of nonnatives. Changes in riparian areas as a result of livestock overgrazing are often linked to more widespread changes in watershed hydrology.

Increases in flycatcher populations have been observed where livestock grazing has been reduced, modified, or eliminated in riparian areas. Harris *et al.* (1987) observed flycatchers increase by 61 percent over a 5-year period after grazing was reduced. Dramatic increases in other avian species associated with cottonwood/willow habitat were found on Arizona's San Pedro River 4 years after the removal of livestock.

Brown-headed cowbird parasitism is known to have detrimental effects on neotropical migratory birds including the flycatcher (Robinson *et al.* 1992). Cowbirds are brood parasites and parasitize smaller songbirds. Cowbird parasitism can impact host populations in several ways: 1) upon laying eggs, female cowbirds dispose of one or more host eggs; 2) the thick eggs of cowbirds often break the host eggs when laid; 3) cowbird eggs hatch earlier than host eggs; and 4) cowbird young are larger than host young and grow faster, beg louder, and have larger gapes (Robinson *et al.* 1992).

Detrimental effects of cowbird parasitism have increased throughout the Southwest and these effects are directly associated with settlement of the west. Development of livestock and agricultural operations have allowed expansion of brown-headed cowbird habitat by providing feeding areas where grazing livestock concentrate. Livestock feedlots, dairy operations, ranch headquarters, and other agricultural operations where grains and forage are fed to livestock provide food sources near host species nesting habitats (Hanna 1928, Mayfield 1977). Other human attractants to cowbirds also include bird feeders, lawns, golf courses, and agricultural fields.

The expansion of agriculture, livestock grazing, and widespread human activities have caused fragmentation of forest and woodland habitats. Habitat fragmentation has been documented to increase edge effects, increasing the potential for predation, including parasitism by the brown-headed cowbird. Riparian habitats in the Southwest are linear and naturally have a high amount of edge (Spencer *et al.* 1996). Tall, dense, impenetrable vegetation and large patch sizes will minimize the ability of cowbirds to see down through the canopy or in from the edge, and this may reduce parasitism rates.

The distance cowbirds travel from feeding areas to riparian areas where females lay their eggs vary among sites, depending on numerous factors, including cowbird attracting activities on surrounding lands, location and abundance of suitable feeding areas in relation to suitable breeding and egg laying areas, land ownership patterns, and other factors. Due to variability in cowbird traveling distances and lack of research specific to the Southwest, there is considerable controversy on designating a set distance in which cowbird parasitism is considered a concern. However, for this guidance document, a set distance in which to evaluate the possibility of cowbird parasitism as related to livestock grazing is required. After reviews of the literature and discussions with experts on cowbird behavior in the Southwest, the Southwestern Willow Flycatcher Recovery Team determined that restricting livestock activities within 2 mi of an occupied site during the critical season would remove the majority of threat of cowbird parasitism. As the Southwestern Willow Flycatcher Recovery Team's guidelines are applied and results are monitored, the 2-mile criterion may change. This may precipitate a need to re-evaluate any effects determinations made in this guidance document.

Trapping brown-headed cowbirds has been documented to reduce parasitism rates on the flycatcher and other host species. On the Kern River in California, parasitism rates dropped from between 50-80 percent to below 10 percent after the implementation of a trapping program (Whitfield 1993, Spencer *et al.* 1996).

Poor watershed conditions in the uplands can have adverse indirect effects on flycatcher habitat. Livestock grazing (as well as other activities such as timber harvesting, roads and trails construction, off-road-vehicle use, heavy recreational use in concentrated areas, large-scale fires, resource extraction, and other ground-disturbing activities) can contribute to poor watershed conditions. Such activities result in the removal of organic material on the soil surface. Removal of vegetation cover, in addition to compaction, decreases infiltration of the soil, which enhances surface runoff (U.S. Fish and Wildlife Service 1993b). Increased runoff in turn then results in increased silt loads, increased turbidity, decreased water quality, increased scouring during high flows, and altered pH levels. All of these impacts can have an indirect adverse effect to riparian areas, including flycatcher habitat.

Assessing the effects of various activities on the flycatcher requires consideration of the dynamic interactions within riparian ecosystems and their watersheds. Management of riparian ecosystems should consider their adaptation to flood events and the necessity of floods for regeneration of species like cottonwoods and willows. Fully functioning, healthy riparian ecosystems can readily absorb and quickly recover from relatively major flood events. Degraded systems cannot withstand flood events, and additional resource damage often occurs. Uplands degraded by overgrazing often promote surges that are flashier, with higher peak flows and reduced low flows. While flooding is very important to riparian habitat, unnaturally flashy flooding can be damaging and prevent further recruitment, particularly in degraded riparian systems.

DETERMINATIONS FOR THE SOUTHWESTERN WILLOW FLYCATCHER

No Effect

Livestock grazing on the allotment will not occur within any subwatershed that drains into southwestern willow flycatcher habitat.

May Affect, Not Likely to Adversely Affect (must meet all of the of the criteria)

Livestock use will not occur within 5 miles of occupied habitat during the breeding season, or will not occur within 2 miles if cowbird trapping and monitoring or an approved cowbird research program is in place.

Livestock grazing in unoccupied suitable habitat will not reduce the suitability, nor reduce the likelihood of suitable habitat to expand to the site's potential.

No livestock grazing will occur in potential habitat.

Subwatershed condition in the presence of livestock grazing will be maintained or improved and indicators of watershed health and TEP species habitat demonstrate that effects will be insignificant or discountable.

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APPENDIX C

ADDENDUM TO 2002 LIVESTOCK GRAZING ON THE CORONADO NATIONAL FOREST

OCTOBER 7, 2002

Addendum to 2002 On-going Grazing Reinitiation Biological Assessment

Gila Topminnow Consultation Reinitiation
Biological Assessment for Threatened and Endangered Species
Prepared by Bob Csargo
October 7, 2002

Introduction: This brief analysis is being completed in a very short time period due to meeting legal deadlines and to comply with the updated Guidance Criteria (2002), regarding the 2002 Grazing Reinitiation for on-going grazing on the Coronado National Forest. The scope of this analysis includes only allotments with on-going grazing that may affect Gila topminnow populations and/or its habitats. The assessment of these allotments were overlooked in the 1998 Biological Assessment and in the 1998 Biological Opinion regarding on-going livestock grazing.

Project Location: This Biological Assessment analyzes the effects of livestock grazing on Gila topminnows and their habitats only where livestock grazing occurs within allotments that are in the same subwatershed that drains into Gila topminnow occupied habitat. This situation occurs only on the Sierra Vista and Nogales Ranger Districts and only in the Cienega Creek, Sonoita Creek, Lower Santa Cruz, and Middle Santa Cruz 5th code watersheds.

Purpose of the Biological Assessment: The purpose of this Biological Assessment is to evaluate the potential effects of on-going grazing on the Gila Topminnow, using the April 15, 2002 Guidance Criteria and other available information, and to determine whether the species or habitats are likely to be adversely affected by this action (50 CFR 402.12 (a)). Future, more complete and detailed analysis of the documented and potential effects of livestock grazing on individual allotments could result in different conclusions on some allotments.

Project Description: Refer to 2002 Biological Assessment of On-going and long-term grazing on the Coronado National Forest.

Table 1 displays some Gila Topminnow locations and the number and general location of allotments where livestock grazing activities may affect these populations.

Table 1. Occupied Gila Chub Habitat locations and allotments where livestock grazing may affect these populations.

Occupied habitat	Critical Habitat	Stream miles	5th code watershed Name*	5th code watershed #	Affected allotments***	EMA affected
Santa Cruz River	No	~14+**	Lower Santa Cruz	1505030157	11	Tumacacori and Santa Rita
Santa Cruz River	No	~14+**	Middle Santa Cruz	1505030155	7	Tumacacori
Sonoita Creek	No	~20+	Sonoita Creek	1505030156	11	Santa Rita
Cienega Creek	No	~10	Cienega Creek	1505030259	12	Santa Rita and Whetstone

*Lower and Middle Santa Cruz and Cienega Creek watersheds drain to the Santa Cruz River. The Sonoita Creek watershed drains to Sonoita Creek, which drains to the Santa Cruz.
** Same stream miles; most stream miles are limited to intemittent flows
*** Some allotments are counted twice due to an allotment sometimes being located in 2 different subwatersheds which may affect 2 different populations of Gila topminnow.

There are 3 primary areas on the Coronado NF where management activities (including livestock grazing) may affect the Gila Topminnow. **Table 2** displays these general locations and the current subwatershed condition

Table 2. Gila Topminnow locations and watershed condition.

Gila Topminnow Locations	5th code watershed	5th code watershed #	Watershed Condition (GES)*
1. Upper Cienega Creek	Cienega Creek	1505030259	48% Satisfactory 44% Unsatisfactory 8% Unsuited
2. Sonoita Creek	Sonoita Creek	1505030156	58% Satisfactory 35% Unsatisfactory 7% Unsuited

3. Lower Santa Cruz River	Lower Santa Cruz	1505030157	47% Satisfactory 43% Unsatisfactory 10% Unsuited
	Middle Santa Cruz	1505030155	34% Satisfactory 66% Unsatisfactory 0% Unsuited

***General Ecosystem Survey (GES), published by USDA Forest Service in 1991. The GES is mapped at a scale of 1:250,000.**
Satisfactory = Current Soil Loss<Tolerance Soil Loss>Natural Soil Loss; Not compacted
Unsatisfactory = Current Soil Loss>Tolerance Soil Loss>Natural Soil Loss; Compacted
Unsuited = Current Soil Loss>Tolerance Soil Loss< Natural Soil Loss

Table 3 displays selected parameters considered important in identifying key elements whose spatial location and ecological condition may contribute to affecting Gila topminnow occupied habitat.

Table 3. Grazing Allotment Characteristics

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Agua Caliente	9234	Santa Rita	Poor to good/static trend	30% sat. 20% impaired 25% unsat. 25% unsuited	Agua Caliente	Lower Santa Cruz River	Yes	8 stream miles via Cottonwood Cyn. to occupied habitat in Santa Cruz River.
Alto	11216	Santa Rita	Poor to good/static trend	37% sat. 27% impaired 10% unsat. 25% unsuited	Josephine Canyon	Lower Santa Cruz River	Yes	12 stream miles via Josephine Cyn. to occupied habitat in Santa Cruz River.

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Sopori	20682	Tumacacori	Fair to good/static	52% sat. 31% impaired 11% unsat. 6% unsuited	Sardina, Moyza, and Puerto Canyons	Lower Santa Cruz River	Yes	3 stream miles via Puerto and Aliso Cyns and Tubac Creek. to occupied habitat in Santa Cruz River.
Sardina	12069	Tumacacori	Fair/static	93% sat. 7% impaired	Jalisco, Apache, E. Fork Apache Canyon	Lower Santa Cruz River	Yes	No apparent major drainages to Sonoita Creek
Rock Corral	5552	Tumacacori	Poor to fair/static	50% sat. 47% impaired 1% unsat. 2% unsuited	Rock Corral Canyon	Lower Santa Cruz River	Yes	2 stream miles via Rock Corral Cyn. to occupied habitat in Santa Cruz River.
Murphy	9386	Tumacacori	Poor to fair/static	62% sat. 38% impaired		Lower Santa Cruz River	Yes	3 stream miles via Negro Cyn. to occupied habitat in Santa Cruz River.
Ramanote	16833	Tumacacori	Poor to fair/static	54% sat. 46% impaired 1% unsat.	Fresno canyon	Lower Santa Cruz River	Yes	2 stream miles via Peck Cyn. to occupied habitat in Santa Cruz River.
Bear Valley	22710	Tumacacori		75% sat. 16% impaired 8% unsat. 1% unsuited		Lower Santa Cruz River	yes	No apparent major drainages to Sonoita Creek

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Pena Blanca	11459	Tumacacori	Fair/static	61% sat 29% impaired 9% unsat.	Pena Blanca Canyon	Lower Santa Cruz River	Yes	8 stream miles via Walker/Aqua Fria Cyn. to occupied habitat in Santa Cruz River.
Calabasas	8975	Tumacacori	Poor to fair/static	50% sat. 40% impaired 10% unsat.	Calabasas	Lower Santa Cruz River	Yes	3 stream miles via Calabasas Cyn. to occupied habitat in Santa Cruz River.
Marstellar	10741	Tumacacori	Fair to good/static	51% sat. 48% impaired	Calabasas	Lower Santa Cruz River	Yes	6 stream miles via Calabasas Cyn. to occupied habitat in Santa Cruz River.
Mariposa	6757	Tumacacori	Fair/static	46% sat. 41% impaired 14% unsat.	Potrero	Lower Santa Cruz River	Yes	8 stream miles via Potrero Cyn. to occupied habitat in Santa Cruz River.
Fort	7103	Santa Rita	Fair to good/static	58% sat. 14% impaired 14% unsat. 14% unsuited	Adobe Canyon	Sonoita Creek	Yes	9 stream mile via Adobe Cyn. to occupied habitat in Sonoita Creek

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Temporal	21589	Santa Rita	Fair/static trend	86% sat 13% unsat 1% unsuited	Temporal Canyon	Sonoita Creek	Yes	6 stream miles via Temporal Cyn. to occupied habitat in Sonoita Creek. 6 stream miles via Casa Blanca Cyn. to occupied habitat in Sonoita Creek.
Squaw Gulch	9281	Santa Rita	Poor to fair/static	40% sat. 50% unsat. 10% unsuited	Squaw Gulch	Sonoita Creek	Yes	2 stream miles via Squaw Gulch and Temporal Cyn. to occupied habitat in Sonoita Creek.
DeBaud	2795	Santa Rita	Fair to good/static trend	52% sat 48% impaired	Papago Cyn.	Cienega Creek	Yes	8 stream miles via Papago Cyn. to occupied habitat in Cienega Ck.
Rosemont	9714	Santa Rita	Fair/static trend	58% sat 28% impaired 14% unsat	Barrel Cyn.	Cienega Creek	Yes	7 stream miles via North Cyn. to occupied habitat in Cienega Ck

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Oak Tree I and II	4963	Santa Rita	Fair to good/static trend	75% sat 25% impaired		Cienega Creek	Yes	9 stream miles via Los Posos Gulch. to occupied habitat in Cienega Ck 6 stream miles via Empire Gulch to occupied habitat in Cienega Creek and 6 stream miles via Oak tree Cyn. to occupied habitat in Cienega Creek
Thurber	5000	Santa Rita	Fair/static trend	75% sat 25% impaired	Empire Gulch	Cienega Creek	Yes	5 stream miles via Empire Gulch. To occupied habitat in Cienega Ck
Gardner Canyon	12353	Santa Rita	Fair/static trend	79% sat 21% impaired	Gardner Cyn.	Cienega Creek and Sonoita Creek	Yes	7 stream miles via Gardner and Smith Canyons to occupied habitat in Cienega Ck 3 stream miles via Fort Cyn. to occupied habitat in Sonoita Ck

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Apache Springs	13073	Santa Rita	Fair to good/static trend	80% sat 14% impaired	Gardner Cyn.	Cienega Creek	Yes	15 stream miles via Gardner Cyn. to occupied habitat in Cienega Ck
Greaterville	4549	Santa Rita	Fair to good/static trend	80% sat 20% impaired	Enzenberg Cyn.	Cienega Creek	Yes	8 stream miles via Enzenberg Cyn to occupied habitat in Cienega Ck
Knear	3899	Whetstone	Poor to fair/static trend	64% sat. 35% unsat. 1% unsuited		Cienega Creek	yes	No apparent major drainages to Cienega Creek occupied habitat
Wakefield	10030	Whetstone	Poor to fair/upward	51% sat. 16% unsat. 33% unsuited	Willow Creek Montosa Canyon Wakefield Canyon	Cienega Creek	Yes	6 stream miles via Montaso Cyn to occupied habitat in Cienega Cyn.
Coal Mine	3003	Whetstone	Fair/static trend	30% sat 29% unsat 41% unsuited	Shellenberger	Cienega Creek	Yes	6 stream miles via Shellenberger Cyn to occupied habitat in Cienega Ck
Mescal	17686	Whetstone	Fair/static trend	92% sat 8% impaired	French Joe Dry Canyon	Cienega Creek	Yes	7 stream miles via Death Trap Cyn to occupied habitat in Cienega C

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Oak Bar	11314	Huachuca	Very poor to fair/static	36% sat. 64% unsat.	Three R Canyon	Sonoita Creek and Lower Santa Cruz River	Yes	2 stream miles via 3R Canyon to occupied habitat in Sonoita Creek 10 stream miles via Canada de la Paloma Canyon to occupied habitat in the lower Santa Cruz River
Santa Cruz	11652	Huachuca	Poor to fair/static	26% sat. 74% unsat.	Wild Hog Canyon	Lower Santa Cruz River	Yes	10 stream miles via Wild Hog Canyon to occupied habitat in the lower Santa Cruz River
Alisos/ Sierra Tordilla	11366	Huachuca	Very poor to poor/static	53% sat./45 sat 46% unsat/55% unsat 1% unsuited	Sycamore canyon	Lower Santa Cruz River	Yes	10 stream miles via Sycamore Canyon occupied habitat in the lower Santa Cruz River
Weiland	2088	Huachuca	Poor/downward	77% sat. 20% unsat. 3% unsuited	Harshaw Creek	Sonoita Creek	Yes	3 stream miles via Harshaw Creek to occupied habitat in Sonoita Creek

Allotment	Total Acres	EMA	General Range Condition/Trend	Soil Condition**	Major drainages	Gila Topminnow pop. Potentially affected by livestock	Livestock access to Riparian areas	Distance to occupied Gila topminnow habitat*
Lewis	1060	Huachuca	Very poor to poor/downward	76% sat. 20% unsat. 4% unsuited	Harshaw Creek	Sonoita Creek	Yes	3 stream miles via Harshaw Creek to occupied habitat in Sonoita Creek
MacFarland	1042	Huachuca	Poor/downward	94% sat. 6% unsat.	Harshaw Creek	Sonoita Creek	Yes	4 stream miles via Harshaw Creek to occupied habitat in Sonoita Creek
Red Mountain	1220	Huachuca	Poor/static	91% sat. 9% unsat.		Sonoita Creek	Yes	1 stream mile via unnamed drainages to occupied habitat in Sonoita Creek
Bender	3180	Huachuca	Fair to good/static	92% sat. 6% unsat. 3% unsuited	Harshaw Creek	Sonoita Creek	Yes	5 stream miles via Alum Canyon to occupied habitat in Sonoita Creek
Harshaw	9302	Huachuca	Fair/static	95% sat. 5% unsat.	Harshaw Creek	Sonoita Creek	Yes	5 stream miles via Harshaw Creek to occupied habitat in Sonoita Creek
Farrell	6429	Huachuca	Poor/downward	65% sat. 35% unsat.	Harshaw Creek	Sonoita Creek	Yes	6 stream miles via Corral Cyn. and Harshaw Creek to occupied habitat in Sonoita Creek

* Stream miles are estimates. Potential livestock grazing effects to Gila topminnow habitat may also occur from other drainages not identified on this table.
** Soil condition % mostly taken from 1995 ? 1999 data on the Santa Rita and Tumacacori allotments
Soil condition % mostly taken from 1990 data on the Whetstone and Huachuca allotments

Table 4. 5th Code Watershed Condition

Allotment	EMA	5th Code Watershed*	Watershed Condition
Agua Caliente	Santa Rita	Lower Santa Cruz	47% Satisfactory
Alto	Santa Rita	Lower Santa Cruz	47% Satisfactory
Sopori	Tumacacori	Lower Santa Cruz	47% Satisfactory
Sardina	Tumacacori	Lower Santa Cruz	47% Satisfactory
Rock Corral	Tumacacori	Lower Santa Cruz	47% Satisfactory
Murphy	Tumacacori	Lower Santa Cruz	47% Satisfactory
Ramanote	Tumacacori	Lower Santa Cruz	47% Satisfactory
Bear Valley	Tumacacori	Lower Santa Cruz	47% Satisfactory
Pena Blanca	Tumacacori	Lower Santa Cruz	47% Satisfactory
Calabasas	Tumacacori	Lower Santa Cruz	47% Satisfactory
Marstellar	Tumacacori	Lower Santa Cruz	47% Satisfactory
Calabasas	Tumacacori	Middle Santa Cruz	34% Satisfactory
Marstellar	Tumacacori	Middle Santa Cruz	34% Satisfactory
Mariposa	Tumacacori	Middle Santa Cruz	34% Satisfactory
Gardner Canyon	Santa Rita	Sonoita Creek	58% Satisfactory
Fort	Santa Rita	Sonoita Creek	58% Satisfactory
Temporal	Santa Rita	Sonoita Creek	58% Satisfactory
Squaw Gulch	Santa Rita	Sonoita Creek	58% Satisfactory
DeBaud	Santa Rita	Cienega Creek	48% Satisfactory
Rosemont	Santa Rita	Cienega Creek	48% Satisfactory
Oak Tree I	Santa Rita	Cienega Creek	48% Satisfactory
Oak Tree II	Santa Rita	Cienega Creek	48% Satisfactory
Thurber	Santa Rita	Cienega Creek	48% Satisfactory
Greaterville	Santa Rita	Cienega Creek	48% Satisfactory
Apache Springs	Santa Rita	Cienega Creek	48% Satisfactory
Gardner Canyon	Santa Rita	Cienega Creek	48% Satisfactory

Allotment	EMA	5th Code Watershed*	Watershed Condition
Knear	Whetstone	Cienega Creek	48% Satisfactory
Wakefield	Whetstone	Cienega Creek	48% Satisfactory
Coal Mine	Whetstone	Cienega Creek	48% Satisfactory
Mescal	Whetstone	Cienega Creek	48% Satisfactory
Oak Bar	Huachuca	Middle Santa Cruz	34% Satisfactory
Santa Cruz	Huachuca	Middle Santa Cruz	34% Satisfactory
Alisos	Huachuca	Middle Santa Cruz	34% Satisfactory
Sierra Tordilla	Huachuca	Middle Santa Cruz	34% Satisfactory
Weiland	Huachuca	Sonoita Creek	58% Satisfactory
Lewis	Huachuca	Sonoita Creek	58% Satisfactory
MacFarland	Huachuca	Sonoita Creek	58% Satisfactory
Red Mountain	Huachuca	Sonoita Creek	58% Satisfactory
Bender	Huachuca	Sonoita Creek	58% Satisfactory
Harshaw	Huachuca	Sonoita Creek	58% Satisfactory
Farrell	Huachuca	Sonoita Creek	58% Satisfactory

*All or a portion of individual allotments are within identified 5th code watersheds. Individual allotments may also lie in other watersheds that do not drain into Gila topminnow occupied habitat. If any portion of an allotment lies within a subwatershed that drains into occupied habitat, it is identified in this table and elsewhere in this document.

Table 5. Effects of watershed or discharge alterations on aquatic species (Reid 1961; Ward and Stanford 1979; Waters 1995; Belsky et al. 1999).

Altered watersheds or discharges can influence:	Which may cause changes in:	Potentially impacting habitat:	Linking to effects on aquatic species

Water quality	-Nutrient concentrations -Bacteria/protozoa -Parasites -Suspended sediments and turbidity -Water temperature regime -Dissolved oxygen levels -Light penetration	-Reduced dissolved oxygen in water column and substrate -Alteration of species composition -Increased health hazards -Increased siltation and embeddedness -Decreased water clarity -Reduced pool volume	-Loss of cold-water species -Loss of habitat specialist species -Shift towards warm-water and sediment-tolerant species composition -Shift towards species that are generalists in habitat preferences -Shift towards smaller-bodied fishes -Loss of ?trophy-sized? individuals -Decreased feeding success of visual feeders -Lowered standing crop -Increased susceptibility to diseases and parasitism -Restricted migration -Interrupted life history patterns -Stranding of individuals -Displacement of individuals -Synergistic effects -Lowered biodiversity -Disruption of spawning -Increased egg and larval mortality -Increased juvenile mortality -Higher population abundance fluctuations (boom and bust) -Altered metabolic rate -Loss of prey species -Increase in algae feeders -Decrease in insects that breakdown litter -Loss of native species -Increased number of species trending towards Federal listing as T&E -Local extirpation -Possible extinction
Stream channel morphology	-Channel form, width, depth, and stability -Streambank stability, bank angle, and undercuts -Bed stability and bedload movement -Pool:riffle ratio -Substrate composition and embeddedness -Water temperature regime -Sediment processing capability -Braiding -Lowered groundwater table	-Narrower or fragmented riparian zone -Increased sedimentation and embeddedness -Loss of pools and meanders -Loss of spawning and nursery habitat -Alteration of species composition -Increased erosion and turbidity -Decreased habitat diversity -Loss of instream cover and shelter	

Hydrology (stream flow patterns)	-Extreme high and low flows -Overland flow -Water velocity -Water table -Median flow -Bed stability -Discharge variance -Seasonal runoff distribution	-Increased erosive stream energy -Increased flooding -Reduced groundwater discharge -Removal of riparian vegetation and instream woody material -Loss of perennial streams -Loss of migration corridors -Loss of spawning and nursery habitat -Narrower or fragmented riparian zone -Increased substrate homogeneity -Increased embeddedness
Riparian zone soils	-Amount of bare ground, soil compaction, and soil disturbance -Erosion -Litter layer -Infiltration and fertility	-Higher erosion and stream sedimentation -Loss of pool volume -Warmer, drier soils -Reduced plant productivity -Reduced plant growth and vegetative cover
Instream vegetation	-Algal blooms -Amount of submergent and emergent vegetation	-Loss of oxygen during algal dieoffs -Reduced sediment trapping -Decreased food supplies -Decrease in instream cover
Streambank vegetation	-Amount of herbaceous cover, biomass, productivity, and structure (age and size) -Species diversity and composition -Plant phenology and succession	-Lowered food and energy input to stream -Reduction of detrital and nutrient input -Increased water temperature fluctuations -Higher water velocities during floods -Less instream woody material -Decreased stream bank stability -Narrower riparian zone -Decrease in instream cover -Reduced sediment trapping/bank building

Determination of Effects for Gila Topminnow using Regional Guidance Criteria

Regional guidance criteria for listed fishes were developed in order to provide streamlined and consistent effects analyses for species that occurred on more than one National Forest (USFS 2001a) (Table 3).

Table 6. Regional guidance criteria for determining the effects of on-going grazing and issuing term grazing permits on selected TEP species and proposed and designated critical habitat.

Regional guidance criteria	Applicability to allotment management plans	
CRITERIA FOR ?NO EFFECT? DETERMINATION	RESPONSE	
1. Livestock grazing will not occur within any subwatershed that drains into TEP habitat, or	Livestock grazing does occur within the Cienega Creek, Middle Santa Cruz River, Lower Santa Cruz River, Sonoita Creek 5th code watersheds. All allotments analyzed in this document are within the same watershed as occupied Gila topminnow habitat and thus drain directly into Gila topminnow occupied habitat.	Not met
2. Livestock grazing on the allotment will be excluded from TEP species habitat, in order to sustain all life stages of TEP species, the subwatershed is in satisfactory condition, and there will not be effects such as:	There is no livestock grazing on Forest Service lands that would directly affect known topminnow occupied habitat.	No direct effects criteria is met
a. Sedimentation (sediment traps occur between the allotment and TEP species habitat). b. Evidence of active erosion caused by livestock or livestock management activities.	All subwatersheds, except one, are < 50% in satisfactory condition. There may be sediment traps between TEP habitat on some allotments and in some drainages. There is evidence of active erosion on many allotments.	Satisfactory condition of subwatersheds is not met on 3 of the 4 subwatersheds Erosion factor is not met on some allotments
CRITERIA FOR ?MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT? DETERMINATION	RESPONSE	
1. TEP species or their habitats are present within the allotment or the subwatershed that drains the allotmen	The Gila topminnow is present in the subwatershed that drains all the allotments addressed in this document. There is potential downstream effects into occupied habitat on all the allotments analyzed in this document.	Met, the topminnow is present in the same subwatersheds as all of the allotments
2. Direct effects are avoided	Gila topminnow occupied habitat is not known on any	Met on all

3. The subwatershed, in the presence of livestock grazing, will be maintained or improved and indicators of watershed health and TEP species habitats demonstrate that effects will be insignificant or discountable.	All of the subwatersheds, except one, addressed in this document are in < 50% satisfactory condition. Range utilization standards may be set too high to achieve significant improvement in a timely manner. Downstream effects cannot be considered insignificant or discountable on any allotment, considered in this analysis, which drains into occupied habitat.	Not met

Determination of effects:

After considering the Regional Guidance Criteria (April 2002), it is my determination that continued livestock grazing management may affect the Gila topminnow and its habitat on 35 of the 38 allotments addressed in this document.

With reference to the preceding guidance criteria, on-going livestock grazing ?**may affect, and is likely to adversely affect?** the Gila topminnow on 35 of the allotments analyzed. This determination is made in view that livestock grazing has potential for indirect impacts on the habitat of Gila topminnow. This conclusion is based on:

- Livestock grazing occurs on the allotment and within subwatersheds which drains into occupied habitat
- All the subwatersheds, except for Sonoita Creek, are < 50 percent in satisfactory condition.
- Although the Sonoita Creek 5th code watershed condition is > 50 percent satisfactory condition, range condition and trend on allotments in this subwatershed was generally poorer than the allotments in the remainder of the watersheds.
- All allotments considered have some degree (5-75 percent) of unsatisfactory and/or impaired soil condition.
- No allotments have an upward trend (except one) and few have good range condition. Range condition is typically fair to poor with a static or downward trend.
- Utilization levels on these allotments have usually resulted in static and downward trends in range conditions. Soil and watershed improvements expected from these current utilization levels is not occurring, likely resulting in downstream effects that are not discountable or insignificant.

The Guidance Criteria state that maintaining or improving watershed conditions can result in a may affect, not likely to adversely affect, determination for the species. However, maintaining < 50 percent satisfactory watershed condition, does not likely benefit the species, nor its habitat. Additionally, the cumulative effects of maintaining typically poor to fair range condition and at least some degree of impaired and/or unsatisfactory soil condition, while allowing livestock access to riparian areas also needs to be considered. These current conditions likely result in measurable and significant effects that are not discountable.

On-going livestock grazing activities ?**may affect, but is not likely to adversely affect?** the Gila topminnow and its habitat on 3 allotments**.** This conclusion is based on the premise that even though the allotments are within the same subwatershed as the Gila topminnow, no major drainages appear to drain directly into Gila topminnow occupied habitat.

Table 7, below, displays the rationale and the determinations of effects call for all the allotments addressed in this document.

Table 7. Effects Determinations for the Gila Topminnow

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Agua Caliente	Lower Santa Cruz	47% Sat.	yes	50%	20% impaired 25% unsat.	Poor to good/static trend	8	MALAA***	Potential adverse indirect downstream effects into occupied habitat
Alto	Lower Santa Cruz	47% Sat.	yes	50%	27% impaired 10% unsat.	Poor to good/static trend	12	MALAA	Potential adverse indirect downstream effects into occupied habitat
Sopori	Lower Santa Cruz	47% Sat.	yes	35% grow s. 45% dorm s.	31% impaired 11% unsat.	Fair to good/static	3	MALAA	Potential adverse indirect downstream effects into occupied habitat
Sardina	Lower Santa Cruz	47% Sat.	yes	35% grow s. 45% dorm s.	7% impaired	Fair/static	No apparent major drainages to Occupied habitat	MANLAA****	Little to no Potential for downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Rock Corral	Lower Santa Cruz	47% Sat.	yes	35% grow s. 45% dorm s.	47% impaired 1% unsat.	Poor to fair/static	2	MALAA	Potential adverse indirect downstream effects into occupied habitat
Murphy	Lower Santa Cruz	47% Sat.	yes	55% dorm. s	38% impaired	Poor to fair/static	3	MALAA	Potential adverse indirect downstream effects into occupied habitat
Ramanote	Lower Santa Cruz	47% Sat.	yes	45%	46% impaired	Poor to fair/static	2	MALAA	Potential adverse indirect downstream effects into occupied habitat
Bear Valley	Lower Santa Cruz	47% Sat.	yes		16% impaired 8% unsat.		No apparent major drainages to Occupied habitat	MANLAA	Little to no Potential for downstream effects into occupied habitat; this allotment was previously determined to nlaa the topminnow

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Pena Blanca	Lower Santa Cruz	43% Sat.	yes	45%	29% impaired 9% unsat.	Fair/static	8	MALAA	Potential adverse indirect downstream effects into occupied habitat
Calabasas	Lower Santa Cruz and Middle Santa Cruz	43% Sat. and 34% Sat.	yes	45%	40% impaired 10% unsat.	Poor to fair/static	3	MALAA	Potential adverse indirect downstream effects into occupied habitat
Marstellar	Lower Santa Cruz and Middle Santa Cruz	47% Sat. and 34% Sat.	yes	45%	48% impaired	Fair to good/static	6	MALAA	Potential adverse indirect downstream effects into occupied habitat
Mariposa	Middle Santa Cruz	34% Sat.	yes	35% grow s. 45% dorm s.	41% impaired 14% unsat.	Fair/static	8	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Fort	Sonoita Creek	58% Sat.	yes	35% grow s. 45% dorm s.	14% impaired 11% unsat.	Fair to good/static	9	MALAA	Potential adverse indirect downstream effects into occupied habitat
Temporal	Sonoita Creek	58% Sat.	yes	35% grow s. 45% dorm s.	13% unsat.	Fair/static trend	6	MALAA	Potential adverse indirect downstream effects into occupied habitat
Squaw Gulch	Sonoita Creek	58% Sat.	yes	35% grow s. 45% dorm s.	50% unsat.	Poor to fair/static	2	MALAA	Potential adverse indirect downstream effects into occupied habitat
Debaund	Cienega Creek	48% Sat	yes	35% grow s. 55% dorm s.	48% impaired	Fair to good/static	8	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Rosemont	Cienega Creek	48% Sat	yes	35% grow s. 45% dorm s.	28% impaired 14% unsat	Fair/static	7	MALAA	Potential adverse indirect downstream effects into occupied habitat
Oak Tree I and II	Cienega Creek	48% Sat	yes	35% grow s. 45% dorm s.	25% impaired	Fair to good/ static	6/9	MALAA	Potential adverse indirect downstream effects into occupied habitat
Thurber	Cienega Creek	48% Sat	yes	35% grow s. 55% dorm s.	25% impaired	Fair/static	5	MALAA	Potential adverse indirect downstream effects into occupied habitat
Gardner Canyon	Cienega Creek and Sonoita Creek	48% Sat and 58% Sat.	yes	35% grow s. 45% dorm s	21% impaired	Fair/static	7/3	MALAA	Potential adverse indirect downstream effects into occupied habitat
Apache Springs	Cienega Creek	48% Sat	yes	35% grow s. 45% dorm s.	14% impaired	Fair to good/static	15	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Greaterville	Cienega Creek	48% Sat	yes	35% grow s. 55% dorm s.	20% impaired	Fair to good/static	8	MALAA	Potential adverse indirect downstream effects into occupied habitat
Knear	Cienega Creek	48% sat.	yes	45%	35% unsat.	Poor to fair/static trend	No apparent major drainages to Occupied habitat	MANLAA	Little to no Potential for downstream effects into occupied habitat
Wakefield	Cienega Creek	48% Sat.	yes	45%	16% unsat.	Poor to fair/upward	6	MALAA	Potential adverse indirect downstream effects into occupied habitat
Coal Mine	Cienega Creek	48% Sat.	yes	45%	29% unsat.	Fair/static trend	6	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Mescal	Cienega Creek	48% Sat.	yes	45%	8% impaired	Fair/static trend	7	MALAA	Potential adverse indirect downstream effects into occupied habitat
Oak Bar	Middle Santa Cruz and Sonoita Creek	34% Sat. and 58% Sat.	yes	45%	64% unsat.	Very poor to fair/static	2/10	MALAA	Potential adverse indirect downstream effects into occupied habitat
Santa Cruz	Middle Santa Cruz	34% Sat.	yes	45%	74% unsat.	Poor to fair/static	10	MALAA	Potential adverse indirect downstream effects into occupied habitat
Alisos/ Sierra Tordilla	Middle Santa Cruz	34% Sat.	yes	45%	46%/55% unsat.	Very poor to poor/static	10	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5th Code Watershed	Watershed Condition	Grazing in the 5th Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Weiland	Sonoita Creek	58% Sat.	yes	45%	20% unsat.	Poor/downward	3	MALAA	Potential adverse indirect downstream effects into occupied habitat
Lewis	Sonoita Creek	58% Sat.	yes	45%	20% unsat.	Very poor to poor/downward	3	MALAA	Potential adverse indirect downstream effects into occupied habitat
MacFarland	Sonoita Creek	58% Sat.	yes	45%	6% unsat.	Poor/downward	4	MALAA	Potential adverse indirect downstream effects into occupied habitat
Red Mountain	Sonoita Creek	58% Sat.	yes	45%	9% unsat.	Poor/static	1	MALAA	Potential adverse indirect downstream effects into occupied habitat
Bender	Sonoita Creek	58% Sat.	yes	45%	6% unsat.	Fair to good/static	5	MALAA	Potential adverse indirect downstream effects into occupied habitat

Allotment	5^{th} Code Watershed	Watershed Condition	Grazing in the 5^{th} Code Watershed	Max utilization Level*	Soil condition **	Range Condition/ Trend	Stream miles to Occupied Habitat	Finding	Rationale
Harshaw	Sonoita Creek	58% Sat.	yes	45%	5% unsat.	Fair/static	5	MALAA	Potential adverse indirect downstream effects into occupied habitat
Farrell	Sonoita Creek	58% Sat.	yes	45%	35% unsat.	Poor/downward	6	MALAA	Potential adverse indirect downstream effects into occupied habitat

* growing season/dormant season
** Only impaired and unsatisfactory % of soils is displayed in this table; a complete picture is shown in Table 3.
*** May affect, likely to adversely affect
**** May affect, not likely to adversely affect

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APPENDIX D

DROUGHT POLICY

SEPTEMBER 2002

Coronado National Forest Drought Policy

The Coronado National Forest will implement the policy when rainfall for the water year (beginning October 1) is less than 75 percent of normal by March 1 and the long-range forecast is for less than normal precipitation.

The Forest will notify all permittees of the conditions and the need to look at ways to limit livestock pressure on the land. Permittees will work with District Ranger and District Range Specialists to determine the best way to address the situation on their allotment. There is not a single answer for the entire Forest but there are basically 2 ways to limit livestock pressure: either reduce numbers or reduce the amount of time on an allotment or in a pasture.

If the summer rains are less than 75 percent by September 1, additional measures may be needed.

While the Forest doesn't have a specific method that will be implemented, the allowable use set for an allotment will not be exceeded. On allotments or pastures with restrictions on season of use that are tied to wildlife needs (such as breeding season restrictions), these will not be violated.

APPENDIX E

PERMIT VIOLATION PROCEDURES

CORONADO NATIONAL FOREST

SEPTEMBER 2002

Permit Violation Procedures

The Forest is currently implementing the following procedures for permit violations.

In situations where the District Ranger is considering the initiation of action to suspend or cancel term permit grazing privileges in whole or in part based on violations of grazing permit terms and conditions, a Notice of Non-compliance letter is issued to the permittee. The notice provides the following information: a) a specific description of the permit violation(s); b) what must be done to achieve compliance; c) a set period of time to correct the violation(s) and achieve compliance, and; d) a warning that the permittee's failure to correct the violation within the prescribed time could result in the initiation of permit suspension or cancellation proceedings.

Immediately upon the expiration of the time period specified in the Notice of Non-Compliance, the District Ranger determines by inspection or otherwise whether the permittee has taken the necessary steps to correct the violation and achieve compliance with the grazing permit. This determination is documented in a certified letter sent to the permittee. In those instances where the violation has not been corrected within the prescribed time, the letter notifies the permittee that a decision has been made to institute permit action proceedings. Among other things, the letter describes the type and extent of the permit action being taken and notifies the permittee of his/her right to seek mediation and/or administrative appeal of the decision.

Permit violations can be divided into those that are of a continuing nature and those that are not. Where "continuing violations are identified, the cure is relatively straightforward the activity resulting in the violation must be modified or terminated. However, where there is a non-continuing violation, the remedial steps are more complicated. One example of a non-continuing violation might be a determination by the Forest Service at the end of the grazing season that the forage utilization levels specified in the grazing permit had been exceeded by the permittee. In this case, nothing can be done to "cure this violation; the over-utilized forage cannot be replaced or restored.

In this case, the District Ranger notifies the permittee in writing prior to the beginning of the next grazing season of: a) the forage utilization standard violation that occurred during the previous season; b) modifications to the grazing operations that may be necessary to avoid future violations; and c) the likelihood that subsequent violations of the grazing utilization standards may result in permit suspension or cancellation.

In situations involving infrequent minor or first-time offences that ordinarily do not warrant initiation of suspension or cancellation proceedings, the District Ranger may discuss the violation with the permittee in a less formal manner.

APPENDIX F

SOILS ANALYSIS

CORONADO NATIONAL FOREST

SEPTEMBER 2002

SOIL, WATERSHED, AND RIPARIAN CONDITION BY EMA

Soil Condition Descriptions

This information is for acres within range allotments only. It does not include areas outside allotment boundaries such as the Pusch Ridge Wilderness Area or the top of the Pinaleno Mountains.

Soil condition is a result of all impacts to the soil over time. The definitions found below include some management implications. Because conditions change slowly, changes in management do not have rapid consequences to soil condition. Corrective actions taken only five or ten years ago may not yet have had an effect on soil condition.

Soil Condition is described as the ability of soil to infiltrate water, resist erosion, and recycle nutrients. It is a relative assessment in that any given soil is compared to water infiltration, erosion resistance, and nutrient recycling for undisturbed soil developed in the same geologic and climatic situation. Information contained in this report is taken directly from the General Ecosystem Survey (GES), a document published by the Southwestern Region of the Forest Service in 1991. The GES is mapped at a scale of 1:250,000, which is most appropriately used at planning levels larger than Range Allotments. In the absence of site specific soil condition information such as is available in the Terrestrial Ecosystem Survey, the GES is used. The soil conditions classification used in the GES "reflects soil disturbance resulting from a management practice and maintenance of soil productivity" (page 48 of the GES). It is also documented on page 48 of the GES that "The majority of effort to date has been to determine the effects of grazing on terrestrial ecosystems" which lends support to using the GES to analyze grazing allotments. The definitions for the rating classifications appear quite simplistic on page 51 of the GES, but that is on the sheet and rill erosion portion of the rating. The other main factor used to rate soil condition is infiltration, a surface soil property affected by ground cover and compaction (page 50 of the GES). In this report, soils that would rate impaired condition in a site specific survey are included in the Unsatisfactory classification. Definitions for the categories:

- Satisfactory = Current Soil Loss<Tolerance Soil Loss>Natural Soil Loss; Not compacted
- Unsatisfactory = Current Soil Loss>Tolerance Soil Loss>Natural Soil Loss; Compacted
- Unsuited = Current Soil Loss>Tolerance Soil Loss<Natural Soil Loss

Current soil loss is the rate of soil loss occurring under present conditions of ground cover (vegetative and litter).
Tolerance soil loss is the rate of soil loss that can occur while sustaining inherent site productivity.
Natural soil loss is the rate of soil loss occurring under conditions associated with a climax class (minimum rate). *(Page 47 of the GES)*

In addition, soils that are gullied are considered to be in unsatisfactory condition. On the Coronado National Forest, all unsuited soils are located on slopes greater than 40 percent . However, many areas greater than 40 percent do not have unsuited soils. The situation is that many areas over 40 percent have satisfactory soil conditions because they are not so steep that natural soil loss exceeds tolerance soil loss, but they are steep enough that there have been no impacts. For this reason, a rugged Ecosystem Management Area (EMA) such as the Winchester has high proportions in satisfactory soil condition compared to a more gentle EMA such as the Huachuca.

Soil Condition from Site Specific Soil Condition Analysis* (See end of Table)						
Allotment	Year	District	percent Satisfactory	percent Impaired	percent Unsatisfactory	percent Unsuited
Barboot	1999	1	99 percent	1 percent	0 percent	n/a
Black Diamond	1999	1	60 percent	10 percent	0 percent	30 percent
Boss	1999	1	56 percent	44 percent	0 percent	n/a
Cave Creek	1998	1	84 percent	0 percent	0 percent	16 percent
Cienega	1999	1	92 percent	8 percent	0 percent	n/a
Dragoon	1995	1	49 percent	37 percent	0 percent	14 percent
Fairchild	2001	1	97 percent	3 percent	0 percent	n/a
Geronimo	2001	1	95 percent	5 percent	0 percent	2 percent
Horseshoe	1999	1	96 percent	4 percent	0 percent	n/a
Hunt Canyon	1999	1	80 percent	20 percent	0 percent	n/a
Maverick	2001	1	89 percent	11 percent	0 percent	n/a
Middlemarch	1996	1	63 percent	15 percent	5 percent	17 percent
Oak	2000	1	78 percent	0 percent	22 percent	n/a
Paradise	1998	1	95 percent	0 percent	0 percent	5 percent
Pedregosa	1999	1	82 percent	18 percent	0 percent	n/a
Pine	1995	1	68 percent	31 percent	0 percent	1 percent
Pinery	1995	1	88 percent	9 percent	0 percent	3 percent
Robertson	1999	1	82 percent	0 percent	7 percent	11 percent
Skull Canyon	1998	1	73 percent	0 percent	0 percent	27 percent
Sulphur Draw	1999	1	97 percent	3 percent	0 percent	n/a
Tex Canyon	1995	1	40 percent	26 percent	24 percent	9 percent
Upper Rock Creek	1996	1	96 percent	2 percent	1 percent	1 percent
Walnut Canyon	2000	1	75 percent	24 percent	0 percent	1 percent
West End	1995	1	closed	closed	closed	closed
West Whitetail	1995	1	69 percent	29 percent	0 percent	2 percent
Willie Rose	1995	1	64 percent	0 percent	36 percent	0 percent
Agua Caliente	1995	2	29 percent	21 percent	24 percent	27 percent
Alto	1995	2	37 percent	27 percent	10 percent	25 percent
Apache Springs	1996	2	80 percent	14 percent	0 percent	7 percent
Bear Valley	1999	2	75 percent	16 percent	8 percent	1 percent
Box Canyon	1995	2	66 percent	23 percent	0 percent	11 percent

Calabasas	1995	2	50 percent	40 percent	10 percent	0 percent
Carrizo	1999	2	49 percent	51 percent	0 percent	0 percent
Cross S	1999	2	90 percent	10 percent	0 percent	0 percent
DeBaud	1997	2	52 percent	48 percent	0 percent	0 percent
Fort	1996	2	58 percent	14 percent	14 percent	14 percent
Fresnal	1999	2	57 percent	43 percent	0 percent	0 percent
Gardner	1997	2	79 percent	21 percent	0 percent	0 percent
Greaterville	1997	2	80 percent	20 percent	0 percent	0 percent
Jarillas	1999	2	96 percent	4 percent	0 percent	0 percent
Mariposa	1995	2	46 percent	41 percent	14 percent	0 percent
Marstellar	1995	2	51 percent	48 percent	0 percent	0 percent
Montana	1999	2	80 percent	18 percent	1 percent	1 percent
Murphy	1995	2	62 percent	38 percent	0 percent	0 percent
Oak Tree	1997	2	75 percent	25 percent	0 percent	0 percent
Oro Blanco	1999	2	74 percent	18 percent	8 percent	0 percent
Pena Blanca	1995	2	61 percent	29 percent	9 percent	0 percent
Proctor (Whitehouse/Madera)	1995	2	16 percent	11 percent	28 percent	45 percent
Ramanote	1995	2	54 percent	46 percent	1 percent	0 percent
Rock Corral	1995	2	50 percent	47 percent	1 percent	2 percent
Rosemont	1997	2	58 percent	28 percent	14 percent	0 percent
Sardina	1999	2	93 percent	7 percent	0 percent	0 percent
Sopori	1995	2	52 percent	31 percent	11 percent	6 percent
Stone Springs	1995	2	50 percent	40 percent	0 percent	10 percent
Temporal	1999	2	86 percent	13 percent	1 percent	n/a
Thurber	1997	2	75 percent	25 percent	0 percent	0 percent
A-Draw	1998	3	72 percent	27 percent	0 percent	0 percent
Campini	1995	3	41 percent	36 percent	23 percent	0 percent
Canelo	1999	3	85 percent	15 percent	0 percent	n/a
Crittenden	1999	3	77 percent	23 percent	0 percent	n/a
Kunde	1999	3	67 percent	33 percent	0 percent	n/a
Lone Mountain	1998	3	60 percent	30 percent	0 percent	10 percent
Lyle Canyon	1999	3	73 percent	26 percent	1 percent	n/a
Manila	1999	3	57 percent	35 percent	8 percent	n/a
Mescal	1995	3	92 percent	8 percent	0 percent	0 percent
Papago	1999	3	50 percent	47 percent	3 percent	n/a
San Rafael	1995	3	15 percent	52 percent	32 percent	1 percent

Seibold	1999	3	30 percent	70 percent	0 percent	n/a
Bass	1995	4	27 percent	0 percent	2 percent	70 percent
Bayless	1995	4	6 percent	2 percent	0 percent	92 percent
Black Rock	1995	4	49 percent	0 percent	0 percent	51 percent
Foster	1995	4	50 percent	0 percent	19 percent	31 percent
Gillespie	2000	4	93 percent	7 percent	0 percent	n/a
Grant Creek	2000	4	100 percent	0 percent	0 percent	n/a
Hawk Hollow	2000	4	95 percent	5 percent	0 percent	n/a
Marijilda	2000	4	93 percent	7 percent	0 percent	n/a
O Bar O	1999	4	86 percent	14 percent	0 percent	n/a
Redtail	1999	4	100 percent	0 percent	0 percent	0 percent
Riley Peak	1995	4	99 percent	0 percent	0 percent	1 percent
Rocky	1995	4	45 percent	13 percent	42 percent	0 percent
San Pedro	1995	4	9 percent	1 percent	0 percent	90 percent
Seventy Six	1995	4	34 percent	44 percent	12 percent	10 percent
Shingle Mill	2000	4	89 percent	8 percent	3 percent	n/a
Sombrero Butte	1995	4	40 percent	3 percent	43 percent	14 percent
Stockton Pass	1995	4	59 percent	17 percent	15 percent	9 percent
Ten	1999	4	98 percent	2 percent	0 percent	n/a
Veach	2000	4	87 percent	11 percent	0 percent	n/a
Wear	1995	4	59 percent	12 percent	27 percent	3 percent
White Streaks	2000	4	94 percent	5 percent	0 percent	n/a
Canada Del Oro	1998	5	95 percent	5 percent	0 percent	n/a
Happy Valley	1995	5	33 percent	39 percent	20 percent	8 percent
Last Chance	1996	5	69 percent	24 percent	0 percent	8 percent
Rincon/Agua Verde	1995	5	66 percent	13 percent	15 percent	7 percent
Rock Pile	1995	5	13 percent	35 percent	40 percent	12 percent

Site specific soil condition analysis has been conducted on these allotments. As more allotments have this analysis conducted, more areas of the Forest will have these types of soil condition ratings. It is considered draft because the acreage used to develop these percentages are not in the Forest GIS database. When there put into the GIS database these percentages may change slightly.

These allotments have been evaluated for the soil's ability to infiltrate water, recycle nutrients, and resist erosion.
The following definitions for the soil conditions classes are used:

Satisfactory= Soil condition indicates that the inherent productive capacity of the soil resource is being sustained with respect to soil function

Impaired = Soil condition indicates a reduction of the soil's inherent productive capacity with respect to soil function. The ability of the soil to produce has been impaired.

Unsatisfactory= Soil condition indicates that degradation exists. A loss of the soil's inherent productivity capacity has occurred. Soil productivity has been reduced.

Soil Condition from GES* (See End of Table)

Allotment	Year	District	percent Satisfactory	percent Impaired	percent Unsatisfactory	percent Unsuited
Big Bend	1990	1	15 percent	n/a	83 percent	2 percent
Bruno	1990	1	31 percent	n/a	69 percent	0 percent
Clanton	1990	1	31 percent	n/a	69 percent	0 percent
Cloverdale	1990	1	59 percent	n/a	40 percent	0 percent
Cochise	1990	1	74 percent	n/a	25 percent	0 percent
Deer Creek	1990	1	62 percent	n/a	38 percent	0 percent
East Whitetail	1990	1	49 percent	n/a	24 percent	27 percent
Fourr	1990	1	65 percent	n/a	18 percent	17 percent
Granite Springs	1990	1	29 percent	n/a	62 percent	9 percent
Graves	1990	1	75 percent	n/a	25 percent	0 percent
Guadalupe	1990	1	59 percent	n/a	38 percent	3 percent
Halfmoon	1990	1	21 percent	n/a	60 percent	19 percent
Hunt Canyon	1990	1	21 percent	n/a	78 percent	1 percent
Jackwood	1990	1	11 percent	n/a	89 percent	0 percent
Juniper Basin	1990	1	10 percent	n/a	90 percent	0 percent
Lower Rock Creek	1990	1	90 percent	n/a	10 percent	0 percent
Lower Rucker	1990	1	69 percent	n/a	31 percent	0 percent

Middlemarch	1990	1	44 percent	n/a	38 percent	18 percent
Noonan	1990	1	39 percent	n/a	60 percent	1 percent
Outlaw Mountain	1990	1	38 percent	n/a	55 percent	7 percent
Price Canyon	1990	1	53 percent	n/a	40 percent	7 percent
Pridham	1990	1	69 percent	n/a	18 percent	14 percent
RAK	1990	1	58 percent	n/a	21 percent	22 percent
Reppy	1990	1	6 percent	n/a	70 percent	25 percent
Rough Mountain	1990	1	40 percent	n/a	29 percent	32 percent
Sanders	1990	1	3 percent	n/a	97 percent	0 percent
Sanford	1990	1	55 percent	n/a	40 percent	5 percent
Skeleton	1990	1	17 percent	n/a	75 percent	7 percent
Slavin	1990	1	44 percent	n/a	43 percent	13 percent
Stanford	1990	1	65 percent	n/a	22 percent	13 percent
Turkey Creek	1990	1	96 percent	n/a	2 percent	2 percent
Walnut Spring	1990	1	25 percent	n/a	73 percent	2 percent
Helveitia	1990	2	28 percent	n/a	49 percent	23 percent
McBeth	1990	2	60 percent	n/a	12 percent	28 percent
Squaw Gulch	1990	2	41 percent	n/a	52 percent	7 percent
Alisos	1990	3	53 percent	n/a	46 percent	1 percent
Ash Canyon	1990	3	29 percent	n/a	32 percent	40 percent
Bender	1990	3	92 percent	n/a	6 percent	3 percent
Benson	1990	3	46 percent	n/a	54 percent	0 percent
Blacktail	1990	3	10 percent	n/a	90 percent	0 percent
Brown Canyon	1990	3	52 percent	n/a	20 percent	28 percent
Carr Canyon	1990	3	87 percent	n/a	13 percent	0 percent
Chuney	1990	3	33 percent	n/a	67 percent	0 percent
Coalmine	1990	3	30 percent	n/a	29 percent	41 percent
Duquesne	1990	3	57 percent	n/a	43 percent	0 percent
Farrell	1990	3	65 percent	n/a	35 percent	0 percent
Harshaw	1990	3	95 percent	n/a	5 percent	0 percent
Hayfield	1990	3	8 percent	n/a	92 percent	0 percent
HQ	1990	3	14 percent	n/a	86 percent	0 percent
Joe's Spring	1990	3	5 percent	n/a	37 percent	59 percent
Knear	1990	3	64 percent	n/a	35 percent	1 percent
Lewis	1990	3	76 percent	n/a	20 percent	4 percent
Lochiel	1990	3	71 percent	n/a	29 percent	0 percent
MacFarland	1990	3	94 percent	n/a	6 percent	0 percent

Middle Canyon	1990	3	71 percent	n/a	21 percent	8 percent
Miller Canyon	1990	3	73 percent	n/a	12 percent	15 percent
Oak Bar	1990	3	36 percent	n/a	64 percent	0 percent
O'Donnell	1990	3	34 percent	n/a	66 percent	1 percent
Post Canyon	1990	3	33 percent	n/a	67 percent	0 percent
Red Mountain	1990	3	91 percent	n/a	9 percent	0 percent
Santa Cruz	1990	3	26 percent	n/a	74 percent	0 percent
Sawtelle	1990	3	48 percent	n/a	52 percent	0 percent
Sierra Tordilla	1990	3	45 percent	n/a	55 percent	0 percent
Sycamore	1990	3	0 percent	n/a	100 percent	0 percent
U-D	1990	3	18 percent	n/a	82 percent	0 percent
Wakefield	1990	3	51 percent	n/a	16 percent	33 percent
Weiland	1990	3	77 percent	n/a	20 percent	3 percent
Z-Triangle	1990	3	17 percent	n/a	83 percent	0 percent
Bonita	1990	4	43 percent	n/a	23 percent	34 percent
Bottle Canyon	1990	4	54 percent	n/a	46 percent	0 percent
Bull Tank	1990	4	26 percent	n/a	54 percent	19 percent
Cedar Springs	1990	4	34 percent	n/a	63 percent	2 percent
Copper Creek	1990	4	55 percent	n/a	45 percent	0 percent
Deer Creek	1990	4	81 percent	n/a	9 percent	9 percent
Four Mile	1990	4	64 percent	n/a	33 percent	3 percent
Gillman	1990	4	0 percent	n/a	93 percent	7 percent
Goodwin	1990	4	67 percent	n/a	24 percent	10 percent
Harrison Canyon	1990	4	61 percent	n/a	20 percent	19 percent
High Creek	1990	4	40 percent	n/a	11 percent	50 percent
Jakes	1990	4	14 percent	n/a	55 percent	30 percent
Kane Springs	1990	4	88 percent	n/a	6 percent	6 percent
Laurel Canyon	1990	4	33 percent	n/a	8 percent	59 percent
North Ash	1990	4	36 percent	n/a	36 percent	28 percent
North Reef	1990	4	34 percent	n/a	61 percent	4 percent
O Bar O Canyon	1990	4	24 percent	n/a	71 percent	5 percent
Oak Grove	1990	4	93 percent	n/a	5 percent	2 percent
Paddy's River	1990	4	68 percent	n/a	30 percent	3 percent
Polecat	1990	4	89 percent	n/a	11 percent	0 percent
Redfield	1990	4	81 percent	n/a	7 percent	12 percent
Rockhouse	1990	4	76 percent	n/a	19 percent	5 percent
South Ash	1990	4	33 percent	n/a	18 percent	49 percent

South Reef	1990	4	24 percent	n/a	33 percent	43 percent
Squaw Basin	1990	4	26 percent	n/a	74 percent	0 percent
Sunset	1990	4	62 percent	n/a	28 percent	10 percent
Two Troughs	1990	4	33 percent	n/a	61 percent	6 percent
VJ	1995	4	47 percent	n/a	29 percent	25 percent
Willow Creek	1990	4	17 percent	n/a	73 percent	10 percent
YLE	1990	4	3 percent	n/a	82 percent	15 percent
American Flag	1990	5	55 percent	n/a	35 percent	9 percent
Bellota	1990	5	52 percent	n/a	46 percent	2 percent
Cumero	1990	5	76 percent	n/a	21 percent	3 percent
Finely Spring	1990	5	56 percent	n/a	29 percent	15 percent
Fresno	1990	5	44 percent	n/a	56 percent	0 percent
Interocean	1990	5	57 percent	n/a	17 percent	25 percent
Redington Pass	1990	5	11 percent	n/a	75 percent	15 percent
Samaniego	1990	5	67 percent	n/a	24 percent	9 percent
Barney	1995	5	73 percent	n/a	13 percent	14 percent

*Information contained in this table is taken directly from the General Ecosystem Survey (GES), a document
published by the Southwestern Region of the Forest Service in 1991. The GES is mapped at a scale
of 1:250,000, which is most appropriately used at planning levels larger than Range Allotments.
In the absence of site specific soil condition information such as is available in the Terrestrial Ecosystem Survey,
the GES is used. Definitions for soil condition do not conform to the May 1995 memo referred to in the
Consultation Forms. The soil conditions classification used in the GES "reflects soil disturbance resulting from
a management practice and maintenance of soil productivity." (Page 48 of the GES) It is also documented on
on page 48 of the GES that "The majority of effort to date has been to determine the effects of grazing on terrestrial
ecosystems" which lends support to using the GES to analyze grazing allotments. The definitions for the rating
classifications appear quite simplistic on page 51 of the GES but that is only the sheet and rill erosion portion of
the rating. The other main factor used to rate soil condition is infiltration, a surface soil property affected by
ground cover and compaction (page 50 of the GES).
In this table, soils that would rate impaired in a site specific survey are included in the Unsatisfactory classification.
Definitions for the categories:
Satisfactory = Current Soil Loss < Tolerance Soil Loss> Natural Soil Loss; Not compacted
Unsatisfactory = Current Soil Loss > Tolerance Soil Loss > Natural Soil Loss; Compacted
Unsuited = Current Soil Loss > Tolerance Soil Loss < Natural Soil Loss
As site specific information is collected, the condition ratings in this table will be updated.

Chiricahua EMA
The Chiricahua EMA is located in the southeastern part of the Forest. Approximately 60 percent of the EMA is in satisfactory soil condition, 30 percent is impaired or unsatisfactory and 10 percent is unsuited. Six allotments representing approximately 100,000 acres in this EMA have been field checked for consistency with the GES. The field checking supported the GES in that there is no statistical difference between the two methods for determining the percent of allotments with satisfactory soil conditions.

Dragoon EMA
The Dragoon EMA is located approximately in the central part of the Forest. Approximately 40 percent of the EMA is in satisfactory soil condition, 50 percent is impaired or unsatisfactory and 10 percent is unsuited. Only one allotment representing about 4,000 acres in this EMA has been field checked for consistency. No statistical analysis was done.

<u>Galiuro EMA</u>
The Galiuro EMA is located in the north central part of the Forest. Approximately 60 percent of the EMA is in satisfactory soil condition, 30 percent is impaired or unsatisfactory and less than 10 percent is unsuited. Five allotments representing approximately 20,000 acres in this EMA have been field checked for consistency with the GES. The field checking supported the GES in that there is no statistical difference between the two methods for determining the percent of allotments with satisfactory soil conditions.

<u>Huachuca EMA</u>
The Huachuca EMA is located in the south central part of the Forest. Approximately 40 percent of the EMA is in satisfactory soil condition, 55 percent is impaired or unsatisfactory and less than 5 percent is unsuited. Five allotments representing approximately 90,000 acres in this EMA have been field checked for consistency with the GES. The field checking indicates that conditions on the ground are different than the GES at the 50 percent confidence level.

<u>Peloncillo EMA</u>
The Peloncillo EMA is located in the extreme southeastern part of the Forest. Approximately 45 percent of the EMA is in satisfactory soil condition, 45 percent is impaired or unsatisfactory and 10 percent is unsuited. Two allotments representing approximately 15,000 acres in this EMA have been field checked for consistency with the GES. No statistical analysis was done.

<u>Pinaleño EMA</u>
The Pinaleno EMA is located in the north eastern part of the Forest. Approximately 40 percent of the EMA is in satisfactory soil condition, 55 percent is impaired or unsatisfactory and less than 5 percent is unsuited. Two allotments representing approximately 40,000 acres in this EMA have been field checked for consistency with the GES. No statistical analysis was done.

<u>Santa Catalina EMA</u>
The Santa Catalina EMA is located in the north western part of the Forest. Approximately 55 percent of the EMA is in satisfactory soil condition, 35 percent is impaired or unsatisfactory and 10 percent is unsuited. Five allotments representing approximately 50,000 acres in this EMA have been field checked for consistency with the GES. The field checking supported the GES in that there is no statistical difference between the two methods for determining the percent of allotments with satisfactory soil conditions.

<u>Santa Rita EMA</u>
The Santa Rita EMA is located in the south central part of the Forest. Approximately 60 percent of the EMA is in satisfactory soil condition, 30 percent is impaired or unsatisfactory and 10 percent is unsuited. Thirteen allotments representing approximately 100,000 acres in this EMA have been field checked for consistency with the GES. The field checking supported the GES in that there is no statistical difference between the two methods for determining the percent of allotments with satisfactory soil conditions.

<u>Santa Teresa EMA</u>

The Santa Teresa EMA is located in the north central part of the Forest. Approximately 40 percent of the EMA is in satisfactory soil condition, 30 percent is impaired or unsatisfactory and less than 30 percent is unsuited. Two allotments representing approximately 20,000 acres in this EMA have been field checked for consistency with the GES. No statistical analysis was done.

Tumacacori EMA
The Tumacacori EMA is located in the western part of the Forest. Approximately 45 percent of the EMA is in satisfactory soil condition, 50 percent is impaired or unsatisfactory and less than 5 percent is unsuited. Fifteen allotments representing approximately 200,000 acres in this EMA have been field checked for consistency with the GES. The field checking supported the GES in that there is no statistical difference between the two methods for determining the percent of allotments with satisfactory soil conditions.

Whetstone EMA
The Whetstone EMA is located in the central part of the Forest. Approximately 70 percent of the EMA is in satisfactory soil condition, 20 percent is impaired or unsatisfactory and 10 percent is unsuited. Only one allotment representing approximately 20,000 acres in this EMA have been field checked for consistency with the GES. No statistical analysis was done.

Winchester EMA
The Winchester EMA is located in the central part of the Forest. Approximately 85 percent of the EMA is in satisfactory soil condition, 10 percent is impaired or unsatisfactory and less than 5 percent is unsuited. Two allotments representing approximately 5,000 acres in this EMA have been field checked for consistency with the GES. No statistical analysis was done.

Summary
The GES indicates Forest-wide conditions to be 46 percent Satisfactory, 43 percent Unsatisfactory, and 11 percent Unsuited. These are the only soil condition classes recognized in the GES: the "Impaired" class included in many consultation forms is a soil condition class defined since publication of the GES. The 64 allotments that have been field checked had a combined GES condition of 47 percent Satisfactory, 43 percent Unsatisfactory, and 11 percent Unsuited; field checking found conditions to be 56 percent Satisfactory, 35 percent Impaired and Unsatisfactory, and 9 percent Unsuited. Reports for those allotments separate Impaired soils from Unsatisfactory soils. The details of those inspections are in the files and in a spreadsheet filed on the Forest Service IBM system. For this EMA summary, soils found to be in Impaired condition are included in the total of Unsatisfactory soils.

Forest-wide, the areas with the least amount of topographic relief are typically the areas that have been grazed, logged, roaded, and recreated on. These activities impact soil condition. Therefore, those EMA's with the greatest relief have the least amounts of Unsatisfactory (and Impaired) soils (the Winchester and Whetstone Mountains, for example). Those EMA's with large areas of slopes less than 40 percent have had activities that negatively impact soil condition, resulting in more area with Unsatisfactory ratings.

The GES soil condition analysis investigated erosion and compaction. Current soil condition parameters include erosion and compaction, but also investigate the ability of the soil to recycle nutrients. The following table is a summary of soil conditions by EMA.

EMA	percent Satisfactory	percent Impaired and Unsatisfactory	percent Unsuited
Chiricahua	56 percent	31 percent	12 percent
Dragoon	39 percent	49 percent	11 percent
Galiuro	50 percent	31 percent	19 percent
Huachuca	41 percent	55 percent	4 percent
Peloncillo	45 percent	52 percent	3 percent
Pinaleno	44 percent	44 percent	12 percent
Santa Catalina	54 percent	35 percent	11 percent
Santa Rita	57 percent	29 percent	14 percent
Santa Teresa	38 percent	29 percent	33 percent
Tumacacori	47 percent	52 percent	1 percent
Whetstone	70 percent	19 percent	11 percent
Winchester	86 percent	11 percent	3 percent
Forest Total	50 percent	40 percent	10 percent

The General Ecosystem Survey (GES), a document published by the Southwestern Region of the Forest Service in 1991. The GES is mapped at a scale of 1:250,000, which is most appropriately used at planning levels larger than Range Allotments.

In the absence of site specific soil condition information such as is available in the Terrestrial Ecosystem Survey, the GES is used. Definitions for soil condition do not conform to the May 1995 memo referred to in the Consultation Forms. The soil conditions classification used in the GES "reflects soil disturbance resulting from a management practice and maintenance of soil productivity" (Page 48 of the GES). It is also documented on page 48 of the GES that "The majority of effort to date has been to determine the effects of grazing on terrestrial ecosystems" which lends support to using the GES to analyze grazing allotments. The definitions for the rating classifications appear quite simplistic on page 51 of the GES but that is only the sheet and rill erosion portion of the rating. The other main factor used to rate soil condition is infiltration, a surface soil property affected by ground cover and compaction (page 50 of the GES).

In this table, soils that would rate impaired in a site specific survey are included in the Unsatisfactory classification.

Definitions for the categories:

- Satisfactory = Current Soil Loss < Tolerance Soil Loss> Natural Soil Loss; Not compacted
- Unsatisfactory = Current Soil Loss > Tolerance Soil Loss > Natural Soil Loss; Compacted
- Unsuited = Current Soil Loss > Tolerance Soil Loss < Natural Soil Loss

As site specific information is collected, the condition ratings in this table will be updated.

Allotments that have been field checked have been evaluated for the soil's ability to infiltrate water, recycle nutrients, and resist erosion. The following are definitions for soil condition classes for field checked allotments:

- Satisfactory = Soil condition indicates that the inherent productive capacity of the soil resource is being sustained with respect to soil function.Management practices do not reduce soil function. Proper soil function results in the ability of the soil to maintain resource values and sustain outputs.

- Impaired = Soil condition indicates a reduction of the soil's inherent productive capacity with respect to soil function. The ability of the soil to function properly has been reduced. An impaired category should signal land managers that there is a need to evaluate existing management practices, take corrective actions where necessary and to further investigate the ecosystem to determine the degree and cause in decline in soil function.
- Unsatisfactory = Soil condition indicates that degradation exists. A loss of the soil's inherent productivity capacity has occurred. Soil productivity is not being sustained with respect to soil function. A reduction of soil function results in the inability of the soil to maintain resource values and sustain outputs. Soils rated in the unsatisfactory category are a high priority for land managers to evaluate and change management practices.

Riparian Area Conditions

Riparian areas throughout the Coronado National Forest have been assessed by measuring woody riparian vegetation parameters and comparing that information to the standards and guidelines found in the Coronado Plan.

Those standards and guidelines, found on page 39 of the Coronado Plan are:

(1) Maintain at least 60 percent of the woody plant composition in three or more riparian species.

(2) Maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species.

(3) Maintain at least 60 percent of natural shrub and tree crown cover.

This work was begun in 1983 while the Plan was being developed. To date, 250 channels have been assessed, and 100 have been revisited in a monitoring effort to get trend information. The Southwestern Region guidelines for assessing riparian areas currently require information about hydrology and erosion in channels in addition to vegetation. This type of information has been gathered on about 100 channels and an evaluation of that information is ongoing.

It has been found that vegetation information alone is not sufficient for analyzing riparian habitat for some species involved in the consultation. For this reason, and because of the incomplete nature of the evaluation of all current information, a riparian assessment by Ecosystem Management Area is not presented here. The best information available for each species in each allotment is used on a case by case basis.

For those allotments that have been analyzed for riparian condition as part of permit issuance or allotment management plan development, tables describing riparian area conditions are found. Those tables represent the percent of riparian area parameters met when field information is compared to the standards and guidelines described on page 39 of the Coronado Plan.

File Code: 2520 Date: July 15, 2002
Route To:

Subject: Watershed Condition

To: Watershed Staff Officer, Coronado National Forest

It has been brought to my attention that the guidance criteria and other documents associated with the Range Program consultation refer to "watershed condition". Watershed condition is a term used to describe hydrologic function and is the cumulative result of soil condition, riparian area condition, and water quality. Technical reports describing soil, water, and air conditions for projects including range allotment management plans have not included a call of "satisfactory" or "unsatisfactory" watershed condition. The following discussion should help interpret the information available to determine watershed condition for the purpose of using the guidance criteria.

Satisfactory Watershed Condition
In order for an allotment to have satisfactory watershed condition, the parameters must be satisfactory. That means that water quality must be generally satisfactory, soil condition must be generally satisfactory, and riparian areas must be generally satisfactory.

Water Quality
The Coronado National Forest has satisfactory water quality with a few exceptions. Those waters that are not satisfactory are listed in a report published every other year by the State of Arizona. Of the waters found to be unsatisfactory on the Coronado, based on information contained in The Status of Water Quality in Arizona, Clean Water Act Section 305b Report 2000, none of the causes were attributed to cattle grazing. The unsatisfactory waters are:
Alum Gulch (D-3)
Arivaca Lake (D-2)
Harshaw Wash (D-3)
Pena Blanca Lake (D-2)
Three R Canyon Creek (D-3)

It should be assumed that all other waters meet the standards and are satisfactory.

Soil Condition

The table provided for the range consultation effort has the most up-to-date summary of soil condition. About half the soil on the Forest is in satisfactory condition. For a project area such as a range allotment, I would suggest that if 70 percent of the area is in satisfactory condition, this portion of the watershed condition call is satisfactory.

Riparian Condition

Most of the Forest has some riparian condition information based on comparison of vegetation data to the Coronado Plan Standards and Guidelines. Unfortunately, much of this is ten years old or so. For those areas with only this old information, be aware that it assesses vegetation only, and does not take into account hydrology or channel erosion processes. Information collected in the last year includes this additional information. If more than 70 percent of the parameters meet the standards, this portion of the watershed condition call is satisfactory.

Watershed condition would be considered satisfactory for allotments that have at least two out of the three categories rated satisfactory. Those are:
- The area does not contribute to the waters listed above as having unsatisfactory water quality
- At least 70 percent of the area in satisfactory soil condition
- At least 70 percent of the known riparian area parameters are satisfactory.

For most of the Forest, this means that we either need to have at least 70 percent of the area in satisfactory soil condition or at least 70 percent of the known riparian area parameters are met. For those watersheds that contribute to the listed unsatisfactory waters, both soil condition and riparian area condition should be satisfactory. For those areas with old riparian information, no riparian information, or with no riparian areas, it might be advisable to use only soil condition to determine watershed condition. Exceptions to this advice would be narrative reports of inspections that support either a satisfactory or unsatisfactory call in "borderline" situations.

There are complicating factors. The most significant is the presence of unsuited soils. Unsuited soils are generally rock outcrop. All unsuited soils on the Coronado are also greater than 40 percent slope, so there are no unsuited soils in the capable rangeland. However, there are large areas of land with slopes greater than 40 percent that have satisfactory soils. Thus, some of the of the steeper areas of the Forest will have satisfactory soil conditions and consequently satisfactory watershed conditions.

Using Watershed Condition Information

Once watershed condition has been determined, the guidance criteria sometimes goes on to comment on the effects of cattle grazing on progress toward satisfactory conditions. Generally speaking, if range condition trend is upward, I would consider the cattle grazing to have no significant effect on progress toward satisfactory conditions. Static trends in unsatisfactory watersheds would lead me to believe grazing is impeding progress. Downward trends in either unsatisfactory or satisfactory watersheds would indicate grazing is impeding progress.

In satisfactory watersheds, I would consider grazing to not be impeding progress if trend is either static or upward.

/s/ Robert E. Lefevre

ROBERT E. LEFEVRE
Watershed Program Manager

Definitions of terms

Your range condition categories correspond to standard range terms as follows: high=excellent, moderately high=good, moderately low=fair, low=poor to very poor. Range condition measures similarity to potential natural community. Degraded rangelands are missing plant species that under natural conditions are present, or plant species abundances are altered from natural conditions. The plant species used for determining range condition are ones commonly used by livestock. The Society for Range Management publishes a glossary of range management terms (Range Term Glossary Committee, Society for Range Management, M. M. Kothmann, Chairman 1974).

Soil condition is described as the ability of soil to infiltrate water, resist erosion, and recycle nutrients. Condition classes reflect soil disturbance resulting from a management practice and maintenance of soil productivity. A summary of soil, watershed, and riparian conditions on each allotment can be found in Appendix F. Condition classes are defined as follows (USFWS 1999a):

Satisfactory: Soil condition indicates that the inherent productive capacity of the soil resource is being sustained with respect to soil function. Management practices do not reduce soil function. Proper soil function results in the ability of the soil to maintain resource values and sustain outputs.

Impaired: Soil condition indicates a reduction of the soil's inherent productive capacity with respect to soil function. The ability of the soil to function properly has been reduced. An impaired category should signal land managers that there is a need to evaluate existing management practices, take corrective actions where necessary, and to investigate the ecosystem further to determine the degree and cause in decline in soil function.

Unsatisfactory: Soil condition indicates that degradation exists. A loss of the soil's inherent productivity capacity has occurred. Soil productivity is not being sustained with respect to soil function. A reduction of soil function results in the inability of the soil to maintain resource values and sustain outputs. Soils rated in the unsatisfactory category are a high priority for land managers to evaluate and change management practices.

Unsuited: Soils on slopes greater than 40 percent where the natural level of soil loss exceeds the rate of soil loss that should occur while sustaining inherent site productivity. These soils are unsuited for livestock use.

APPENDIX G

REVISED ALLOTMENT SUMMARY TABLES

CORONADO NATIONAL FOREST

OCTOBER 1, 2002

Allotment Name	Barboot	**Allotment Number**	122
5th Code Watershed	White Water Draw	**4th Code Watershed**	White Water Draw
Allotment Acres			
Total Acres	10381		
Capable Range	10274		
Permitted Use	450 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Leslie Canyon	**Elevation**	5200 to 6200 feet
Major Vegetation type	desert grassland; chaparral		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	- Repair earth dam - Drill well - Reconstruct FB fence		
Allotment Condition	- The overall trend of the allotment is static. 5% of the allotment is in moderately high range condition with an upward trend, 80% is moderately high with a static trend and 15% is moderately low with a downward trend. - 99% of the allotment is in satisfactory soil condition and 1% is in impaired condition.		
Management Actions that contribute to effects	**LAA** (likely to adversely affect) - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB = lesser long-nosed bat) **NLAA** (not likely to adversely affect) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG = jaguar) - Livestock grazing occurs within PAC or within MSO habitat. (MSO = Mexican spotted owl)		

	Big Bend	**Allotment Number**	124

Allotment Name			
5th Code Watershed	White Water Draw	**4th Code Watershed**	White Water Draw
Allotment Acres			
Total Acres	7832		
Capable Range	6669		
Permitted Use	400 cow/calf; 11/1-4/30 8 cow/calf; 11/1-4/30; private land permit	**Utilization Level**	50% max utilization
Major Drainage	Big Bend Creek	**Elevation**	5000 to 6400 feet
Major Vegetation type	desert grasslands		
Type of grazing system	5 pasture rotation		
Planned Improvements	- Pipeline extension and trough		
Allotment Condition	- The overall trend for the allotment is static. 20% of the allotment is in moderately high range condition with an upward trend and 80% is moderately high with a static trend. - 15% of the allotment is in satisfactory soil condition and 85% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Boss	**Allotment Number**	126
5th Code Watershed	San Bernardino Valley	**4th Code Watershed**	San Bernardino Valley
Allotment Acres			
Total Acres	734		
Capable Range	734		
Permitted Use	32 cow/calf; 3/1-2/28 3 horses; 3/1-2/28 off NFS; 1 horse 3/1-2/28 on NFS		
		Utilization Level	45% utilization in growing season, 50% utilization in dormant season
Major Drainage	None	**Elevation**	4850 to 5200 feet
Major Vegetation type	desert grassland		
Type of grazing system	2 pasture season long		
Planned Improvements	- Reconstruct division fence - Construct pasture division fence		
Allotment Condition	- The overall trend of the allotment is static. 5% of the allotment is in moderately high range condition with a static trend and 95% is moderately low with a static trend. - 56% of the allotment is in satisfactory soil condition and 44% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Bruno	**Allotment Number**	120
5th Code Watershed	White Water Draw	**4th Code Watershed**	White Water Draw
Allotment Acres			
Total Acres	7978		
Capable Range	6239		
Permitted Use	266 cow/calf; 10/16-4/30		
		Utilization Level	50% max utilization
Major Drainage	Bruno Canyon	**Elevation**	5200 to 6900 feet
Major Vegetation type	chaparral		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	- Mesquite Control (20 acres)		
Allotment Condition	- The overall trend of the allotment is upward. 60% of the allotment is in moderately low range condition with an upward trend and 40% is moderately low with a static trend. - 30% of the allotment is in satisfactory soil condition and 70% is in unsatisfactory soil condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Cave Creek	Allotment Number	107
5th Code Watershed	San Simon	**4th Code Watershed**	San Simon
Allotment Acres	26,590		
Total Acres	26,590		
Capable Range	13,242		
Permitted Use	80 cow/calf 10/01-04/30		
		Utilization Level	45%
Major Drainage	Cave Creek, North & So. Fork	**Elevation**	5200 to 8500
Major Vegetation Type	Desert grassland, Oak woodland, P/J woodland, Deciduous riparian, & Coniferous (transition & mixed-conifer)		
Type of Grazing System	4-pasture rest rotation system		
Planned Improvements	Reconstruct division fence between Basin and Green House Pasture.		
Allotment Condition	Range condition on this allotment is rated as moderately low condition with an upward trend to a high condition with an upward trend. - 84% of the allotment is in satisfactory soil condition and 16% is unsuited		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** -Sighting within range since 1970, grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors (JAG) -Livestock grazing occurs in PAC(s) or MSO habitat (MSO)		

Allotment Name	Cienega	**Allotment Number**	108
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	2646		
Capable Range	1519		
Permitted Use	50 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	None	**Elevation**	4800 to 8500 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	- Reconstruction of National Forest Boundary Fence - Clean out dams by hand		
Allotment Condition	- The overall trend of the allotment is static. Half of the allotment is in moderately high range condition with a static trend and half is in moderately low condition with a static trend. - 92% of the allotment is in satisfactory soil condition, 8% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Cochise Head	**Allotment Number**	150
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon Creek
Allotment Acres			
Total Acres	7378		
Capable Range	5592		
Permitted Use	126 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Brushy, Keating, Oak Canyons	**Elevation**	5000 to 8109 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	2 pasture season long		
Planned Improvements	- Reconstruct two springs		
Allotment Condition	- The overall trend of the allotment is static. 80% of the allotment is in moderately high range condition with a static trend and 20% is moderately low with an upward trend. - 75% of the allotment is in satisfactory soil condition and 25% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	East Whitetail	**Allotment Number**	149
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon Creek
Allotment Acres			
Total Acres	10962		
Capable Range	4684		
Permitted Use	100 cow/calf; 11/1-4/30		
		Utilization Level	45% max utilization
Major Drainage	East Whitetail, Indian Creek & Jhus Canyon	**Elevation**	4800 to 8100 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	7 pasture rotation		
Planned Improvements	- 1/8 mile drift fence in E. Whitetail above private land - Develop two springs on the allotment		
Allotment Condition	- The overall trend of the allotment is upward. 25% of the allotment is in moderately high range condition with a stable trend, 60% is moderately low with an upward trend and 15% is moderately low with a static trend. - 50% of the allotment is in satisfactory soil condition, 25% is unsatisfactory and 25% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Horseshoe	**Allotment Number**	118
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	18864		
Capable Range	9087		
Permitted Use	250 cow/calf; 11/1-4/30		
		Utilization Level	45% max utilization
Major Drainage	Horseshoe Canyon, Pot Hole & Blevins Draw	**Elevation**	4500 to 8200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture rotation		
Planned Improvements	-Construct drift fence on south side of Horseshoe Canyon above the Roush Place and still east of Horseshoe Tank -Line Licklog Tank		
Allotment Condition	- The overall trend of the allotment is upward. 10% of the allotment is in moderately high range condition with an upward trend, 70% is moderately low with an upward trend and 20% is moderately low with a static trend. - 96% of the allotment is in satisfactory soil condition, 4% impaired		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Hunt Canyon	**Allotment Number**	123
5th Code Watershed	San Simon Creek & White Water Draw	**4th Code Watershed**	San Simon Creek & White Water Draw
Allotment Acres			
Total Acres	8462		
Capable Range	8369		
Permitted Use	2,340 AM 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Hunt, South Bruno, High Lonesome, Rustler Canyons	**Elevation**	5500 to 6500 feet
Major Vegetation type	broadleaf woodland; coniferous woodland		
Type of grazing system	5 pasture deferred rotation		
Planned Improvements	- Pipeline extension - Watershed Structures (Loose rock check dams)		
Allotment Condition	- The overall trend of the allotment is downward. 45% of the allotment is in moderately low range condition with a static trend and 55% is moderately low with a downward trend. - 80% of the allotment is in satisfactory soil condition and 20% is in impaired condition.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Jackwood	**Allotment Number**	119
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	10832		
Capable Range	10832		
Permitted Use	406 yearlings 12/1 – 5/31		
		Utilization Level	45% max utilization
Major Drainage	Jackwood Canyon	**Elevation**	4300 to 6300 feet
Major Vegetation type	desert grassland		
Type of grazing system	4 pasture on/off		
Planned Improvements	- Watershed/Range Project restoring 5 dams		
Allotment Condition	- The overall trend of the allotment is static. 10% of the allotment is in moderately high range condition with an upward trend and 90% is moderately high with a static trend. - 10% of the allotment is in satisfactory soil condition and 90% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Lower Rock Creek	**Allotment Number**	103
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	7890		
Capable Range	5541		
Permitted Use	75 cow/calf; 7/1-10/31		
		Utilization Level	45% max utilization
Major Drainage	Rock, Witch, Fife Canyons & Five Mile Creek	**Elevation**	6000 to 7000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture rest rotation		
Planned Improvements	Build two water developments in Rock Creek drainage.		
Allotment Condition	- The overall trend of the allotment is upward. 90% of the allotment is in high range condition with an upward trend and 10% is moderately high with an upward trend. - 90% of the allotment is in satisfactory soil condition with 10% in unsatisfactory condition.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in riparian areas. (BAE = bald eagle) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Lower Rucker	**Allotment Number**	115
5th Code Watershed	Whitewater Draw	**4th Code Watershed**	Whitewater Draw
Allotment Acres			
Total Acres	4730		
Capable Range	4730		
Permitted Use	151 cow/calf; 11/16-7/15 20 cow/calf; 11/16-7/15; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Rucker & O'Keefe Canyons	**Elevation**	5500 to 6800 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	- Reconstruct Allotment boundary fence		
Allotment Condition	- The overall trend of the allotment is static. 5% f the allotment is in moderately high range condition with an upward trend, 75% is moderately high with a static trend and 20% is moderately low with a static trend. - 70% of the allotment is in satisfactory soil condition and 30% is unsatisfactory		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Oak	**Allotment Number**	111
5th Code Watershed	White Water Draw	**4th Code Watershed**	White Water Draw
Allotment Acres			
Total Acres	4085		
Capable Range	2380		

Permitted Use	80 cow/calf; 10/1-4/30		

		Utilization Level	45% max utilization
Major Drainage	Cottonwood Canyon	**Elevation**	5500 to 8000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	Price Tank waterlot and extend pipeline		
Allotment Condition	- Overall trend of the allotment is upward. 95% of the allotment is in moderately high range condition with an upward trend and 5% is moderately high with a static trend. - 78% of allotment in satisfactory soil condition, 22% unsatisfactory -		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Paradise	Allotment Number	102
5th Code Watershed	San Simon	**4th Code Watershed**	San Simon
Allotment Acres	9466		
Total Acres	9466		
Capable Range	7770		
Permitted Use	70 cows 11/01 – 07/31		
		Utilization Level	45%
Major Drainage	East Turkey Cr. & Silver Cr.	**Elevation**	4500 to 8500
Major Vegetation Type	SW Desert Scrub, Chaparral, Broadleaf woodland, Coniferous Woodland, Coniferous forest, Deciduoius Riparian, &Coniferous Riparian		
Type of Grazing System	Four pasture deferred rotation		
Planned Improvements	Construct two earth dams, one in the Lower & Upper Silver Cr. Pasture, Reconstruct Cross fence & boundary fence.		
Allotment Condition	Most of the allotment is in moderately low with upward trend (81%), with 14% moderately low with static trend - 95% of the allotment is in satisfactory soil condition and 5% is unsuited		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) -Livestock grazing occurs in PAC(s) or MSO habitat (MSO).		

Allotment Name	Pedregosa	**Allotment Number**	125
5th Code Watershed	San Bernardino Valley	**4th Code Watershed**	San Bernardino Valley
Allotment Acres			
Total Acres	10035		
Capable Range	9966		
Permitted Use	196 cow/calf; 3/1-2/28 4 horses; 3/1-2/28		
		Utilization Level	45% utilization during growing season, 50% utilization during dormant season
Major Drainage	Indian Creek, Buck Creek & High Lonesome	**Elevation**	5000 to 6500 feet
Major Vegetation type	desert grassland		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	- Water well with pipeline - Reconstruct boundary fence		
Allotment Condition	- The overall trend of the allotment is static. 5% of the allotment is in moderately high range condition with an upward trend, 15% is moderately high with a static trend and 80% is moderately low with a static trend. - 82% of the allotment is in satisfactory soil condition and 18% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Pine	**Allotment Number**	104
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	9498		
Capable Range	6772		
Permitted Use	11 cow/calf; 3/1-2/28 on NFS; 20 cow/calf, 3/1-2/28 off NFS		
		Utilization Level	45% max utilization
Major Drainage	Fife, Hoovey & Green Canyons	**Elevation**	5300 to 7500 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	2 pasture season long		
Planned Improvements	- Reconstruct allotment boundary fences.		
Allotment Condition	- The overall trend of the allotment is static. 10% of the allotment is in moderately low range condition with an upward trend and 90% is moderately low with a static trend. - 68% of the allotment is in satisfactory soil condition and 31% is in impaired condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Pinery	Allotment Number	162
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox Playa
Allotment Acres	10806		
Total Acres	10806		
Capable Range	7626		
Permitted Use	130 cow/calf 11/01 – 04/30		
		Utilization Level	45%
Major Drainage		**Elevation**	5000 to 8500
Major Vegetation Type	Desert grassland, Chaparral, Broadleaf & Coniferous Woodland, Coniferous Forest, & Deciduous & Coniferous Riparian		
Type of Grazing System	4-pasture deferred pasture rotation		
Planned Improvements	Improve developed waters and reconstruct Spring division pasture fence.		
Allotment Condition	Allotment has had 4 years of total non-use rest, and stocking was adjusted from yearlong to seasonal use with repair of developed waters. Allotment condition is in moderately low condition with upward trend. Soil conditions: 88% satisfactory; 9% impaired; and 3% unsuited.		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) -Livestock grazing occurs in PAC(s) or MSO habitat (MSO)		

Allotment Name	Price Canyon	**Allotment Number**	117
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	14016		
Capable Range	11596		
Permitted Use	190 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Jackwood, Brushy & Baker Canyons	**Elevation**	5000 to 9000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	12 pasture deferred rotation		
Planned Improvements	- Reconstruction of boundary fence - Reconstruction of internal fence		
Allotment Condition	- The overall trend of the allotment is upward. All of the allotment is in moderately low range condition with an upward trend. - 53% of the allotment is in satisfactory condition, 40% is unsatisfactory and 7% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	RAK	**Allotment Number**	114
5th Code Watershed	Whitewater Draw	**4th Code Watershed**	Whitewater Draw
Allotment Acres			
Total Acres	36324		
Capable Range	21307		
Permitted Use	400 cow/calf, 8/1-4/30; 25 bulls, 8/1-4/30		
		Utilization Level	45% max utilization
Major Drainage	John Long & Rucker Canyon	**Elevation**	5600 to 9350 feet
Major Vegetation type	broadleaf woodland; coniferous woodland		
Type of grazing system	14 pasture rest rotation		
Planned Improvements			
Allotment Condition	- The overall trend of the allotment is static. 20% of the allotment is in moderately high range condition with an upward trend, 30% is moderately low with an upward trend and 50% is moderately low with a static trend. - 58% of allotment is in satisfactory soil condition, 21% is unsatisfactory and 22% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Rough Mountain	**Allotment Number**	146
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon Creek
Allotment Acres			
Total Acres	17885		
Capable Range	8838		
Permitted Use	295 cow/calf 11/1-4/30; 56 cow/calf 11/1-4/30; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Emigrant, Little Wood, Wood, & Fox Canyon	**Elevation**	4600 to 8000 feet
Major Vegetation type	broadleaf woodland; chaparral		
Type of grazing system	CRMP with state, NF, BLM and private land		
Planned Improvements	Develop additional waters, create three additional pastures, fence reconstruction.		
Allotment Condition	- The overall trend of the allotment is static. Half of the allotment is in moderately high range condition with an upward trend and half is moderately low with a static trend. - 40% of the allotment is in satisfactory soil condition, 29% is unsatisfactory and 31% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Sanford	**Allotment Number**	109
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	1085		
Capable Range	562		
Permitted Use	16 cow/calf, 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	No major ones	**Elevation**	4800 to 7200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	- Reconstruct Forest Boundary fence in Sanford and Sulphur Draw		
Allotment Condition	- The overall trend of the allotment is upward. 20% of the allotment is in moderately high range condition with a static trend and 80% is in moderately low condition with an upward trend. - 99% of the allotment is in satisfactory soil condition and 1% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Sulphur Draw	**Allotment Number**	110
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	5636		
Capable Range	2410		
Permitted Use	72 cow/calf, 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Sulphur Draw Canyon	**Elevation**	4800 to 8100 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	- Reconstruct Forest Boundary fence in Sanford and Sulphur Draw		
Allotment Condition	- The overall trend of the allotment is upward. 85% of the allotment is in moderately low range condition with an upward trend and 15% is moderately low with a static trend. - 97% of the allotment is in satisfactory soil condition, 3% is impaired		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Tex Canyon	**Allotment Number**	121
5th Code Watershed	San Simon Creek & San Bernardino Valley	**4th Code Watershed**	San Simon Creek & San Bernardino Valley
Allotment Acres			
Total Acres	18336		
Capable Range	16589		

Permitted Use	600 cow/calf 11/1-2/28; 150 cow/calf 12/1-2/28;		
		Utilization Level	50% max utilization
Major Drainage	Tex Canyon & Shake Gulch	**Elevation**	5000 to 7500 feet
Major Vegetation type	chaparral; broadleaf woodland; coniferous woodland		
Type of grazing system	8 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend of the allotment is upward. 10% of the allotment is in moderately high range condition with a static trend, 55% is moderately low with an upward trend and 35% is moderately low with a static trend. - 40% of the allotment is in satisfactory condition, 25% is impaired, 25% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Turkey Creek	**Allotment Number**	106
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	13817		
Capable Range	3380		
Permitted Use	66 cow/calf; 3/1-2/28 25 cows; 9/15-12/15		
		Utilization Level	45% max utilization
Major Drainage	Turkey Creek, Turkey Pen, Coal Pit Mormon & Saulsbury Canyons,	**Elevation**	5400 to 9600 feet
Major Vegetation type	broadleaf woodland; coniferous forest		
Type of grazing system	4 pasture Best Pasture system		
Planned Improvements	- Umbrella trick tank - Develop Mormon Spring		
Allotment Condition	- The overall trend of the allotment is upward. 5% of the allotment is in moderately high range condition with an upward, 20% is moderately high with a static trend and 75% is moderately low with an upward trend. - Almost all of the allotment is in satisfactory soil condition with a small amount in unsatisfactory and unsuited condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs on the allotment as does chub (YAC = Yaqui chub) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Upper Rock Creek	Allotment Number	105
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox Playa
Allotment Acres	8284		
Total Acres	8284		
Capable Range	5761		
Permitted Use	70 yearling 11/01 – 03/31		
		Utilization Level	45%
Major Drainage	Rock Cr., Fife Cyn., Five Mile Cr.	**Elevation**	5600 to 7225 ft.
Major Vegetation Type	Chiricahua Pine/Oak woodland with some Mexican Pinyon & Alligato juniper on drier sites.		
Type of Grazing System	4-pasture deferred rotation system		
Planned Improvements	Construct rock/cement dam and reconstruct allot. Bdry. Fence.		
Allotment Condition	Upland and riparian range is in moderately high condition with upward trend. -96% of the allotment is in satisfactory soil condition, 2% impaired, 1% unsatisfactory, 1% unsuited		
Management Actions that contribute to effects	**NLAA** -Livestock grazing does not occur in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) -Livestock grazing occurs in PAC(s) or MSO habitat (MSO).		

Allotment Name	West Whitetail	Allotment Number	148
5th Code Watershed	Willcox Playa	4th Code Watershed	Willcox
Allotment Acres			
Total Acres	3777		
Capable Range	3194		
Permitted Use	7cow/calf, 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	West Whitetail	Elevation	5600 to 7800 feet
Major Vegetation type	broadleaf woodland; coniferous woodland		
Type of grazing system	4 pasture		
Planned Improvements	- Replace trick tank apron		
Allotment Condition	- The overall trend of the allotment is static. 5% of the allotment is in moderately high range condition with an upward trend, 35% is moderately high with a static trend and 60% is moderately low with a static trend. - 70% of the allotment is in satisfactory soil condition and 30% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Willie Rose	Allotment Number	147
5th Code Watershed	San Simon Creek	4th Code Watershed	San Simon Creek
Allotment Acres			
Total Acres	1572		
Capable Range	565		
Permitted Use	31 cow/calf; 11/1-5/15		
		Utilization Level	50% max utilization
Major Drainage	Triangle Canyon	Elevation	4650 to 7200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	- Storage and pipeline from Spring - Hand grub juniper seedlings		
Allotment Condition	- The overall trend of the allotment is upward. All of the allotment is in moderately low range condition with an upward trend. - 65% of the allotment is in satisfactory soil condition and 35% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Black Diamond	**Allotment Number**	159
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	1586		
Capable Range	1303		
Permitted Use	25 cow/calf; 3/1-2/28 7 cow/calf; 3/1-2/28; pvt		
		Utilization Level	45% utilization during growing season, 50% utilization during dormant season
Major Drainage	None	**Elevation**	4800 to 7150 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	- Forest Boundary Fence (2.0 miles) - Cattleguard		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately high range condition with a downward trend. - 60% of the allotment is in satisfactory soil condition, 10% is impaired and 30% is unsuited (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Dragoon	Allotment Number	152
5th Code Watershed	San Pedro & Willcox Playa	**4th Code Watershed**	San Pedro & Willcox Playa
Allotment Acres	4,495		
Total Acres	4,495		
Capable Range	4,274		
Permitted Use	75 cow/calf 3/1-2/28		
		Utilization Level	50%
Major Drainage	Jordan & Wood Cyn.	**Elevation**	4600 to 6500 ft.
Major Vegetation Type	Desert Grassland and Chaparral		
Type of Grazing System	Coordinated Ranch Management Plan (CRMP) , on Forest have 5 pastures, Pvt. 2 pastures, & 1 state pasture.		
Planned Improvements	Reconstruct NF Bdry. Fence along East Past. All other improvement have been installed as planned.		
Allotment Condition	Allotment range & watershed condition are relatively stable and in a upward trend. - 49% of the allotment is in satisfactory soil condition, 37% impaired, and 14% unsuited		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Fourr	**Allotment Number**	153
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	3617		
Capable Range	1075		
Permitted Use	117 cow/calf; 11/15-5/15		
		Utilization Level	45% max utilization
Major Drainage	Fourr Canyon	**Elevation**	4200 to 7450 feet
Major Vegetation type	desert grassland; broadleaf woodland; coniferous woodland		
Type of grazing system	10 pasture, best pasture system with NF, state and private land		
Planned Improvements	- Develop Spring - South Boundary		
Allotment Condition	- The overall trend for the allotment is upward. 35% of the allotment is in moderately high range condition with a static trend and 35% is moderately low with an upward trend. - 65% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Granite Springs	**Allotment Number**	155
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres **Capable Range**	7173 4911		
Permitted Use	117 cow/calf; 3/1-2/28 3 horses; 3/1-2/28		
		Utilization Level	45% utilization during growing season, 50% utilization during dormant season
Major Drainage	None	**Elevation**	4000 to 7100 feet
Major Vegetation type	desert grassland; broadleaf woodland; coniferous woodland		
Type of grazing system	9 pasture deferred rotation with state and private land		
Planned Improvements			
Allotment Condition **Management Actions that contribute to effects**	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 30% of the allotment is in satisfactory soil condition, 60% is unsatisfactory and 10% is unsuited. **LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Halfmoon	**Allotment Number**	156
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	7566		
Capable Range	3801		
Permitted Use	100 mature cow; 3/1-2/28		
		Utilization Level	45% utilization during growing season, 50% utilization during dormant season
Major Drainage	none	**Elevation**	5000 to 7500 feet
Major Vegetation type	desert grassland; coniferous woodland		
Type of grazing system	4 pasture rest rotation		
Planned Improvements	- Cattleguards (2 each) - Hillside Spring Development		
Allotment Condition	- The overall trend for the allotment is static. Half of the allotment is in moderately high range condition with a static trend and half is moderately low with an upward trend. - 20% of the allotment is in satisfactory soil condition, 60% is unsatisfactory and 20% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Middlemarch	Allotment Number	158
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox Playa
Allotment Acres	5,970		
Total Acres	5,970		
Capable Range	2,733		
Permitted Use	204 cow/calf 11/16-04/15		
		Utilization Level	50%
Major Drainage	Stronghold & Middlemarch	**Elevation**	5128 to 7100 ft.
Major Vegetation Type	Desert grassland, Oak woodland on south exposure, and P/J woodland on north facing slopes		
Type of Grazing System	Seasonal 7-pasture deferred pasture rotation coordinated with permittee Pvt. & state land under a CRMP.		
Planned Improvements	Develop spring on Black Diamond Pasture,		
Allotment Condition	Most of allotment capable acres are in moderately high condition with upward trend. 63% of the allotment is in satisfactory soil condition, 15% impaired, 5% unsatisfactory, and 17% unsuited		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Noonan	**Allotment Number**	157
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	5446		
Capable Range	2899		
Permitted Use	256 cow/calf; 11/16-5/15		
		Utilization Level	50% max utilization
Major Drainage	Noonan & Grapevine	**Elevation**	4500 to 6000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	10 pasture deferred rotation		
Planned Improvements	- Develop seep in Middle Pasture		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 40% of the allotment is in satisfactory soil condition and 60% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Reppy	**Allotment Number**	160
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	2792		
Capable Range	1473		
Permitted Use	40 cow/calf 3/1-2/28		
		Utilization Level	45% utilization during growing season, 55% utilization during dormant season
Major Drainage	Henry Canyon	**Elevation**	5200 to 7000 feet
Major Vegetation type	desert grassland		
Type of grazing system	1 pasture on/off with state and private land		
Planned Improvements	None		
Allotment Condition	The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. 5% of the allotment is in satisfactory soil condition, 70% is unsatisfactory and 25% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Slavin	**Allotment Number**	154
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	11616		
Capable Range	5017		
Permitted Use	130 cow/calf, 12/1-5/31		
		Utilization Level	50% max utilization
Major Drainage	West Stronghold Canyon & Slavin Canyon	**Elevation**	4800 to 7000 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	- Well with windmill - Install storage and trough at Slavin pipeline		
Allotment Condition	- The overall trend for the allotment is static. 15% of the allotment is in moderately high range condition with an upward trend, 65% is moderately high with a static trend and 20% is moderately low with a static trend. - 44% of the allotment is in satisfactory soil condition, 43% is unsatisfactory and 13% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Walnut Springs	**Allotment Number**	161
5th Code Watershed	Willcox Playa	**6th Code Watershed**	Willcox
Allotment Acres			
Total Acres	2787		
Capable Range	2101		
Permitted Use	76 cow/calf, 3/1-2/28		

		Utilization Level	50% maximum untilization

Major Drainage	none	**Elevation**	5000 to 6800 feet
Major Vegetation type	broadleaf woodland, desert grassland and deciduous riparian		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements			
Allotment Condition	- The overall trend for the allotment is static. 40% of the allotment is in high range condition with an upward trend, 10% is high with a static trend, 45% is moderately high with a static trend and 5% is moderately low with a static trend. - 25% of the allotment is in satisfactory soil condition and 75% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Clanton/Cloverdale	**Allotment Number**	137
5th Code Watershed	Cloverdale Creek/Animas Creek	**4th Code Watershed**	Cloverdale/Animas Valley
Allotment Acres			
Total Acres	14913		
Capable Range	14356		
Permitted Use	300 cow/calf; 3/1-2/28		
		Utilization Level	45% utilization during growing season, 50% utilization during dormant season
Major Drainage	Cloverdale Creek	**Elevation**	5200 to 6200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	- Extend pipeline to Rock Tank - Mesquite and manzanita control (1,000 acres) - Reconstruct allotment boundary fence		
Allotment Condition	- The overall trend for the allotment is upward. 65% of the allotment is in moderately high range condition with an upward trend and 35% is moderately high with a static trend. - 45% of the allotment is in satisfactory soil condition and 55% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB = Mexican long-nosed bat) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR = New Mexico ridge-nosed rattlesnake) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF = northern aplomado falcon)		

Allotment Name	Deer Creek	**Allotment Number**	129
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	5222		
Capable Range	4878		
Permitted Use	276 cow/calf; 11/1-5/1	**Utilization Level**	50% max utilization
Major Drainage	Owl, North Deer, South Deer, Middle Deer Creeks	**Elevation**	4500 to 6300 feet
Major Vegetation type	Desert grassland, broadleaf woodland, and coniferous woodland and chaparral		
Type of grazing system	4 pasture season-long grazing		
Planned Improvements	Construct two earth dams in Upper So. Deer Creek and modify existing dams. Reconstruct allotment boundary between Juniper and Deer Creek.		
Allotment Condition	Majority of allotment is Moderately High with an upward trend. -62% of the allotment is in satisfactory soil condition, 38% unsatisfactory		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) -Livestock grazing occurs in PAC(s) or MSO habitat (MSO)		

Allotment Name	Fairchild	**Allotment Number**	134
5th Code Watershed	San Simon Creek/ San Bernardino Valley	**4th Code Watershed**	San Simon Creek/ San Bernardino Valley
Allotment Acres			
Total Acres	3939		
Capable Range	3608		
Permitted Use	92 cow/calf; 10/1-3/15		
		Utilization Level	50% max utilization
Major Drainage	South Fork Skeleton Canyon	**Elevation**	2500 to 6200 feet
Major Vegetation type	broadleaf woodland; coniferous woodland		
Type of grazing system	season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 70% of the allotment is in moderately high range condition with an upward trend and 30% is moderately high with a static trend. - 97% of the allotment is in satisfactory soil condition and 3% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Livestock grazing does not occur in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Geronimo	**Allotment Number**	138
5th Code Watershed	San Bernardino Valley	**4th Code Watershed**	San Bernardino Valley
Allotment Acres			
Total Acres	8105		
Capable Range	7345		
Permitted Use	177 cow/calf 11/16-4/30		
		Utilization Level	50% max utilization
Major Drainage	Cottonwood, Estes, Sycamore Canyons	**Elevation**	4700 to 6000 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 70% of the allotment is in moderately high range condition with an upward trend and 30% is moderately high with a static trend. - 95% of the allotment is in satisfactory soil condition and 5% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Graves	**Allotment Number**	133
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	709		
Capable Range	709		
Permitted Use	14 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Starvation Canyon	**Elevation**	5200 to 6000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 40% of the allotment is in moderately high range condition with an upward trend and 60% is in moderately low condition with a static trend. - 75% of the allotment is in satisfactory soil condition and 25% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Guadalupe	**Allotment Number**	143
5th Code Watershed	San Bernardino Valley	**4th Code Watershed**	San Bernardino Valley
Allotment Acres			
Total Acres	7266		
Capable Range	6703		
Permitted Use	150 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	Guadalupe & Baker Canyons	**Elevation**	4300 to 6250 feet
Major Vegetation type	desert grassland		
Type of grazing system	6 pasture CRMP with BLM		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 70% of the allotment is in moderately high range condition with an upward trend, 20% is moderately high with a static trend and half is moderately low with an upward trend. - 60% of the allotment is in satisfactory condition and 40% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Juniper Basin	**Allotment Number**	130
5th Code Watershed	Animas Creek	**4th Code Watershed**	Animas Valley
Allotment Acres			
Total Acres	2671		
Capable Range	2554		
Permitted Use	125 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Horse Camp Draw & Juniper Basin Draw	**Elevation**	5500 to 6300 feet
Major Vegetation type	desert grassland		
Type of grazing system	3 pasture season long		
Planned Improvements	- Pepi Tank: Add water storage and trough - Miller Tank: Raise dam - South Pasture: Construct 10,000 gallon trick tank		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 10% of the allotment is in satisfactory soil condition and 90% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Maverick	**Allotment Number**	136
5th Code Watershed	San Bernardino Valley/ Animas Creek/Cloverdale Creek	**4th Code Watershed**	San Bernardino Valley/ Animas Creek/Cloverdale Creek
Allotment Acres			
Total Acres	11416		
Capable Range	11038		
Permitted Use	184 cow/calf 3/1-2/28; 7 horses 3/1-2/28; private land permit		
		Utilization Level	50% max utilization
Major Drainage	Clanton Draw, Miller Creek, Lion Creek, Cloverdale, & Guadalupe Canyons	**Elevation**	5400 to 6250 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	5 pasture season long		
Planned Improvements	- Watershed Project Gully Control		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 89% of the allotment is in satisfactory soil condition and 11% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Outlaw Mountain	**Allotment Number**	135
5th Code Watershed	San Bernardino Valley	**4th Code Watershed**	San Bernardino Valley
Allotment Acres			
Total Acres	2178		
Capable Range	1989		
Permitted Use	33 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	Hog & Cottonwood Canyons	**Elevation**	5000 to 6100 feet
Major Vegetation type	desert grassland; coniferous woodland		
Type of grazing system	1 pasture season long with state land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in high range condition with an upward trend, 30% is high with a static trend, 5% is moderately high with an upward trend and 45% is moderately high with a static trend. - 38% of allotment in satisfactory soil condition, 55% is unsatisfactory and 7% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Robertson	**Allotment Number**	144
5th Code Watershed	Cloverdale Creek	**4th Code Watershed**	Cloverdale
Allotment Acres			
Total Acres	9792		
Capable Range	9267		
Permitted Use	143 cow/calf; 3/1-2/28 42 cow/calf; 3/1-2/28 private land		
		Utilization Level	45% maximum utilization
Major Drainage	Cloverdale Creek	**Elevation**	5250 to 6200 feet
Major Vegetation type	desert grassland		
Type of grazing system	6 pasture, best pasture system		
Planned Improvements	- Pipeline into South Cloverdale Pasture (1 mile) - Extend existing pipeline from Gammy pasture into Bud trap (1/4 mile)		
Allotment Condition	- The overall trend for the allotment is static. 5% of allotment is in moderately high range condition with an upward trend, 40% is moderately high with static trend, 20% is moderately low with a static trend, 35% is moderately low with a downward trend. - 82% of allotment in satisfactory soil condition, 7% unsatisfactory and 11% is unsuited (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas containing agaves when they produce flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Skeleton Canyon	**Allotment Number**	131
5th Code Watershed	San Simon Creek	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	4651		
Capable Range	4365		
Permitted Use	180 cow/calf; 10/1-3/15		
		Utilization Level	50% max utilization
Major Drainage	Skeleton Canyon	**Elevation**	2500 to 6300 feet
Major Vegetation type	desert grassland		
Type of grazing system	season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 17% of allotment is in satisfactory soil condition, 75% is unsatisfactory, 7% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Livestock grazing does not occur in areas with agaves when they produce flower stalks. (LNB, MLB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs with MSO habitat. (MSO)		

Allotment Name	Skull Canyon	Allotment Number	128
5th Code Watershed	San Simon	**4th Code Watershed**	San Simon
Allotment Acres	!,540		
Total Acres	1,540		
Capable Range	600		
Permitted Use	7 cow/calf 3/1-2/28		
		Utilization Level	50%
Major Drainage	none	**Elevation**	5500 to 6625 ft.
Major Vegetation Type	Desert grassland and desert scrub		
Type of Grazing System	Yearlong on/off grazing with BLM & Pvt.		
Planned Improvements	none		
Allotment Condition	Moderately high with static to upward trend. Soil conditions on the allotment: 73% satisfactory; 27% unsuited.		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Walnut Canyon	**Allotment Number**	132
5th Code Watershed	San Simon Creek & Animas Creek	**4th Code Watershed**	San Simon/Animas Valley
Allotment Acres			
Total Acres	15359		
Capable Range	14555		
Permitted Use	271 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	Skeleton & Dutchman Canyons	**Elevation**	5100 to 6500 feet
Major Vegetation type	coniferous woodland		
Type of grazing system	9 pasture HRM with 3 NF pastures		
Planned Improvements	- Waterlot twin ponds - Waterlot Big Lake		
Allotment Condition	- The overall trend for the allotment is static. 10% of the allotment is in moderately high range condition with an upward trend, 85% is moderately high with a static trend and 5% is moderately low with a static trend. - 75% of the allotment is in satisfactory soil condition, 24% is impaired and 1% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB, MLB) - Livestock grazing occurs in areas over 5,000 feet in elevation. (NMR) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Agua Caliente	**Allotment Number**	245
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	9234		
Capable Range	3966		
Permitted Use	110 cow/calf; 11/1-4/30		
		Utilization level	50% max utilization
Major Drainage	Agua Caliente Canyon	**Elevation**	
Major Vegetation type	desert grassland; coniferous forest		
Type of grazing system	1 pasture season long		
Planned Improvements	- South Boundary Tank: Clean and seal		
Allotment Condition	- The overall trend for the allotment is static. 20% of the allotment is in high range condition with a static trend, 60% is moderately high with a static trend and 20% is moderately low with a static trend. - 30% of the allotment is in satisfactory soil condition, 20% is impaired, 25% is unsatisfactory and 25% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - The presence of suitable CFPO habitat is considered to be unlikely, but habitat assessments have not been made using Arizona Game and Fish Department protocol to confirm the absence of suitable habitat. (CFP= cactus ferruginous pygmy-owl) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Alto	**Allotment Number**	246
5th Code Watershed	Lower Santa Cruz/Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	11216		
Capable Range	6033		
Permitted Use	148 cow/calf 3/1-9/30; 296 cow/calf 10/1-3/31		
		Utilization level	50% max utilization
Major Drainage	Josephine Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	- HQ corral: reconstruct - HQ well: install solar system		
Allotment Condition	- The overall trend for the allotment is static. 20% of the allotment is in high range condition with a static trend, 60% is moderately high with a static trend and 20% is moderately low with a static trend. - 35% of the allotment is in satisfactory soil condition, 30% is impaired, 10% is unsatisfactory and 25% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not during the time agaves are bolting. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Apache Springs	**Allotment Number**	240
5th Code Watershed	Cienega Creek/Sonoita Creek	**4th Code Watershed**	Rillito/Upper Santa Cruz
Allotment Acres			
Total Acres	13073		
Capable Range	9978		
Permitted Use	140 cow/calf; 3/1-2/28		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Gardner Canyon	**Elevation**	
Major Vegetation type	coniferous woodland		
Type of grazing system	8 pasture deferred rotation		
Planned Improvements	- Fish Canyon well: convert to solar power - Pasture 6 well: convert to solar power - Aliso Spring pipeline: replace		
Allotment Condition	- The overall trend for the allotment is static. Half of the allotment is in high range condition with a static trend, 10% is moderately high with an upward trend and 40% is moderately high with a static trend. - 80% of the allotment is in satisfactory soil condition, 15% is impaired and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Box Canyon	Allotment Number	235
5th Code Watershed	Lower Santa Cruz	4th Code Watershed	Upper Santa Cruz
Allotment Acres			
Total Acres	3131		
Capable Range	1804		
Permitted Use	100 cow/calf; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Box Canyon	Elevation	
Major Vegetation type	southwestern desertscrub; broadleaf woodland; coniferous woodland		
Type of grazing system	6 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 10% of the allotment is in high range condition with a static trend, 60% is moderately high with an upward trend and 90% is moderately high with a static trend. - 65% of the allotment is in satisfactory soil condition, 25% is impaired and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Debaud	Allotment Number	232
5th Code Watershed	Cienega Creek	4th Code Watershed	Rillito
Allotment Acres			
Total Acres	2795		
Capable Range	2707		
Permitted Use	150 cow/calf; 11/1-2/28		
		Utilization level	35% utilization in growing season, 55% utilization in dormant season
Major Drainage	Papago Canyon	Elevation	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in high range condition with an upward trend and 75% is moderately high with a static trend. - Half of the allotment is in satisfactory soil condition and half is impaired.		
Management Actions that contribute to effects	**NLAA** - No grazing during agave bolting period. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Fort	**Allotment Number**	247
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	7103		
Capable Range	5520		
Permitted Use	85 cow/calf; 12/1-8/30		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Adobe Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in high range condition with a static trend and 75% is moderately high with a static trend. - 55% of the allotment is in satisfactory soil condition, 15% is impaired, 15% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed habitat or potential habitat. NAF)		

Allotment Name	Gardner Canyon	**Allotment Number**	241
5th Code Watershed	Cienega Creek/Sonoita Creek	**4th Code Watershed**	Rillito/Upper Santa Cruz
Allotment Acres			
Total Acres	12353		
Capable Range	12307		
Permitted Use	211 cow/calf 6/1-10/31; 211 cow/calf 12/1-2/28; 20 cow/calf 6/1-10/31 private land permit; 20 cow/calf 12/1-2/28 private land permit		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Gardner Canyon	**Elevation**	
Major Vegetation type	plains grassland		
Type of grazing system	3 pasture rotation		
Planned Improvements	- Allotment boundary fence: reconstruct 1.5 miles		
Allotment Condition	- The overall trend for the allotment is static. 10% of the allotment is in moderately high range condition with an upward trend and 90% is moderately high with a static trend. - 80% of the allotment is in satisfactory soil condition and 20% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Greaterville	**Allotment Number**	238
5th Code Watershed	Lower Santa Cruz/Cienega Creek	**4th Code Watershed**	Upper Santa Cruz/Rillito
Allotment Acres			
Total Acres	4549		
Capable Range	4228		
Permitted Use	325 cow/calf; 4/1-8/31		
		Utilization level	35% utilization in growing season, 55% utilization in dormant season
Major Drainage	Enzenberg Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland; coniferous woodland		
Type of grazing system	5 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 40% of the allotment is in high range condition with a static trend and 60% is moderately high with a static trend. - 80% of the allotment is in satisfactory soil condition and 20% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Helvetia	**Allotment Number**	233
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	2159		
Capable Range	1123		
Permitted Use	60 cow/calf; 3/1-2/28		
		Utilization level	55% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	3 pasture rotation with Santa Rita Experimental Range		
Planned Improvements	- South pasture division drift fence: 0.5 miles - Solar pumping system and storage: 1 each		
Allotment Condition	- The overall trend for the allotment is upward. 30% of the allotment is in high range condition with a static trend and 70% is moderately low with an upward trend. - 30% of the allotment is in satisfactory soil condition, 50% is unsatisfactory and 20% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	McBeth	**Allotment Number**	239
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	8843		
Capable Range	2946		
Permitted Use	95 cow/calf; 3/1-2/28		
		Utilization level	55% max utilization
Major Drainage	Florida Canyon	**Elevation**	
Major Vegetation type	coniferous woodland		
Type of grazing system	4 pasture rest rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 35% of the allotment is in high range condition with a static trend, 35% is moderately high with a static trend and 30% is moderately low with a static trend. - 60% of the allotment is in satisfactory soil condition, 10% is unsatisfactory and 30% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - The presence of suitable CFPO habitat is considered to be unlikely, but habitat assessments have not been made using Arizona Game and Fish Department protocol to confirm the absence of suitable habitat. (CFP) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Oak Tree I and II	**Allotment Number**	201/237
5th Code Watershed	Cienega Creek	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	4963		
Capable Range	4963		
Permitted Use	124 cow/calf 3/1-2/28; 10 cow/ calf 3/1-2/28 private land permit		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	none	**Elevation**	
Major Vegetation type	broadleaf woodland; plains grassland		
Type of grazing system	2 and 3 pasture deferred rotation systems		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is moderately high range condition with an upward trend and 75% is moderately high with a static trend. - 75% of the allotment is in satisfactory soil condition and 25% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Proctor	**Allotment Number**	243
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	8229		
Capable Range	3955		
Permitted Use	80 cow/calf; 3/1-6/30		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Madera Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	2 pasture; winter and fall use		
Planned Improvements	- Missle stock tank: Clean tank and repair silt trap - Chino stock tank: New construction - Annex dam: New Construction		
Allotment Condition	- The overall trend for the allotment is upward. 85% of the allotment is in moderately high range condition with an upward trend and 15% is moderately low with a static trend. - 15% of the allotment is in satisfactory soil condition, 10% is impaired, 30% is unsatisfactory and 45% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas containing agaves when agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Presence of suitable CFPO habitat is considered to be unlikely, but habitat assessments have not been made using AGFD protocol to confirm the absence of suitable habitat. (CFP) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF) - Livestock grazing occurs in compliance with Biological Opinion issued in 1994. (PPC = Pima pineapple cactus)		

Allotment Name	Rosemont	Allotment Number	234
5th Code Watershed	Lower Santa Cruz/Cienega	4th Code Watershed	Santa Cruz/Rillito
Allotment Acres			
Total Acres	9714		
Capable Range	9072		
Permitted Use	325 cow/calf, 3/1-3/31; 325 cow/calf, 9/1-10/31; 150 cow/calf, 11/1-2/28		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Barrel Canyon	Elevation	
Major Vegetation type	broadleaf woodland		
Type of grazing system	2 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 60% of the allotment is in satisfactory soil condition, 25% is impaired and 15% is unsatisfactory.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occurs on the allotment during the agave bolting and flowering period. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Squaw Gulch	**Allotment Number**	248
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	9281		
Capable Range	7928		
Permitted Use	155 cow/calf, 3/1-2/28; 5 horses, 3/1-2/28; private land permit		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Squaw Gulch	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	8 pasture deferred rotation		
Planned Improvements	- Horse Power/Temporal stock tank: new construction - Temporal Pasture stock tank: new construction		
Allotment Condition	- The overall trend for the allotment is static. Half of the allotment is in moderately high range condition with a static trend and half is moderately low with a static trend. - 40% of the allotment is in satisfactory soil condition, 50% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - The presence of suitable CFPO habitat is considered to be unlikely, but habitat assessments have not been made using Arizona Game and Fish Department protocol to confirm the absence of suitable habitat. (CFP) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Stone Springs	**Allotment Number**	231
5th Code Watershed	Lower Santa Cruz/Cienega	**4th Code Watershed**	Upper Santa Cruz/Rillito
Allotment Acres			
Total Acres	8794		
Capable Range	6972		
	245 cow/calf; 10/1-3/31		
		Utilization level	45% max utilization
Major Drainage	Sycamore Canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	2 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 45% of the allotment is in moderately high range condition with a static trend and 55% is moderately low with a static trend. - 50% of the allotment is in satisfactory soil condition, 40% is impaired and 10% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs on the allotment but outside the agave bolting and flowering period. (LNB) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - The presence of suitable CFPO habitat is considered to be unlikely, but habitat assessments have not been made using Arizona Game and Fish Department protocol to confirm the absence of suitable habitat. (CFP)		

Allotment Name	Temporal	**Allotment Number**	250
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	21589		
Capable Range	14872		
Permitted Use	350 cow/calf; 3/1-2/28		
		Utilization level	35% utilization in growing season, 45% utilization in dormant season
Major Drainage	Temporal Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 10% of the allotment is in high range condition with a static trend, 80% is moderately high with a static trend and 10% is moderately low with a static trend. - 86% of the allotment in satisfactory soil condition, 13% is impaired, and 1% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Thurber	**Allotment Number**	236
5th Code Watershed	Cienega Creek	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	5000		
Capable Range	5000		
Permitted Use	221 cow/calf; 3/1-2/28		
		Utilization level	35% utilization in growing season, 55% utilization in dormant season
Major Drainage	Empire Gulch	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	16 pasture deferred rotation		
Planned Improvements	- Well: refurbished - Well: new construction - Water storage tank: new - Trough: added as additional water source		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 75% of the allotment is in satisfactory soil condition and 25% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Bear Valley	Allotment Number	208
5th Code Watershed	Rio Altar	**4th Code Watershed**	
Allotment Acres			
Total Acres	22,710		
Capable Range	15,575		
Permitted Use	350 cow/calf, 3/1-2/28		
		Utilization Level	45%
Major Drainage	Sycamore Creek	**Elevation**	3500-6500
Major Vegetation Type	Desert Grassland, Broadleaf Woodland		
Type of Grazing System	Deferred/Rest Rotation		
Planned Improvements	Watershed boundary fence, 3.0 miles		
Allotment Condition	Watershed analysis indicates the allotment is in satisfactory condition. 1997 range condition data indicates that most of the allotment is in good condition. September 29, 2000, Sycamore Canyon Watershed assessment indicates that soil quality condition is 75 % satisfactory, 16% impaired, 8% unsatisfactory, and 1% unsuited.		
Management Actions that contribute to effects	**LAA** -Livestock grazing occurs during the agave bolting season (LNB) -Habitat, fish sometimes present in areas not excluded yearlong from livestock (SOC=Sonora Chub) **NLAA** -No topminnow on allotment but present in subwatershed that drains allotment (GIM = Gila topminnow). -Sighting since 1970; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) -Livestock grazing occurs in PAC(s). (MSO)		

Allotment Name	Calabasas	**Allotment Number**	216
5th Code Watershed	Middle/Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	8975		
Capable Range	8975		
Permitted Use	220 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Calabasas Canyon	**Elevation**	
Major Vegetation type	desert grassland		
Type of grazing system	3 pasture Santa Rita rotation		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 95% of the allotment is in moderately high range condition with a static trend and 5% is moderately low with a static trend. - 50% of the allotment is in satisfactory soil condition, 40% is impaired and 10% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing in what is thought to be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Carrizo	**Allotment Number**	205
5th Code Watershed	Altar Valley/Rio Altar	**4th Code Watershed**	Brawley/Rio Altar
Allotment Acres			
Total Acres	3609		
Capable Range	3267		
Permitted Use	105 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Yellow Jacket Wash	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	4 pasture deferred rotation		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 49% of the allotment is in satisfactory soil condition and 51% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what is thought to be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Cross S	**Allotment Number**	204
5th Code Watershed	Rio Altar	**4th Code Watershed**	Rio Altar
Allotment Acres			
Total Acres	18397		
Capable Range	18120		
Permitted Use	450 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 55% utilization in dormant season
Major Drainage	Tres Bellotas Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture deferred rotation		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 90% of the allotment is in satisfactory soil condition and 10% is impaired (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in potential habitat. (MAB = masked bobwhite quail)		

Allotment Name	Fresnal	**Allotment Number**	203
5th Code Watershed	Altar Valley/Rio Altar	**4th Code Watershed**	Brawley/Rio Altar
Allotment Acres			
Total Acres	13020		
Capable Range	12118		
Permitted Use	280 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Fresnal Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	5 pasture deferred rotation		
Planned improvements	None		
Allotment Condition	- Overall trend is static. All of allotment is in moderately high range condition with static trend. - 57% of the allotment is in satisfactory soil condition and 43% is impaired (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas with agaves when agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what may be unsurveyed suitable habitat February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in potential habitat. (MAB) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Jarillas	**Allotment Number**	202
5th Code Watershed	Altar Valley/Rio Altar	**4th Code Watershed**	Brawley/Rio Altar
Allotment Acres			
Total Acres	12485		
Capable Range	12485		
Permitted Use	270 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	San Luis Wash	**Elevation**	
Major Vegetation type	desert grassland		
Type of grazing system	8 pasture deferred rotation		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 90% of the allotment is in high range condition with a static trend and 10% is moderately high with a static trend. - 96% of the allotment is in satisfactory soil condition and 4% is impaired (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between January 1 and June 30. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs in potential habitat. (MAB) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Mariposa	**Allotment Number**	219
5th Code Watershed	Middle Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	6757		
Capable Range	6635		
Permitted Use			
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Potrero Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland; desert grassland		
Type of grazing system	5 pasture deferred rotation		
Planned improvements	- Green Tank - construct fence around tank - Little Alamo Tank - construct fence around tank - Twin Tank - construct fence around tank - Punk Tank - construct fence around tank - East Potrero Tank - construct fence around tank - Potrero Trough - reattach to Community well pipeline		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 45% of the allotment is in satisfactory soil condition, 40% is impaired and 15% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Species present in subwatershed that drains the allotment. (GIM)		

Allotment Name	Marstellar	**Allotment Number**	218
5th Code Watershed	Lower Santa Cruz/Middle Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	10741		
Capable Range	9099		
Permitted Use	247 cow/calf, 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Calabasas	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture deferred rotation		
Planned improvements	- Ruby Road right-of-way fence - construct fence to keep cattle off road - Bull Spring - repair spring box, pipeline and trough - Walker dam - shorten pipeline and replace trough - Pesquiera Tank - reconstruct - Remove 3 existing fences		
Allotment Condition	- The overall trend for the allotment is static. 5% of the allotment is in high range condition with a static trend and 95% is moderately high with a static trend. - Half of the allotment is in satisfactory soil condition and half is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas containing agaves when agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Murphy	**Allotment Number**	212
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	9386		
Capable Range	7068		
Permitted Use	213 cow/calf; 3/1-2/28		
		Utilization Level	55% max utilization during dormant season
Major Drainage	none	**Elevation**	
Major Vegetation type	broadleaf woodland; desert grassland		
Type of grazing system	10 pasture high intensity/ short duration		
Planned improvements	- Fresno spring pipeline - construct 0.25 miles - Camp Loco division fence - new construction		
Allotment Condition	- The overall trend for the allotment is static. 55% of the allotment is in moderately high range condition with a static trend and 45% is moderately low with a static trend. - 60% of the allotment is in satisfactory soil condition and 40% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks.. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Oro Blanco	**Allotment Number**	206
5th Code Watershed	Altar Valley/Rio Altar	**4th Code Watershed**	Brawley/Rio Altar
Allotment Acres			
Total Acres	3181		
Capable Range	2903		
Permitted Use	123 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Oro Blanco Wash	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	5 pasture deferred rotation		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 60% of the allotment is in moderately high range condition with an upward trend and 40% is moderately high with a static trend. - 75% of allotment is in satisfactory soil condition, 10% is impaired and 15% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Peña Blanca	**Allotment Number**	215
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	11459		
Capable Range	7444		
Permitted Use	110 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Peña Blanca Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture deferred rotation		
Planned improvements	Amado division fence - new construction		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 60% of allotment in satisfactory soil condition, 30% impaired, 10% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks.. (LNB) - Livestock grazing in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Ramanote	**Allotment Number**	214
5th Code Watershed	Lower Santa Cruz/Rio Altar	**4th Code Watershed**	Upper Santa Cruz/Rio Altar
Allotment Acres			
Total Acres	16833		
Capable Range	11451		
Permitted Use	331 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Peck Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland; desert grassland		
Type of grazing system	13 pasture rotation		
Planned improvements	- Mountain division fence - new construction - Ramanote division fence - new construction		
Allotment Condition	- The overall trend for the allotment is static. 60% of the allotment is in moderately high range condition with a static trend and 40% is moderately low with a static trend. - 55% of the allotment is in satisfactory soil condition and 45% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what is thought to be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Rock Corral	**Allotment Number**	211
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	5552		
Capable Range	3023		
Permitted Use	57 cow/calf, 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Rock Corral	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	3 pasture deferred rotation with state and private land		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 55% of the allotment is in moderately high range condition with a static trend and 45% is moderately low with a static trend. - 50% of the allotment is in satisfactory soil condition and 50% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Sardina	**Allotment Number**	209
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	12069		
Capable Range	10757		
Permitted Use	340 cow/calf; 3/1-2/28		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Jalisco, Apache, E. Fork Apache Canyon	**Elevation**	
Major Vegetation type	desert grassland		
Type of grazing system	4 pasture winter and spring use		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 93% of the allotment is in satisfactory soil condition and 7% is impaired (1999).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	Sopori	**Allotment Number**	210
5th Code Watershed	Lower Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	20682		
Capable Range	16219		
Permitted Use	300 cow/calf, 3/1-2/28; 48 cow/ calf, 3/1-2/28; private land permit		
		Utilization Level	35% utilization during growing season, 45% utilization in dormant season
Major Drainage	Sardina, Moyza and Puerto Canyons	**Elevation**	
Major Vegetation type	desert grassland		
Type of grazing system	5 pasture deferred rotation		
Planned improvements	- Aliso/Puerto division fence - new construction - Gravel pasture fence - reconstruction		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in high range condition with a static trend and 75% is moderately high with a static trend. - 50% of allotment in satisfactory soil condition, 30% impaired, 10% unsatisfactory, 10% unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in what may be suitable habitat at levels in excess of 30%. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Recent sighting within range; grazing activities will not reduce cover within riparian areas or disrupt connectivity corridors. (JAG)		

Allotment Name	A Bar Draw	Allotment Number	301
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	4963		
Capable Range	4803		
Permitted Use	142 cow/calf, 03/01-02/28		
		Utilization Level	45% maximum use
Major Drainage	A Bar Draw	**Elevation**	4900-5200 feet
Major Vegetation Type	Plains Grassland, Broadleaf Woodland		
Type of Grazing System	4 pasture rotation		
Planned Improvements	Drill and equip a new well in th east end of Apache Pasture and connect it to the Cornelia Dam Pipeline, which will also be extended.		
Allotment Condition	65% of the allotment is in Moderately High Range condition with upward trend. 35% of the allotment is in Moderately Low Range condition with upward trend. 70% of the allotment is in Satisfactory Soil condition, and 30% is		
Management Actions that contribute to effects	**LAA** Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) Livestock use tanks with salamander or within range of the salamander (STS = Sonora tiger salamander) **NLAA** Species present in sub-watershed. (GIM)		

Allotment Name	Alisos/Sierra Tordilla	**Allotment Number**	353/341
5th Code Watershed	Middle Santa Cruz	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	11366		
Capable Range	9914		
Permitted Use	352 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Sycamore Canyon	**Elevation**	3800 to 7200 feet
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 55% of the allotment is in moderately high range condition with a static trend, 30% is moderately low with a static trend and 15% is low with a static trend. - Half of the allotment is in satisfactory soil condition and half is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in compliance with Biological Opinion issued in 1995. (PPC)		

	Ash Canyon	Allotment Number	305

Allotment Name			
5th Code Watershed	Upper San Pedro River	**4th Code Watershed**	Upper San Pedro River
Allotment Acres			
Total Acres	7041		
Capable Range	3084		
Permitted Use	25 cow/calf, 10/1-2/28		
		Utilization Level	45% maximum use
Major Drainage	Ash Canyon, Stump Canyon, Hunter Canyon	**Elevation**	4850-9500 feet
Major Vegetation Type	Broadleaf woodland, upper Sonoran Grassland		
Type of Grazing System	Winter use		
Planned Improvements			
Allotment Condition	The overall trend for the allotment is upward. All of the allotment is in Moderately High range condition with an upward trend. 30% of allotment is in Satisfactory soil condition. 10% of allotment Unsatisfactory soil condition, and 60% of allotment in Unsuited.		
Management Actions that contribute to effects	**NLAA** Livestock grazing occurs on the allotment but not during agave bolting period. (LNB) Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Bender	**Allotment Number**	333
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	3180		
Capable Range	1798		
Permitted Use	14 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Harshaw Creek	**Elevation**	5100 to 6600 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 95% of the allotment is in moderately high range condition with a static trend and 5% is moderately low with an upward trend. - 90% of the allotment is in satisfactory soil condition, 5% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave bolting and flowering season. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Blacktail	**Allotment Number**	307
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	3809		
Capable Range	3809		
Permitted Use	100 cow/calf 3/1-2/28;		

	30 cow/calf 3/1-2/28; private land permit 3 horses 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Sunnyside Canyon	**Elevation**	5200 to 5450 feet
Major Vegetation type	plains grassland		
Type of grazing system	6 pasture deferred rotation with private land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 10% of the allotment is in satisfactory soil condition and 90% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave bolting period. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF = black-footed ferret) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Campini	**Allotment Number**	309
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	5653		
Capable Range	5653		
Permitted Use	200 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Sunnyside	**Elevation**	4900 to 5400 feet
Major Vegetation type	plains grassland		
Type of grazing system	5 pasture Best Pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 40% of the allotment is in satisfactory soil condition, 35% is impaired and 25% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave bolting period. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Canelo	**Allotment Number**	310
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	556		
Capable Range	556		
Permitted Use	34 cow/calf 1/1-3/31; 34 cow/calf 8/1-9/30; 6 cow/calf 12/1-3/31; private land permit 6 cow/calf 8/1-9/30; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Turkey Creek	**Elevation**	5000 feet
Major Vegetation type	broadleaf evergreen woodland		
Type of grazing system	2 pasture deferred rotation with private land		
Planned Improvements	- Combine management with Lyle Canyon under one AMP to provide more growing season rest by allowing Canelo herd to grazing on the Lyle Canyon allotment. - Develop a well in East pasture with a storage tank and three drinkers to improve watershed and riparian condition by providing a predictable water source in the uplands. - Construct a fence in the southwest corner of West pasture to improve distribution in the hilly portions of pasture.		
Allotment Condition **Management Actions that contribute to effects**	- Range vegetation is rated as moderately high with a static apparent trend over 543 acres, and moderately low with an upward trend over 13 acres. - Soil condition on the allotment: 85% satisfactory and 15% impaired. **LAA *(Determination based on* Projected Use *above)*** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Carr Canyon	Allotment Number	311
5th Code Watershed	Upper San Pedro River	**4th Code Watershed**	Upper San Pedro River
Allotment Acres			
Total Acres	7616		
Capable Range	1550		
Permitted Use	25 cow/calf, 10/1-2/28		
		Utilization Level	45% maximum use
Major Drainage	Carr Canyon and Ramsey Canyon	**Elevation**	4850-9500 feet
Major Vegetation Type	Broadleaf woodland, Upper Sonoran Grassland		
Type of Grazing System	Winter use		
Planned Improvements			
Allotment Condition	The overall trend for the allotment is upward. 85% of the allotment is in Moderately High range condition with an upward trend, and 15% is in Moderately Low range condition with upward trend. 20% of the allotment is in Satisfactory soil condition, 10% of allotment Unsatisfactory soil condition, and 70% Unsuited.		
Management Actions that contribute to effects	**NLAA** Livestock grazing occurs on the allotment but not during agave bolting period (LNB)		

Allotment Name	Crittenden	**Allotment Number**	314
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	10083		
Capable Range	7207		
Permitted Use	165 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	None	**Elevation**	4400 to 5950 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture rest rotation with Seibold Allotment		
Planned Improvements	- Pipeline extension to Red Bear, west Corral canyon, upper Oak Grove, and Lampshire.		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 77% of the allotment is in satisfactory soil condition and 23% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in potential habitat. (GIM)		

Allotment Name	Duquesne	**Allotment Number**	342
5th Code Watershed	Sonoita Creek & Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	13767		
Capable Range	12235		
Permitted Use	210 cow/calf; 3/1-2/28 10 cow/calf;3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Harshaw, Mowry, Finley, Adams & Duquesne Canyons	**Elevation**	5000 to 7000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	13 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 55% of the allotment is in satisfactory soil condition and 45% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	Farrell	**Allotment Number**	315
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	6429		
Capable Range	6117		
Permitted Use	60 cow/calf 3/1-2/28; 11		

	cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Harshaw	**Elevation**	4600 to 6200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately low range condition with a downward trend. - 65% of the allotment is in satisfactory soil condition and 35% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	Harshaw	**Allotment Number**	319
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	9302		
Capable Range	6525		
Permitted Use	262 yearlings; 3/1-2/28 2 horse, 3/1-2/28 pvt. land		
		Utilization Level	45% max utilization
Major Drainage	Harshaw	**Elevation**	4400 to 6289 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 95% of the allotment is in satisfactory soil condition and 5% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within range of salamander. (STS) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Hayfield	**Allotment Number**	345
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	9263		
Capable Range	9254		
Permitted Use	203 cow/calf, 3/1-2/28; 47 cow/calf, 3/1-2/28 private land		
		Utilization Level	45% max utilization
Major Drainage	Chino, Finley & Adams	**Elevation**	3900 to 5500 feet

Major Vegetation type	broadleaf woodland
Type of grazing system	3 herd, 14 pasture deferred rotation
Planned Improvements	None
Allotment Condition	- The overall trend for the allotment is static. 80% of the allotment is in moderately high range condition with a static trend and 20% is moderately low with a static trend. - 10% of the allotment is in satisfactory soil condition and 90% is unsatisfactory.
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)

Allotment Name	HQ	**Allotment Number**	321
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	1518		
Capable Range	1518		
Permitted Use	20 cow/calf, 3/1-2/28; 8 c/c & 2 horses, 3/1-2/28 private land		
		Utilization Level	45% max utilization
Major Drainage	Parker Canyon	**Elevation**	4700 to 5000 feet
Major Vegetation type	plains grassland		
Type of grazing system	2 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 80% of the allotment is in moderately high range condition with an upward trend and 20% is moderately high with a static trend. - 15% of the allotment is in satisfactory soil condition and 85% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave bolting period. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Kunde	**Allotment Number**	323
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	4199		
Capable Range	3300		
Permitted Use	53 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Redrock Canyon	**Elevation**	4400 to 5700 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	- 1.5 miles of pasture division fencing. - Construction of a trick tank (from Redrock Action Plan).		
Allotment Condition	- The overall trend for the allotment is static. 85% of the allotment is in moderately low range condition with a static trend and 15% is moderately		

	low with a downward trend. - 67% of the allotment is in satisfactory soil condition and 33% is impaired.
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied and potential habitat. (GIM)

Allotment Name	Lewis	**Allotment Number**	325
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	2280		
Capable Range	1591		
Permitted Use	22 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Harshaw Creek	**Elevation**	4200 to 6375 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. 25% of the allotment is in moderately low range condition with a static trend and 75% is low with a downward trend. - 76% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Lochiel	**Allotment Number**	346
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	2415		
Capable Range	2202		
Permitted Use	79 cow/calf; 3/1-2/28 2 cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	San Antonio Canyon	**Elevation**	4200 to 6200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation with private land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 70% of the allotment is in satisfactory soil condition and 30% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	Lone Mountain/Parker Canyon	**Allotment Number**	326/335
5th Code Watershed	Upper San Pedro/Upper Santa Cruz	**6th Code Watershed**	Upper San Pedro/Upper Santa Cruz
Allotment Acres			
Total Acres	38140		
Capable Range	31840		
Permitted Use	1346 cow/calf; 3/1-2/28 20 cow/calf; 3/1-2/28,private land permit 32 horses; 3/1-2/28, private land permit		
		Utilization Level	45% max utilization (35% in MSO PACs)
Major Drainage	Copper, Sunnyside, Cave, Bear, Lone Mtn, Bodie, Scotia and Parker Canyons	**Elevation**	4800-9450
Major Vegetation type	broadleaf woodland		
Type of grazing system	27 pasture best pasture, deferred rotation		
Planned Improvements	- Wakefield exclosure fence, 2 mi. construction - Scotia exclosure fence, 1.75 mi. construction - Parker riparian pasture fence, 2.5 mi. construction - West Pasture division fence, 1.75 mi. construction - Bury or replace existing water lines, 2 mi. - Peterson pond, reconstruct - Scotia well, reconstruct - Forest boundary fence, 5 mi. reconstruction - South Pasture division fence, 1.5 mi. construction - Airport Mill waterlot, 0.5 mi. construction - Eighty Pasture trap, 0.75 mi. construction		
Allotment Condition	- The overall trend for the allotment is upward. 75% of the allotment is in moderately high range condition with an upward trend, 15% is moderately low with an upward trend and 10% is moderately low with a static trend. - 60% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied habitat. (HWU= Huachuca water umbel) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF) -Livestock grazing may occur in PAC or MSO habitat (MSO) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Lyle Canyon	**Allotment Number**	327
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	11,738		
Capable Range	8,814		
Permitted Use	50 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Lyle Canyon	**Elevation**	4,900 to 7,900 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture rest rotation		
Planned Improvements	- Combine cattle herd and management with Canelo allotment under one AMP to provide for additional rest on Canelo allotment and add rotation flexibility, thereby increase rest for Lyle Canyon allotment. - Change Lyle Canyon boundary to include Tom's Corner, Oso Negro, and Horse pastures from the vacant Collins Canyon allotment to provide increased rest and rotation flexibility for the Lyle Canyon allotment. - Change Lyle Canyon boundary to include Becker parcel, providing additional flexibility, slightly reduce stocking rate on allotment, and thereby the grazing effects. - Construct a water storage tank in Harkey pasture and run a pipeline and drinker to the Weaner, Page, Algerita, and Center pastures. This will assist in livestock management by providing water in areas that do not currently have any. - Build check-dams in northwest portion of Korn pasture and south portion of Mathews pasture to mitigate down cutting and erosion of channel. - Construct pipeline from the storage tank in Mountain pasture to the SW corner of Algerita pasture, the SE corner of the Lower Algerita pasture, and the SE end of the Page pasture to assist management and dispersal of livestock on the allotment and allow for improved riparian conditions in the Lyle Canyon riparian area by providing a predictable water source in the uplands. - Develop a well with a windmill and submersible pump in Merritt pasture. Construct pipelines to troughs in Upper Lyle, Merrit, Mountain, Oso Negro, and Tonm's Corner pasture to mitigate adverse effects to riparian areas and watershed condition by providing a predictable water source in the uplands. - Develop a well with pipelines and troughs in Oso Negro pasture to provide a predictable water source in the uplands. - Construct ¼-mile of fence around the spring area in Merrit Canyon with the Oso Negro pasture to mitigate cattle impacts to the riparian area. - Fence the stock tank in Mathews pasture to allow more control of cattle. - Implement a rest/rotation grazing schedule utilizing 18 available pastures.		
Allotment Condition	- Rangeland vegetation condition is rated as low on 377 capable acres, moderately low on 3,812 capable acres, and 5,090 capable acres appear to be in a static trend. - 73% of the allotment is in satisfactory soil condition, with 26% impaired. - There are currently erosion problems in Brushy Canyon in the Korn pasture. - Continued improvement is needed in the riparian areas located in Mountain, Merritt, Lower Lyle, Lyle, and Korn pastures.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	MacFarland	**Allotment Number**	329
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	1042		
-Capable Range	685		
Permitted Use	20 cow/calf; 3/1-2/28 1 horse; 3/1-2/28; private land permit 2 cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Harshaw Creek	**Elevation**	4600 to 5700 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately low range condition with a downward trend. - 95% of the allotment is in satisfactory soil condition and 5% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Manila	**Allotment Number**	328
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	4,504		
Capable Range	4,116		
Permitted Use	125 cow/calf; 3/1-2/28 22 cow/calf; 3/1-2/28; private land permit 6 horses; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Lyle Canyon	**Elevation**	5000 to 6900 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture rotation		
Planned Improvements	- Construct 1.25 miles of fence in Center pasture to improve control of livestock and improvement management of the drainage where the Huachuca water umbel occurs. - Construct a pipeline from a well on adjacent Lyle Canyon allotment to appoint along proposed fence dividing the Center pasture to assist in controlling summer use in lower pasture by providing water. - Divide the North pasture into two smaller pastures by constructing approximately 1-1/2 miles of fence to mitigate grazing impacts to vegetation by providing more control of use in lower elevations. - Improve distribution in Hill pasture by constructing approximately 1 mile of drift fences in two short segments. - Implement 5 or 6 pasture deferred-rest rotation.		
Allotment Condition	- Rangeland vegetation condition is rated as low on 382 capable acres, moderately low on 958 capable acres, and moderately high on 2,776 capable acres. - The apparent trend for 3,404 acres is static, and 712 acres appear to be in a downward trend. - Soil conditions on the allotment: 57% satisfactory, 35% impaired, and 8% unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied habitat. (HWU) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Miller Canyon	**Allotment Number**	330
5th Code Watershed	Upper San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	4841		
Capable Range	3715		
Permitted Use	15 cow/calf; 3/1-2/28 7 cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Miller Canyon	**Elevation**	4800 to 9400 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 75% of the allotment is in satisfactory soil condition, 10% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave bolting and flowering season. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	O'Donnell	**Allotment Number**	332
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	7993		
Capable Range	7794		
Permitted Use	120 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	O'Donnell Canyon	**Elevation**	5100 to 6100 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	- Extension of existing pipeline on neighboring allotment to put a trough in the Heifer pasture.		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 35% of the allotment is in satisfactory soil condition and 65% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Oak Bar	**Allotment Number**	324
5th Code Watershed	Middle Santa Cruz & Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	11314		
Capable Range	10704		
Permitted Use	220 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Three R Canyon	**Elevation**	4000 to 6400 feet
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in moderately high range condition with a static trend, 50% is moderately low with a static trend and 25% is low with a static trend. - 35% of the allotment is in satisfactory soil condition and 65% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Papago/Z-Triangle	**Allotment Number**	334
5th Code Watershed	Middle San Pedro & Cienega Creek	**4th Code Watershed**	Upper San Pedro/Rillito
Allotment Acres			
Total Acres	13540		
Capable Range	13380		
Permitted Use	400 cow/calf; 3/1-2/28 5 horses; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	O'Donnell Creek & Cienega Creek	**Elevation**	5000 to 5953 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	14 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately low range condition with a downward trend. - 50% of the allotment is in satisfactory soil condition and 47% is impaired, and 3% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in potential habitat. (GIM) **NLAA** - Livestock grazing occurs on the allotment but the population is protected from direct effects of grazing. (HWU)		

Allotment Name	Post Canyon	**Allotment Number**	336
5th Code Watershed	Middle San Pedro	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	4491		
Capable Range	4491		
Permitted Use	120 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Post Canyon	**Elevation**	4850 to 5800 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pastures on/off		
Planned Improvements	- Possible cross fencing of the Cemetary and Mountain pastures.		
Allotment Condition	- The overall trend for the allotment is downward. 35% of the allotment is in moderately high range condition with a static trend and 65% is moderately low with a downward trend. - 35% of the allotment is in satisfactory soil condition and 65% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	San Rafael	**Allotment Number**	338
5th Code Watershed	Sonoita Creek & Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	22220		
Capable Range	21446		
Permitted Use	475 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Redrock Canyon & Meadow Valley	**Elevation**	4600 to 6170 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 herd, 23 pasture deferred rotation with private land		
Planned Improvements	- Conversion of Cott Tank Exclosure fence from electric to barbed wire and possible extension. 4.5 miles. This may also entail addition of another water source.		
Allotment Condition	- The overall trend for the allotment is downward. 70% of the allotment is in moderately low range condition with a downward trend and 30% is low with a downward trend. - 15% is in satisfactory soil condition, 50% is impaired and 35% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas with agaves when they are producing flower stalks. (LNB) - Livestock grazing occurs in occupied and potential habitat. (GIM) - Livestock use tanks occupied by salamander or within range of the salamander. (STS) **NLAA** - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Santa Cruz	**Allotment Number**	351
5th Code Watershed	Middle Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	11652		
Capable Range	11339		
Permitted Use	380 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Wild Hog Canyon	**Elevation**	3800 to 6600 feet
Major Vegetation type	desert grassland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	- A 1.5 mile fence to divide the Shamrock pasture. - Extension of an existing pipeline to supply water to the western end of the Wild Hog and Upper Paloma pastures and the northern end of the Shamrock pasture.		
Allotment Condition	- The overall trend for the allotment is static. 35% of the allotment is in moderately high range condition with a static trend and 65% is moderately low with a static trend. - 25% of the allotment is in satisfactory soil condition and 75% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS) **NLAA** - Livestock grazing occurs in compliance with Biological Opinion issued in 1994. (PPC)		

Allotment Name	Sawtelle	**Allotment Number**	339
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	6866		
Capable Range	6662		
Permitted Use	85 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Turkey Creek	**Elevation**	4975 to 6100 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	9 pasture deferred rotation		
Planned Improvements	Maintenance and reconstruction of existing fences.		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - Half of the allotment is in satisfactory soil condition and half is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	Seibold	**Allotment Number**	340
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	3145		
Capable Range	2971		

Permitted Use	50 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Redrock Canyon	**Elevation**	4200 to 5300 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture rest rotation with Crittenden Allotment		
Planned Improvements	- Pipeline extension to Red Bear, west Corral canyon, upper Oak Grove, and Lampshire.		
Allotment Condition	- The overall trend for the allotment is static. 70% of the allotment is in moderately low range condition with a static trend and 30% is moderately low with a downward trend. - 30% of the allotment is in satisfactory soil condition with 70% impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied and potential habitat. (GIM)		

Allotment Name	Sycamore	**Allotment Number**	344
5th Code Watershed	Middle San Pedro	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	564		
Capable Range	564		
Permitted Use	32 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	None	**Elevation**	4800 to 5000 feet
Major Vegetation type	desert grassland		
Type of grazing system	2 pastures of Holistic Resource Mgmt operation with state, private and BLM land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately low range condition with a downward trend. - All of the allotment is in unsatisfactory soil condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs on open grassland mesas and there were historic prairie dog towns in the EMA. (BFF) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	U-D	**Allotment Number**	347
5th Code Watershed	Upper Santa Cruz River	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	1085		
Capable Range	1016		
Permitted Use	20 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	None	**Elevation**	5000 to 6110 feet
Major Vegetation type	plains grassland		
Type of grazing system	18 paddocks of Holistic Resource Mgmt operation with private land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 20% of allotment is in satisfactory soil condition and 80% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) - Livestock use tanks with salamanders or within the range of the salamander. (STS)		

Allotment Name	Wakefield	Allotment Number	304
5th Code Watershed	Cienega Creek	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	10030		
Capable Range	4813		
Permitted Use	50 cow/calf, 3/1-2/28		
		Utilization Level	45% maximum use
Major Drainage	Willow Creek, Montosa Canyon, Wakefield Canyon	**Elevation**	5000-7700 feet
Major Vegetation Type	Broadleaf Woodland, Desert Grassland		
Type of Grazing System	2 pasture deferred rotation		
Planned Improvements	Rebuild west boundary fence (proposed)		
Allotment Condition	The overall trend for the allotment is upward. 60% of the allotment is in Moderately High range condition with an upward trend, and 40% is in Moderately Low condition with an upward trend. 25% of the allotment is in Satisfactory Soil condition, 25% is Unsatisfactory Soil condition, and 50% is Unsuited		
Management Actions that contribute to effects	**LAA** Livestock grazing occurs in areas containing agave during times agave are producing flower stalks (LNB)		

Allotment Name	Weiland	**Allotment Number**	349
5th Code Watershed	Sonoita Creek	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	2088		
Capable Range	1515		
Permitted Use	32 cow/calf; 3/1-2/28 5 cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Harshaw	**Elevation**	4200 to 6400 feet
Major Vegetation type	broadleaf woodland		
Planned Improvements	None		
Type of grazing system	6 pasture deferred rotation		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately low range condition with a downward trend. - 75% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Benson	**Allotment Number**	303
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	4176		
Capable Range	3516		
Permitted Use	120 cow/calf; 3/1-2/28; 7 cow/calf; 3/1-2/28; private land permit		
		Utilization Level	45% max utilization
Major Drainage	Cottonwood Canyon	**Elevation**	4600 to 6600 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	5 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 45% of the allotment is in satisfactory soil condition and 55% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Coal Mine	**Allotment Number**	316
5th Code Watershed	Cienega Creek	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	3003		
Capable Range	1399		
Permitted Use	75 cow/calf; 10/1-3/30		
		Utilization Level	45% max utilization
Major Drainage	Shellenberger Canyon	**Elevation**	5000 to 7700 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 95% of the allotment is in moderately high range condition with a static trend and 5% is moderately low with a static trend. - 30% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 40% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs on the allotment but not during agave bolting and flowering season. (LNB)		

Allotment Name	Knear	**Allotment Number**	302
5th Code Watershed	Middle San Pedro/Cienega Creek	**4th Code Watershed**	Upper San Pedro/Rillito
Allotment Acres			
Total Acres	3899		
Capable Range	3304		
Permitted Use	120 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	None	**Elevation**	4400 to 6000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture deferred rotation		
Planned Improvements	Redevelopment of two old, abandoned wells in the Wildcat and Mountain pastures.		
Allotment Condition	- The overall trend for the allotment is static. 75% of the allotment is in moderately high range condition with a static trend and 25% is moderately low with a static trend. - 65% of the allotment is in satisfactory soil condition and 35% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves and saguaros during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Mescal	**Allotment Number**	318
5th Code Watershed	Middle San Pedro River & Cienega Creek	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	17686		
Capable Range	6989		
Permitted Use	800 cow/calf; 11/1-4/30		
		Utilization Level	45% max utilization
Major Drainage	French Joe, Dry Canyon	**Elevation**	4600 to 7670 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	3 pasture rotation		
Planned Improvements	Two trick tanks and three miles of fence are planned to better regulate livestock movements.		
Allotment Condition	- The overall trend for the allotment is static. 85% of the allotment is in moderately high range condition with a static trend and 15% is moderately low with a downward trend. - 90% of the allotment is in satisfactory soil condition and 10% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during agave bolting and flowering season. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Middle Canyon	**Allotment Number**	306
5th Code Watershed	Middle San Pedro River	**4th Code Watershed**	Upper San Pedro
Allotment Acres			
Total Acres	6802		
Capable Range	2464		
Permitted Use	107 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Guindani Canyon	**Elevation**	4800 to 7350 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 85% of the allotment is in moderately high range condition with a static trend and 15% is moderately low with a static trend. - 70% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the agave bolting and flowering season. (LNB)		

Allotment Name	Bass Canyon	**Allotment Number**	438
5th Code Watershed	Willcox Playa, Lower San Pedro	**4th Code Watershed**	Willcox Playa, Lower San Pedro
Allotment Acres			
Total Acres	4458		
Capable Range	1303		
Permitted Use	125 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Bass Canyon	**Elevation**	5000 to 7000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. All of the allotment is in moderately high range condition with a downward trend. - 30% of the allotment is in satisfactory soil condition and 70% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves when agaves are producing flower stalks and there is a limited amount of capable range. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Bayless	**Allotment Number**	440
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	1477		
Capable Range	90		
Permitted Use	20 cow/calf; 3/1-2/28		
		Utilization Level	25% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 30% of the allotment is in high range condition with an upward trend and 70% is moderately high with an upward trend. - 5% of the allotment is in satisfactory soil condition and 95% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves (and saguaros) during the agave bolting season. (LNB)		

Allotment Name	Bottle Canyon	**Allotment Number**	427
5th Code Watershed	Aravaipa	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3787		
Capable Range	1808		
Permitted Use	130 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Bottle Canyon	**Elevation**	4000 to 5700 feet
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	2 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 55% of the allotment is in satisfactory soil condition and 45% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Bull Tank	**Allotment Number**	434
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	5433		
Capable Range	4129		
Permitted Use	40 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	North and South Oak Creeks	**Elevation**	
Major Vegetation type	desert grassland; coniferous woodland; broadleaf woodland		
Type of grazing system	6 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 30% of the allotment is in moderately high range condition with an upward trend and 70% is moderately high with a static trend. - 25% of the allotment is in satisfactory soil condition, 55% is unsatisfactory and 20% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs within potential habitat and/or adjacent to habitat where falcons have been observed in recent years. (NAF)		

Allotment Name	Copper Creek	**Allotment Number**	444
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3866		
Capable Range	245		

Permitted Use	60 cow/calf; 11/1-4/30 15 cow/calf; 11/1-4/30; private land permit		
		Utilization Level	50% max utilization for uplands, 40% for riparian areas
Major Drainage	Copper Creek; Scanlan Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture winter use		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 55% of the allotment is in satisfactory soil condition and 45% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Deer Creek	**Allotment Number**	429
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	32416		
Capable Range	5943		
Permitted Use	100 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	Deer Creek, Rattlesnake Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	9 pasture rest rotation with state land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 80% of the allotment is in satisfactory soil condition, 10% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Four Mile	**Allotment Number**	425
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	8659		
Capable Range	1238		
Permitted Use	50 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Four Mile Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	6 pasture rotation		
Planned Improvements	None		

Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 65% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 5% is unsuited.
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)

Allotment Name	Harrison Canyon	**Allotment Number**	432
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	2380		
Capable Range	1347		
Permitted Use	35 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	Harrison Canyon	**Elevation**	
Major Vegetation type	desert grassland; coniferous woodland		
Type of grazing system	8 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 25% of the allotment is in moderately high range condition with an upward trend and 75% is moderately high with a static trend. - 60% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 20% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	High Creek	**Allotment Number**	433
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3380		
Capable Range	1041		
Permitted Use	25 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	High Creek	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	2 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 10% of the allotment is in high range condition with an upward trend and 90% is moderately high with an upward trend. - 40% of the allotment is in satisfactory soil condition, 10% is unsatisfactory and 50% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in riparian areas. (BAE) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	North Ash Creek	**Allotment Number**	435
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	1272		
Capable Range	943		
Permitted Use	15 cow/calf; 3/1-2/28		
		Utilization Level	50% max utilization

Major Drainage	North Ash Creek	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in high range condition with an upward trend. - 35% of the allotment is in satisfactory soil condition, 35% is unsatisfactory and 30% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Paddy's River	**Allotment Number**	430
5th Code Watershed	Aravaipa	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	8758		
Capable Range	2991		
Permitted Use	170 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Paddy's River	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 70% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	San Pedro	**Allotment Number**	441
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	5181		
Capable Range	492		
Permitted Use	40 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	Keilberg Canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	3 pasture rest rotation with private land		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 10% of the allotment is in satisfactory soil condition and 90% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Sombrero Butte	**Allotment Number**	443
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	4221		
Capable Range	749		
Permitted Use	19 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 40% of the allotment is in moderately high range condition with an upward trend and 60% is moderately low with an upward trend. - 40% of the allotment is in satisfactory soil condition, 5% is impaired, 40% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	South Ash	**Allotment Number**	436
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox Playa
Allotment Acres			
Total Acres	5274		
Capable Range	1612		
Permitted Use	30 cow/calf; 11/1-6/30		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	South Ash Creek, Bear Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 5% of the allotment is in high range condition with an upward trend and 95% is moderately high with an upward trend. - 35% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 50% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Squaw Basin	**Allotment Number**	426
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	5064		
Capable Range	2723		
Permitted Use	50 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Bottle Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system			
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 25% of the allotment is in satisfactory soil condition and 75% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Sunset	**Allotment Number**	431
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	1591		
Capable Range	1203		
Permitted Use	25 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	Black Canyon	**Elevation**	
Major Vegetation type	desert grassland; coniferous woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 60% of the allotment is in satisfactory condition, 30% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Wear	**Allotment Number**	437
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	2886		
Capable Range	2225		
Permitted Use	58 cow/calf 3/1-2/28; 12 cow/calf 3/1-2/28 private land permit		
		Utilization Level	45% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture rest rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 95% of the allotment is in moderately high range condition with an upward trend and 5% is moderately low with an upward trend. - 60% of the allotment is in satisfactory soil condition, 10% is impaired, 25% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Willow Creek	**Allotment Number**	428
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	4318		
Capable Range	3238		
Permitted Use	185 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization
Major Drainage	Willow Creek	**Elevation**	
Major Vegetation type	desert grassland; coniferous woodland		
Type of grazing system	1 pasture winter use		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 90% of the allotment is in moderately high range condition with an upward trend and 10% is moderately low with an upward trend. - 15% of the allotment is in satisfactory soil condition, 75% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	YLE	**Allotment Number**	442
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	6771		
Capable Range	1386		
Permitted Use	41 cow/calf; 3/1-2/28		
		Utilization Level	40% maximum utilization
Major Drainage	YLE canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 70% of the allotment is in high range condition with a static trend and 30% is moderately high with an upward trend. - 5% of the allotment is in satisfactory soil condition, 80% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Bonita	**Allotment Number**	424
5th Code Watershed	Willcox Playa Basin	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	8742		
Capable Range	3376		
Permitted Use	160 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization
Major Drainage	Goudy Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 45% of the allotment is in moderately high range condition with an upward trend, 35% is moderately high with a static trend, 10% is moderately low with an upward trend and 10% is low with an upward trend. - 45% of the allotment is in satisfactory soil condition, 25% is unsatisfactory and 30% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Gillespie	**Allotment Number**	417
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	8172		
Capable Range	5973		
Permitted Use	47 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization
Major Drainage	Stockton Wash	**Elevation**	
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	9 pasture High Intensity/Short Duration		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 93% of the allotment is in satisfactory soil condition with 7% impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Gillman	**Allotment Number**	420
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	4953		
Capable Range	4604		
Permitted Use	240 cow/calf; 11/1-3/31		
		Utilization Level	50% max use in the uplands and 40% in the riparian areas
Major Drainage	Gillman Canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	2 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 95% of the allotment is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Grant Creek	**Allotment Number**	413
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	6073		
Capable Range	3194		
Permitted Use	30 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization in the uplands and 40% in the riparian areas
Major Drainage	Grant Creek	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland; coniferous forest		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 5% of the allotment is in high range condition with an upward trend, 20% is moderately high with an upward trend, 50% is moderately high with a static trend, 5% is moderately low with an upward trend, 15% is moderately low with a static trend and 5% is low with an upward trend. - 100% of the allotment is in satisfactory soil condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Hawk Hollow	**Allotment Number**	414
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	3967		
Capable Range	2745		
Permitted Use	33 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization
Major Drainage	Frye Creek & Cave Creek	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	2 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 70% of the allotment is in moderately high range condition with an upward trend and 30% is moderately high with a static trend. - 95% of the allotment is in satisfactory soil condition and 5% is impaired.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Marijilda	**Allotment Number**	415
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	12466		
Capable Range	4325		
Permitted Use	30 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	Marijilda & Deadman Creeks	**Elevation**	
Major Vegetation type	southwestern desertscrub; broadleaf woodland; coniferous forest		
Type of grazing system	5 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is downward. 35% of the allotment is in moderately high range condition with an upward trend, 25% is moderately high with a static trend and 40% is moderately low with a downward trend. - 93% of the allotment is in satisfactory soil condition and 7% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	O Bar O	**Allotment Number**	419
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	16338		
Capable Range	11158		
Permitted Use	417 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Big Creek; Grapevine Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland; southwestern desertscrub		
Type of grazing system	6 pasture Holistic Resource Management		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 30% of the allotment is in moderately high range condition with an upward trend, 60% is moderately high with a static trend and 10% is moderately low with a downward trend. - 86% of the allotment is in satisfactory soil condition and 14% is impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	O Bar O Canyon	**Allotment Number**	452
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	6263		
Capable Range	5365		
Permitted Use	275 cow/calf; 4/1-2/28		

		Utilization Level	50% max utilization in uplands and 40% in riparian areas

Major Drainage	O-O Canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	4 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 25% of the allotment is in satisfactory soil condition, 70% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Redtail	**Allotment Number**	421
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	2552		
Capable Range	2511		
Permitted Use	85 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Wood Canyon Wash	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in high range condition with a static trend. - All (100%) of the allotment is satisfactory soil condition.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves but not during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Seventy Six	**Allotment Number**	412
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	13829		
Capable Range	8683		
Permitted Use	285 cow/calf; 11/1-4/10		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	KH Canyon; Durkee Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland; coniferous forest		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 70% of the allotment is in moderately high range condition with an upward trend, 20% is moderately low with an upward trend and 10% is moderately low with a downward trend. - 35% of the allotment is in satisfactory soil condition, 45% is impaired, 10% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	LAA - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Shingle Mill	**Allotment Number**	411
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	34042		
Capable Range	23200		
Permitted Use	50 cow/calf; 10/15-3/31 20 horses; 3/1-2-28		
		Utilization Level	40% max utilization
Major Drainage	Tripp, N. Taylor, Carter, NuHull, Shingle Mill Canyons	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	5 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 35% of the allotment is in moderately high range condition with an upward trend, 40% is moderately high with a static trend, 20% is moderately low with a downward trend and 5% is moderately low with a downward trend. - 55% of the allotment is in satisfactory soil condition, 35% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Stockton Pass	**Allotment Number**	418
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	25162		
Capable Range	18595		
Permitted Use	145 cow/calf; 3/1-2/28		
		Utilization Level	45% max utilization in uplands and 40% in riparian areas
Major Drainage	Stockton Pass Wash, Gillespie, Oak Draw	**Elevation**	
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	9 pasture high intensity, short duration		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 60% of the allotment is in moderately high range condition with an upward trend and 40% is moderately high with a static trend. - 60% of the allotment is in satisfactory soil condition, 15% is impaired, 15% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Ten	**Allotment Number**	422
5th Code Watershed	San Simon River	**4th Code Watershed**	San Simon
Allotment Acres			
Total Acres	6490		
Capable Range	6140		
Permitted Use	112 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization on uplands 40% in the riparian areas
Major Drainage	Sycamore Canyon, Willow Spring Wash	**Elevation**	
Major Vegetation type	southwestern desertscrub		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 98% of the allotment is in satisfactory soil condition with 2% impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Two Troughs	**Allotment Number**	410
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	3774		
Capable Range	3261		
Permitted Use	100 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Two Troughs Canyon	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	1 pasture rotated with Cedar Spring Allotment		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - 35% of the allotment is in satisfactory soil condition, 60% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves but not during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Veach	**Allotment Number**	416
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	12860		
Capable Range	7549		
Permitted Use	275 cow/calf; 12/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Veach, Dutch Henry Canyon	**Elevation**	
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 90% of the allotment is in moderately high range condition with a static trend and 10% is moderately low with a downward trend. - 87% of the allotment is in satisfactory soil condition and 11% impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	White Streaks	**Allotment Number**	423
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	5186		
Capable Range	3141		
Permitted Use	38 cow/calf; 5/1-2/28		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Ash Creek	**Elevation**	
Major Vegetation type	desert grassland; broadleaf woodland; coniferous forest		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 75% of the allotment is in moderately high range condition with a static trend and 25% is moderately low with a downward trend. - 94% of the allotment is in satisfactory soil condition with 5% impaired.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Black Rock	**Allotment Number**	404
5th Code Watershed	Lower Gila	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	13844		
Capable Range	3436		
Permitted Use	66 cow/calf; 3/1-2/28		
		Utilization Level	35% max utilization
Major Drainage	Black Rock Canyon	**Elevation**	
Major Vegetation type	chaparral; broadleaf woodland		
Type of grazing system	3 pasture coordinated Ranch Plan rotation grazing system		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 30% of the allotment is in moderately high range condition with an upward trend, 65% is moderately high with a static trend and 5% is moderately low with an upward trend. - Half of the allotment is in satisfactory soil condition and half is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Cedar Springs	**Allotment Number**	409
5th Code Watershed	Aravaipa, Lower Gila	**4th Code Watershed**	Lower San Pedro/Upper Gila River
Allotment Acres			
Total Acres	4904		
Capable Range	4171		
Permitted Use	150 cow/calf 11/1-3/31		
		Utilization Level	50% max utilization on the uplands and 40% in the riparian areas
Major Drainage	Little Cottonwood Canyon & Linsey Canyon	**Elevation**	4500 to 6700 feet
Major Vegetation type	desert grassland; broadleaf woodland		
Type of grazing system	2 pasture, rotated with Two Troughs Allotment		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 35% of the allotment is in moderately high range condition with an upward trend and 65% is moderately low with an upward trend. - 35% of the allotment is in satisfactory soil condition and 65% is unsatisfactory.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not during the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

	Foster	**Allotment Number**	406

Allotment Name			
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	3671		
Capable Range	697		
Permitted Use	30 cow/calf 11/1-4/30; 10 cow/calf 3/1-2/28 on/off		
		Utilization Level	50% max utilization
Major Drainage	Dark Canyon	**Elevation**	
Major Vegetation type	chaparral		
Type of grazing system	1 pasture winter use or year long on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 85% of the allotment is in moderately high range condition with an upward trend and 15% is moderately low with a static trend. - 50% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 30% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves when agaves are producing flower stalks. (LNB)		

Allotment Name	Jakes	**Allotment Number**	408
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3665		
Capable Range	1183		
Permitted Use	31 cow/calf; 3/1-2/28; on/off		
		Utilization Level	50% max utilization
Major Drainage	Buford Canyon	**Elevation**	
Major Vegetation type	chaparral; broadleaf woodland		
Type of grazing system	3 pasture rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. Half of the allotment is in moderately high range condition with an upward trend and half is moderately high with a static trend. - 15% of the allotment is in satisfactory soil condition, 55% is unsatisfactory and 30% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Kane Springs	**Allotment Number**	405
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	699		
Capable Range	116		
Permitted Use	17 cow/calf; 11/1-4/30		
		Utilization Level	50% max utilization
Major Drainage	Beauchamp Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with an upward trend. - 90% of the allotment is in satisfactory soil condition, 5% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the bolting and flowering season. (LNB)		

Allotment Name	Laurel Canyon/ South Reef	**Allotment Number**	401/451
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	7997		
Capable Range	2117		
Permitted Use	100 cow/calf; 10/1-3/31		
		Utilization Level	50% max utilization
Major Drainage	Laurel Canyon	**Elevation**	
Major Vegetation type	chaparral		
Type of grazing system	2 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for these allotments is upward. 80% of the allotment is in moderately high range condition with an upward trend and 20% is moderately high with a static trend. - 30% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 50% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	North Reef	**Allotment Number**	402
5th Code Watershed	Aravaipa Creek	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	6762		
Capable Range	1783		
Permitted Use	100 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization in uplands and 40% in riparian areas
Major Drainage	Upper Black Rock & Cottonwood Canyons	**Elevation**	4800 to 6200 feet
Major Vegetation type	chaparral		
Type of grazing system	1 pasture season long		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 85% of the allotment is in moderately high range condition with an upward trend and 15% is moderately high with a static trend. - 35% of the allotment is in satisfactory soil condition, 60% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing occurs in areas containing agaves but not when agaves are producing flower stalks. (LNB)		

Allotment Name	South Goodwin	**Allotment Number**	403
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	8738		
Capable Range	1107		
Permitted Use	54 cow/calf; 3/1-2/28		
		Utilization Level	35% max utilization
Major Drainage	South Fork Goodwin Canyon	**Elevation**	
Major Vegetation type	chaparral		
Type of grazing system	2 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 5% of the allotment is in moderately high range condition with an upward trend, 10% is moderately high with a static trend, 75% is moderately low with a static trend and 10% is moderately low with a downward trend. - 65% of the allotment is in satisfactory soil condition, 25% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flowering stalks. (LNB) **NLAA** - Livestock grazing occurs in MSO habitat. (MSO)		

Allotment Name	VJ	**Allotment Number**	407
5th Code Watershed	Lower Gila River	**4th Code Watershed**	Upper Gila River
Allotment Acres			
Total Acres	4461		
Capable Range	1102		

Permitted Use	35 cow/calf; 11/1-3/31		
		Utilization Level	50% max utilization in the uplands and 40% in riparian areas
Major Drainage	Cottonwood Canyon	**Elevation**	
Major Vegetation type	Chaparral		
Type of grazing system	1 pasture winter use		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 95% of the allotment is in moderately high range condition with an upward trend and 5% is moderately low with a static trend. - 45% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 25% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves at the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Oak Grove	**Allotment Number**	447
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	4932		
Capable Range	892		
Permitted Use	50 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization on uplands and 40% in riparian areas
Major Drainage	Oak Grove Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately high range condition with a static trend. - 95% of the allotment is in satisfactory soil condition and 5% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Polecat	**Allotment Number**	448
5th Code Watershed	Lower San Pedro River	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3429		
Capable Range	1341		
Permitted Use	17 cow/calf; 3/1-2/28		
		Utilization Level	40% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	coniferous woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. 5% of the allotment is in high range condition with a static trend and 95% is moderately high with a static trend. - 90% of the allotment is in satisfactory soil condition and 10% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave flowering and bolting season. (LNB)		

Allotment Name	Riley Peak	**Allotment Number**	446
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	4284		
Capable Range	499		
Permitted Use	20 cow/calf 11/1-4/30; 50 cow/calf 3/1-2/28 on/off		
		Utilization Level	45% max utilization
Major Drainage	Mud Springs & Rose Canyon	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. All of the allotment is in moderately high range condition with an upward trend. - All of the allotment is in satisfactory soil condition.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Rockhouse	**Allotment Number**	445
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	7209		
Capable Range	3324		
Permitted Use	150 cow/calf 3/1-2/28		
		Utilization Level	50% max utilization
Major Drainage	Rockhouse Canyon	**Elevation**	
Major Vegetation type	coniferous woodland		
Type of grazing system	one pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is upward. 5% of the allotment is in high range condition with a static trend and 95% is moderately high with an upward trend. - 75% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs in occupied habitat, suitable unsurveyed or potential habitat. (NAF)		

Allotment Name	Rocky	**Allotment Number**	449
5th Code Watershed	Willcox Playa	**4th Code Watershed**	Willcox
Allotment Acres			
Total Acres	660		
Capable Range	362		
Permitted Use	9 cow/calf; 3/1-2/28		
		Utilization Level	30% max utilization
Major Drainage	none	**Elevation**	
Major Vegetation type	broadleaf woodland		
Type of grazing system	1 pasture on/off		
Planned Improvements	None		
Allotment Condition	- The overall trend for the allotment is static. All of the allotment is in moderately low range condition with a static trend. - 45% of the allotment is in satisfactory soil condition, 15% is impaired and 40% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the agave flowering and bolting season. (LNB)		

Allotment Name	American Flag/Interocean	**Allotment Number**	506
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	25566		
Capable Range	12488		
Permitted Use	150 cow/calf; 4/1-8/31 546 cow/calf; 6/15-10/31 65 cow/calf; 6/15-12/31		
		Utilization level	45% max. utilization
Major Drainage	Nugget Canyon, Peppersauce Canyon, Bonito Wash & Smelter Wash	**Elevation**	4,500 to 8,200 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture rotation		
Planned improvements	None		
Allotment Condition	- 25% of the allotment is in moderately high range condition, 70% is moderately low and 5% is low (1974, 1975). - 60% of the allotment is in satisfactory condition, 25% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Barney	**Allotment Number**	517
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	3377		
Capable Range	925		
Permitted Use	65 cow/calf; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Sycamore & Deer Creek	**Elevation**	4,000 to 6,000 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	2 pasture season long		
Planned Improvements	None		
Allotment Condition	- 20% of the allotment is in moderately high range condition and 80% is moderately low (1993). - 70% of the allotment is in satisfactory soil condition, 15% is unsatisfactory and 15% is unsuited (1995).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs on the allotment during the time when agaves are producing flower stalks. (LNB)		

Allotment Name	Bellota	**Allotment Number**	502
5th Code Watershed	Lower San Pedro/Rillito Creek	**4th Code Watershed**	Lower San Pedro/Rillito
Allotment Acres			
Total Acres	37285		
Capable Range	32375		
Permitted Use	400 cow/calf; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Agua Caliente, Tanque Verde, Bullock Canyons	**Elevation**	3,400 to 7,300 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland; coniferous woodland		
Type of grazing system	7 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- 55% of the allotment is in low range condition and 45% is moderately low (1976). - 55% of the allotment is in satisfactory soil condition and 45% is unsatisfactory.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time agaves are producing flower stalks. (LNB) - Livestock grazing occurs in excess of 30% in unsurveyed areas thought to be suitable habitat. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO)		

Allotment Name	Cañada del Oro	**Allotment Number**	503
5th Code Watershed	Cañada del Oro	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	21224		
Capable Range	9849		
Permitted Use	350 cow/calf; 10/1-3/31		
		Utilization level	45% max utilization
Major Drainage	Cañada del Oro	**Elevation**	4,500 to 9,150 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- 65% of allotment is in moderately high range condition and 35% is moderately low (1999). - 95% of the allotment is in satisfactory soil condition and 5% is impaired (1999).		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves during the time when agaves are producing flower stalks. (LNB) - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs at levels in excess of 30% in areas thought to be suitable habitat but there is limited acreage below 4,000 feet. (CFP)		

Allotment Name	Cumero	**Allotment Number**	520
5th Code Watershed	Lower San Pedro/Cienega Creek	**4th Code Watershed**	Lower San Pedro/Rillito
Allotment Acres			
Total Acres	13085		
Capable Range	7128		
Permitted Use	125 cow/calf; 3/1-2/28 4 horse; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Cumero & Ash Creek	**Elevation**	4,000 to 8,500 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- 60% of allotment is in moderately low range condition and 40% is moderately high (1983). - 75% of the allotment is in satisfactory soil condition, 20% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs at levels in excess of 30% in areas that may be suitable habitat. (CFP)		

Allotment Name	Finley Springs	**Allotment Number**	505
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	16034		

Capable Range	7975		
Permitted Use	175 cow/calf; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Edgar Canyon, Bushman Canyon	**Elevation**	3,840 to 8,550 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	3 pasture deferred rotation		
Planned Improvements	None		
Allotment Condition	- 95% of the allotment is in moderately low range condition and 5% is low (1983). . - 55% of the allotment is in satisfactory soil condition, 30% is unsatisfactory and 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs within PAC or within MSO habitat. (MSO) - Livestock grazing occurs at levels in excess of 30% in areas thought to be suitable habitat but there is limited acreage below 4,000 feet. (CFP)		

Allotment Name	Fresno	Allotment Number	519
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	1645		
Capable Range	1500		
Permitted Use	20 cow/calf, 3/1-2/28		
		Utilization Level	45%
Major Drainage	Paige Creek	**Elevation**	4500
Major Vegetation Type	Desert grassland		
Type of Grazing System	Deferred rest rotation		
Planned Improvements	None		
Allotment Condition	Upper Pasture is in good condition. Lower Pasture is in fair condition.		
Management Actions that contribute to effects	**LAA** Livestock grazing occurs in areas containing agaves during the time agaves are producing flower stalks. (LNB)		

Allotment Name	Happy Valley	**Allotment Number**	518
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	11901		
Capable Range	8646		
Permitted Use	140 cow/calf; 3/1-2/28 6 horses; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Paige, Turkey & Miller Creeks	**Elevation**	4,000 to 8,500 feet
Major Vegetation type	broadleaf woodland		
Type of grazing system	4 pasture rest rotation with state land		
Planned Improvements	None		
Allotment Condition	- 20% of the allotment is in high range condition, 55% is moderately high and 25% is moderately low (1995). - 35% of the allotment is in satisfactory soil condition, 40% is impaired, 20% is unsatisfactory and 5% is unsuited (1995).		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB) - Livestock grazing will occur in potential SWF habitat. (SWF = southwestern willow flycatcher) **NLAA** - Livestock grazing occurs at levels in excess of 30% in areas thought to be suitable habitat but there is limited acreage below 4,000 feet. (CFP)		

Allotment Name	Last Chance	**Allotment Number**	516
5th Code Watershed	Lower San Pedro	**4th Code Watershed**	Lower San Pedro
Allotment Acres			
Total Acres	6207		
Capable Range	2941		
Permitted Use	80 cow/calf; 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Espiritu Canyon	**Elevation**	4,250 to 7,150 feet
Major Vegetation type	broadleaf woodland; southwestern desertscrub		
Type of grazing system	4 pasture deferred rotation with state and private land		
Planned Improvements	None		
Allotment Condition	- 5% of the allotment is in high range condition, 45% is moderately high and 50% is moderately low (1995). - 70% of the allotment is in satisfactory soil condition, 25% is impaired and 10% is unsuited (1996).		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time when agaves are producing flower stalks. (LNB) **NLAA** - Livestock grazing occurs at levels in excess of 30% in areas that may be suitable habitat. (CFP)		

	Redington Pass	**Allotment Number**	504

Allotment Name			
5th Code Watershed	Rillito	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	20783		
Capable Range	17587		
Permitted Use	290 cow/calf 3/1-2/28; 4 horses 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Tanque Verde & Agua Caliente	**Elevation**	2,840 to 6,200 feet
Major Vegetation type	southwestern desertscrub		
Type of grazing system	3 pasture rest rotation		
Planned Improvements	None		
Allotment Condition	- 10% of the allotment is in high range condition, 75% is moderately high and 15% is moderately low (1992). - 10% of the allotment is in satisfactory soil condition, 75% is unsatisfactory, 15% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing in areas with agaves when agaves are producing flower stalks. (LNB) - Livestock grazing occurs in excess of 30% in areas thought to be suitable habitat. (CFP) - Livestock gathering occurs in what is thought to be unsurveyed suitable habitat between February 1 and July 31. (CFP)		

Allotment Name	Rincon/Agua Verde	**Allotment Number**	522/524
5th Code Watershed	Rillito, Cienega	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	12000		
Capable Range	9710		
Permitted Use	100 cow/calf 3/1-2/28 (Agua Verde); 52 cow/calf 10/1-3/31 (Rincon)		
		Utilization level	45% max utilization; 30% max utilization below 4000'
Major Drainage	Shaw, Chimney & Distillery Canyons; Posta Quemada	**Elevation**	3,500 to 7,800 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	4 pasture rotation		
Planned Improvements	-Corral -Stock trail		
Allotment Condition	-35% of the allotment is in moderately high range condition, 40% is moderately low and 25% is low (1977, 1994). -65% of the allotment is in satisfactory soil condition, 15% is impaired, 15% is unsatisfactory and 5% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas containing agaves at the time agaves are producing flower stalks. (LNB) *Agua Verde only* **NLAA** **-** Livestock grazing occurs in areas containing agaves but not at the time agaves are producing flower stalks. (LNB) *Rincon only* - Utilization level is 30% below 4,000 feet in elevation. (CFP) - Livestock gathering activities are prohibited within 0.25 miles of detection site or unsurveyed habitat between February 1 and July 31. (CFP)		

Allotment Name	Rock Pile	**Allotment Number**	523
5th Code Watershed	Cienega	**4th Code Watershed**	Rillito
Allotment Acres			
Total Acres	2170		
Capable Range	1630		
Permitted Use	25 cow/calf; 10/1-3/31		
		Utilization level	45% max utilization
Major Drainage	Agua Verde Creek	**Elevation**	4,250 to 7,044 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	3 pasture		
Planned Improvements	None		
Allotment Condition	- 15% of the allotment is in high range condition, 50% is moderately high, and 35% is moderately low (1994). - 15% of the allotment is in satisfactory soil condition, 35% is impaired, 40% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**NLAA** - Livestock grazing does not occur in areas containing agaves when agaves are producing flower stalks. (LNB)		

Allotment Name	Samaniego	**Allotment Number**	513
5th Code Watershed	Cañada del Oro	**4th Code Watershed**	Upper Santa Cruz
Allotment Acres			
Total Acres	17679		
Capable Range	10929		
Permitted Use	356 yearling, 11/1-4/30 50 cow/calf, 3/1-2/28		
		Utilization level	45% max utilization
Major Drainage	Dodge Wash & Carrista Canyon	**Elevation**	3,100 to 7,500 feet
Major Vegetation type	southwestern desertscrub; broadleaf woodland		
Type of grazing system	4 pasture rotation		
Planned Improvements	None		
Allotment Condition	- 35% of the allotment is in moderately high range condition, 40% is moderately high and 25% is low (1977). - 65% of the allotment is in satisfactory soil condition, 25% is unsatisfactory and 10% is unsuited.		
Management Actions that contribute to effects	**LAA** - Livestock grazing occurs in areas thought to be unsurveyed suitable habitat at levels greater than 30%. (CFP) - Livestock gathering activities occur in what is thought to be unsurveyed suitable habitat. (CFP) **NLAA** - Livestock grazing does not occur in areas containing agaves at the time agaves are producing flower stalks. (LNB)		