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AESO/SE
2-21-95-F-177

January 8, 1996

# MEMORANDUM

To: District Manager, Bureau of Land Management, Safford

From: State Supervisor

Subject: Biological Opinion, Cienega Creek Interim Grazing Plan

The U.S. Fish and Wildlife Service has reviewed the proposed Cienega Creek Interim Grazing Plan on the Empire-Cienega Resource Conservation Area (RCA). Your request for formal consultation was received on January 24, 1995. This document represents the Service's biological opinion and conference report on the effects of that action on the following species: endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*), endangered southwestern willow flycatcher (*Empidonax traillii extimus*), and endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*).

This biological opinion (BO) is based on information provided in your January 19, 1995 memorandum and Biological Evaluation (BE); your memorandum of March 7, 1995 fulfilling our request for additional information; the Decision Record and Environmental Assessment (#AZ-046-95-007) you sent on April 10, 1995; and telephone conversations, field investigations, data in our files, and other sources of information. You also sent a memorandum, dated July 19, 1995, requesting formal consultation for the lesser long-nosed bat and the southwestern willow flycatcher and agreeing to a 60-day extension of the consultation period. The deadline for delivering the BO was August 7, 1995. The Decision Record and Environmental Analysis (EA) changed the proposed action slightly, by deleting a few of the proposed projects. A complete administrative record of this consultation is on file in this office.

The Bureau of Land Management has conducted informal and formal section 7 consultations on the RCA before this one, but none have dealt directly with the livestock grazing program or the authorization of such. Fencing portions of the riparian zone of Cienega Creek and Mattie Canyon was informally consulted on in 1990.

In July 1993, the BLM initiated formal consultation on a headcut repair and riparian pasture fencing (2-21-93-F-430)(US BLM 1993*a*). The Service determined that the proposed actions were interdependent and interrelated with the livestock grazing program. The Service recommended that the consultation be withdrawn, and that consultation on the headcut and the grazing program be initiated separately (USFWS 1993*b*). The headcut repair and fencing consultation was withdrawn and consultation reinitiated for the headcut repair (US BLM 1993*b*) on January 3, 1994, and the Biological Opinion was completed on February 7, 1994 (USFWS 1994*a*). The BLM plans to use the Biological Opinion on the Interim Grazing Plan to guide

development of the Resource Management Plan amendment for the RCA. We concur with your not likely to adversely affect determinations for the American peregrine falcon, bald eagle, and the proposed endangered cactus ferruginous pygmy-owl with proposed critical habitat. These species will not be considered in the Biological Opinion.

After reviewing the status of the Gila topminnow, southwestern willow flycatcher, and the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed interim grazing plan and the cumulative effects, it is the Service's biological opinion that the interim grazing plan, as proposed, is not likely to jeopardize the continued existence of these species.

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# BIOLOGICAL OPINION

## DESCRIPTION OF THE PROPOSED ACTION

The Tucson Resource Area of the Safford District, Bureau of Land Management, proposes to continue the authorization of livestock grazing on the Empire-Cienega Ranch, in the Empire-Cienega RCA north of Sonoita, Arizona. The livestock operation would be with the current grazing lessees, John and MacFarland Donaldson (#6090). This interim authorization would occur under the provisions of the Draft Interim Livestock Grazing Management Plan 1995, and the grazing lease between the BLM and John Donaldson dated September, 1991. This interim use would continue pending the resource decisions made in the Land Use Plan Amendment to the Safford Resource Management Plan.

The interim management plan prescribes how the livestock grazing operation will be conducted to sustain the resource base, identifies the range improvements needed to improve the existing management, stipulates the monitoring necessary to measure the effectiveness of the management actions, and details the procedures for the evaluation and modification of the livestock grazing use. The primary change in the existing management is the proposal to construct eight miles of fence and develop three watering facilities to establish riparian pastures along the southern four miles of Cienega Creek. The authorized grazing capacity is 1,500 animal units on three grazing leases. There are 73,960 acres allotted.

Also proposed in the plan are the realignment of existing riparian pastures (3.5 miles) on the north end of the ranch and the development of the waters (2 wells, 3 tanks, and 0.5 miles of pipe) necessary to eliminate the need to water cattle in Cienega Creek, except at the extreme north end near the Narrows. Livestock could be used as a tool in the future in the riparian pastures to achieve resource management goals. It is possible that this may become necessary under some conditions to perpetuate open aquatic habitat (Hendrickson and Minckley 1984).

Several range improvement projects were also proposed to enhance livestock management and wildlife access to water in the uplands. These projects are not essential to manage livestock on the Empire-Cienega Ranch.

The BLM would enter into a Cooperative Agreement with the grazing lessees to construct the projects. The BLM would provide the fence material and the lessees would construct and maintain the fence to BLM standards. The BLM would construct the earthen pit reservoirs for the water facilities and provide the one mile of pipeline for the Cinco Gates water. The lessees would provide the submersible pumps and power plants, as well as equip and maintain the facilities.

### Objectives of Livestock Grazing Under the Interim Management Plan

The general multiple use objectives of the interim plan stated in the Biological Evaluation are:

1. Improve or maintain range condition by assuring the physiological requirements of plant growth, rest, and reproduction are met for the "key" vegetation species.

2. Maintain or restore advanced ecological status and proper functioning condition on riparian areas, thus providing the greatest vegetation and habitat diversity for wildlife, fish, and watershed protection. This will include constructing fencing and upland water developments necessary to create riparian pastures along the perennial portions of Cienega Creek to provide adequate rest from livestock grazing.

3. Improve habitat for pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus couesi*), and other wildlife species by providing adequate food resources, water, cover, and space, with the primary emphasis on pronghom habitat. These efforts will include but not be limited to maintaining forage reserves, cooperatively developing wildlife waters, and providing periodic rest to portions of the range.

4. Provide for the protection and recovery of habitats necessary to support healthy viable populations of Special Status Species.

5. Reduce erosion and increase water penetration by increasing vegetative cover and litter.

6. Sustain livestock production by producing more and better quality forage.

The interim livestock management plan establishes the initial stocking level, prescribes the grazing system, specifies the range improvements necessary for implementation of the grazing system, and provides for evaluation and modification of the plan to achieve the objectives. The proposal establishes a winter use area (31,480 acres), where livestock grazing would occur from November through April. There are 11 separate pastures that are used in different combinations to provide the options necessary for rotation of rest periods. Cattle commonly use 7 or 8 of the pastures during one winter period.

The spring use period of May through mid-July is primarily associated with the sacaton pastures (2,930 acres). There are nine sacaton pastures adjacent to Cienega Creek, Empire Gulch, and Gardner Canyon. Cattle usually use 5 or 6 of the pastures in a year.

The summer use period of mid-July through September is associated with the upland grasslands at the southern, higher end of the ranch. This area encompasses about 37,350 acres in 11 different pastures. The cattle frequently rotate through 8 or 9 pastures during this season. The yearly roundup occurs in mid October through November. The cattle are moved through the 4 or 5 shipping pastures (1,900 acres) then.

## Basis of the Grazing Strategy

The vegetation requirements are basic to the proposed grazing system. Adequate rest from grazing must be provided to enable plants to produce and store carbohydrates for growth and reproduction, and to allow for establishment of new plants. The sequence and timing of the grazing use periods and rest are essential to achieve the plan objectives. The proposed grazing management should minimize adverse plant response to grazing intensity, frequency, selectivity, and seasonality.

The proposed livestock grazing strategy is developed with the seasonal growth habits of the key forage species in mind. The rest periods during the spring and summer growing season are designed to be physiologically beneficial to both cool and warm season perennial grasses. When this rest is allowed to continue through the winter the complete phenological development of the grasses is provided for before grazing.

The grazing permittee's livestock management philosophy is based on one herd of mother cows that move through a series of flexible pasture rotations. The one herd concept is where mature female cattle are run together, and replacement females are bought at breeding age to enable them to enter the herd immediately. One herd is used to maximize rest to the unused pastures and to better utilize different species of grasses (Bryant 1978). Multiple selection of plant species is possible and regrazing of specific species is kept to a minimum.

The ranch is divided into "units of useability," variable sized pastures that will support the herd for a certain period during a certain time of year (Table 1). The "units" are supported by water sources. A primary water source is essential for each unit and the quantity of water must be sufficient for the whole herd. A lactating cow can consume up to 12 gallons of water per day. Accordingly, the water source may have to hold up to 20,000 gallons (0.6 acre feet) of water a day to provide for a herd of up to 1,500 cows and their calves.

Under the proposed management approximately 25% of the ranch would be rested yearlong annually. About 33% of the acreage in the winter pastures (which comprises 43% of the total acreage) would be rested each winter. Approximately 25% of the summer use areas (50% of the total acreage) would be rested each summer. About 20% of the sacaton pastures (7% of the total acreage) would be rested annually.
A rigid system of grazing restricted by dates rather than plant requirements frequently does not work in drought prone ecosystems and a strategy that will not work in a drought will not work

Table 1. Empire-Cienega Ranch pastures and use.

| Pasture | Acres | Use[1] |
|---|---|---|
| Upper 49 | 2,700 | WIN |
| Lower 49 | 1,800 | WIN |
| Rockhouse | 4,000 | WIN |
| North (north end) | 2,600 | WIN |
| Triangle | 300 | WIN |
| Apache | 10,000 | WIN |
| Upper Mattie | 3,200 | WIN |
| Lower Mattie | 660 | WIN |
| Spring Water E | 3,200 | WIN |
| Fresno | 2,700 | WIN |
| Mac's | 450 | S/F |
| 500 Acre | 260 | S/F |
| 5 Wire | 590 | S/F |
| Hilton | 300 | S/F |
| Hummel | 180 | S/F |
| Gardner | 300 | S/F |
| Rick's | 350 | S/F |
| Cottonwood | 130 | S/F |
| North Cienegita | 350 | S/F |

Table 1. Empire-Cienega Ranch pastures and use.

| Pasture | Acres | Use[1] |
|---|---|---|
| Jerry's | 20 | S/F |
| Hilton | 7,300 | SUM |
| Davis | 3,900 | SUM |
| Johnson | 3,000 | SUM |
| Oil Well | 820 | SUM |
| Enzenburg/Bellota | 2,500 | SUM |
| Alamo Solo | 1,300 | SUM |
| North (south end) | 7,240 | SUM |
| Spring Water West | 6,900 | SUM |
| Maternity | 700 | COM |
| West | 1,750 | COM |
| Empire | 1,940 | COM |
| Bull Trap | 450 | COM |
| No. 1 | 360 | shipping |
| No. 2 | 230 | shipping |
| Orchard | 560 | shipping |
| Jerry's | 20 | shipping |
| Headquarters | 300 | horse |
| Cienega HQ | 320 | horse |
| Bahti | 20 | RIP |
| A1 (Sam) | 100 | RIP |
| A2 (Mattie) | 120 | RIP |
| A3 (Falls) | 20 | RIP |
| A4 (Coldwater) | 60 | RIP |

[1] WIN = winter S/F = spring/fall SUM = summer COM = combination RIP = riparian

(Dwyer *et al*. 1984). The Biological Planning Process will continue to review vegetation production, current range conditions, and identify possible conflicts with planned use. If

production is low due to summer drought, stocking rates would be changed by identifying the problem in September and reducing the herd size through the fall roundup. If conditions are extreme, all cattle may be removed until conditions improve. The Biological Planning Team is composed of state and federal conservation agencies, the grazing permittees, neighbors of the ranch, and interested members of the public.

**Figure 1. Pastures of the Empire-Cienega Ranch.**

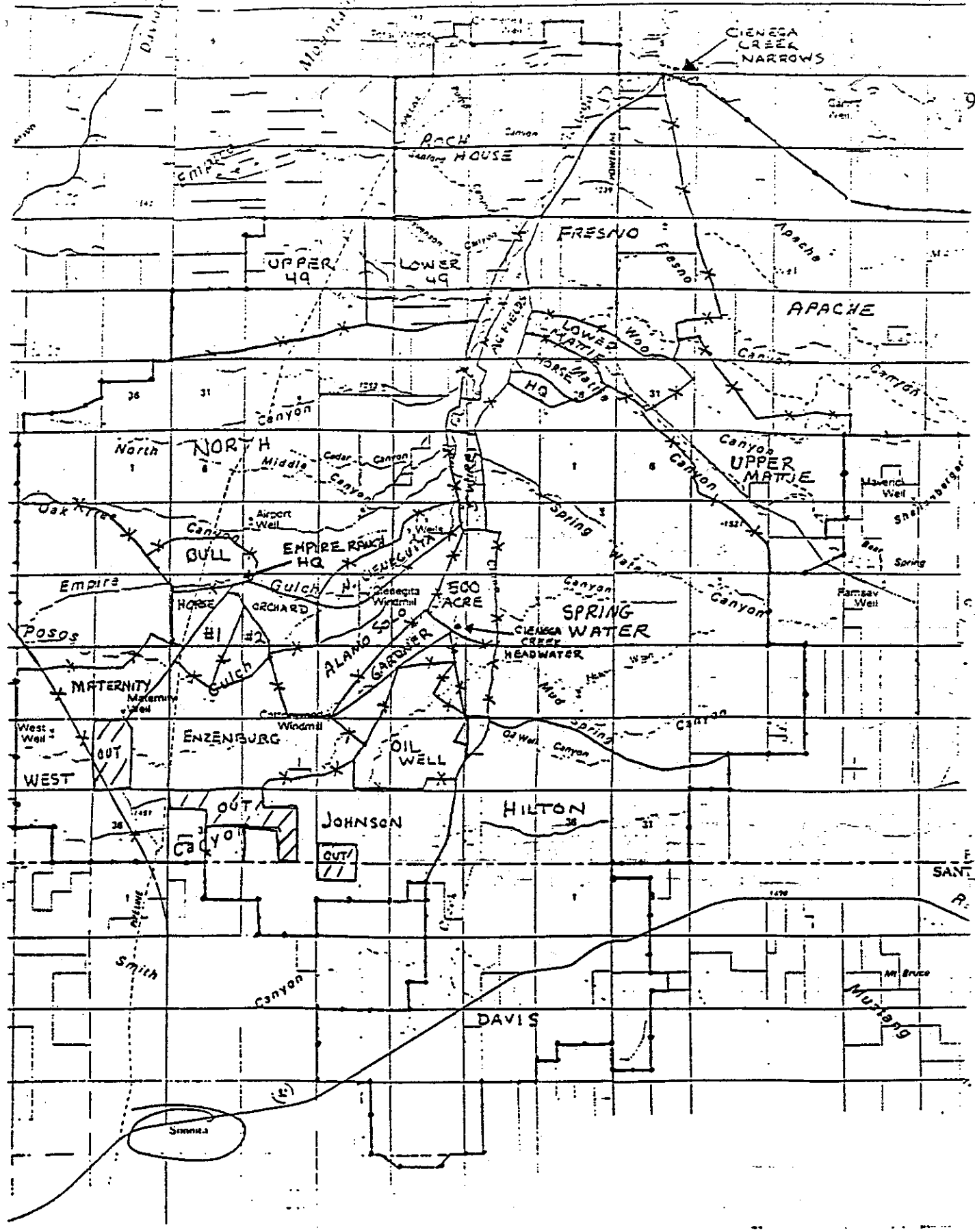


**Figure 1. Pastures of the Empire-Cienega Ranch.**

The grazing management strategy proposed in the Interim Management Plan is a selected-rotation grazing system. The allotment is grazed during the entire year with certain pastures being rested yearlong on a flexible rotation. The pastures that are grazed in a given year will be grazed for less than the entire year (grazing use deferred). The period of the grazing use deferment is also rotated, so individual pastures are not grazed during the same period in successive years (see Figure 1 for pasture locations).

**Winter Use (November-April)**

The winter pastures are generally the rougher, steeper hills and slopes along the Whetstone and Empire Mountains. In the cooler winter months, the cattle are better able to utilize these rougher areas when not lactating and can travel further from water. In cold weather they may only water every second or third day. The result is better distribution of the cattle over these grazing units than would occur during the warmer months. Benefits of grazing after perennial grasses are dormant and have set seed include: gains in plant vigor, increased seed production, adequate time for new seedlings to emerge and become established, and rest for grasses during the period most favorable for their growth.

Periods of grazing use, yearlong rest, and grazing deferment are flexibly rotated between the 11 grazing units in the winter use area. Usually two or three units are rested each year and all winter pastures are rested every summer. Selected pastures are grazed in rotation during the winter, while others are rested. Units grazed in the early winter one year are grazed in the late winter the next year, and units grazed in the late winter are grazed first the following year. This provides each pasture with rest every year for the warm season growing plants, and alternating rest periods for spring growing cool season plants.

**Summer Use - Upland Plains Units - Summer Use (Mid July-October)**

The upland plains pasture units are located towards the southern end of the ranch. They are normally grazed after the summer rains have commenced and the use of the sacaton units has become less desirable due to the insects and mud. The plant composition in these units is predominantly perennial grama grass (*Bouteloua* spp.) and cane beardgrass (*Bothriochloa barbinodis*), with some sacaton (*Sporobolus* spp.) draws and Lehmann lovegrass (*Eragrostis Lehmanniana*).

Summer pastures are most often the less rugged, more level upland range sites. Cattle can better utilize these areas during the late spring and summer months. These units are grazed during the growing season when the perennial grasses are most nutritious. The benefit to cattle of grazing when perennial grasses are actively growing is improved livestock performance. The cows are lactating at this time and their nutritional requirements are at their highest.

The primary detriment of summer grazing is that perennial grasses are most affected by defoliation now (Hormay 1970). The proposed management in these units seeks to prevent damaging grazing on plant regrowth, prevent forage selectivity, evenly distribute the animals through the unit, and use all herbage in the unit. The assumption is that utilization of the less preferred herbage will improve the relative ecological fitness of the more palatable species in later nonuse treatments (Bryant 1978). The periods of grazing use are kept short (3 to 6 weeks) to prevent grazing of regrowth.

Grazing use, yearlong rest, and grazing deferments are flexibly rotated between the 11 units in this summer use area. Usually one or two units are rested for one or two growing seasons. The periods of rest provide time for plant growth, reproduction, and establishment of both warm and

cool season perennial grass species. The loss of grazing use in rested pastures is made up by the improved vigor, increased production, and the improved quality of the forage due to improved range condition (Schmutz 1977). Those units used last in the previous year are used first the next year. This allows the regrowth after early summer use to remain standing to provide better ground cover for soil protection, reproduction, and to remain for wildlife cover.

**Spring and Fall Use - Sacaton Units (May-October)**

The sacaton areas (loamy bottom range sites) are located on the floodplain terraces adjacent to the creeks and drainages. The units of sacaton are mostly fenced off from the adjacent uplands, and grazing is concentrated to increase use and reduce selectivity by the livestock.

The sacaton complex of pastures or units are the true center of the ranch and grazing rotation. These are flats of predominantly sacaton grass with some mesquite. These floodplains provide a large volume of forage when green. When the cattle are calving and coming out of the Whetstone and Empire Mountains, these pastures are essential for reconditioning the cows' nutritional needs.

These sacaton units can be run individually or together in various combinations as larger units. Selection of units would be based on past use, rainfall, fires, etc. The importance of these pastures cannot be overstated. They enable the upland and fragile areas to receive additional rest. They also supply green forage to boost the cattle nutritionally at critical times in the spring when the upland grasses are still dormant, or in the summer when monsoon rains have been sparse and upland grasses have made little growth. These sacaton units are usually grazed during the growing season, but not during the rainy season when insect problems become acute. These units also can provide back-up forage during the non-growing season when much old plant growth can be utilized. The sacaton units may also be used in late summer or early fall to either supplement forage in the uplands or to provide additional rest for the upland units.

There are nine of these pastures that can be used in various combinations during the season of active sacaton growth. Cattle are closed into these units and separated from the adjacent uplands.

The current major concern in use of these units is the grazing of the unfenced riparian areas. The pasture units are small and the high stock densities even for the short periods of use have resulted in repeated heavy grazing of the woody riparian species and high degrees of streambank trampling. There is little recruitment of riparian trees occurring with poor age class distribution.

Part of the proposal includes fencing these sacaton units from the riparian areas of Cienega Creek. This would alleviate the problem of grazing the riparian areas. New waters would be developed in the sacaton pastures where needed.

The sacaton is well adapted to sustain the high intensity short duration grazing pressure that it is subjected to under current management. Removal of the old, coarse leaves and standing biomass benefits the sacaton plants by exposing the lower portions of the plants (where the growing points are located) to sunlight. This increases the photosynthetic efficiency of the plants Humphrey 1958*a*, USDA 1988). The pastures are inspected before use and the past years livestock use is considered in selecting unit combinations and rotations. Units which are used are rested until they have recovered from past use and made sufficient new growth.

**Combination Units**

Combination pastures often have adequate browse in the form of mesquite and perennial grasses. They can be used either during the growing season, or during periods when the perennial grasses are dormant. They can be used as cattle are moving from winter to spring units. Also included in these combination units are the shipping pastures, which are integral to the gathering and management of the cattle.

These pastures are important in increasing the opportunities to provide additional rest to the summer units. They can be used to hold cattle until summer ranges have produced sufficient growth and are ready to be grazed, or they can be used to move cattle off summer ranges early if utilization levels have been reached. Early removal of cattle from the summer ranges can also be done to allow regrowth to occur while weather conditions are still favorable for grass production.

**Riparian Units**

Management of riparian zones is a major source of potential conflict. Riparian systems of the southwest are particularly sensitive to disturbance because of the wide variations in annual precipitation that they are subjected to (Leopold 1946). Information does exist on the influence of grazing systems and intensities of grazing on plant communities and watersheds (Platts 1982, Clary and Webster 1989, Elmore 1992). Information on grazing-wildlife interactions in riparian zones is limited. The harmful effects of overgrazing riparian areas are well known; however, the extent to which moderate or light controlled grazing may affect riparian areas has not been adequately documented (Skovlin 1984, Platts 1991). Because of the significant values associated with the riparian areas along Cienega Creek, the BLM desires rapid recovery and protection of the habitats. Therefore, the interim management proposal includes the fencing and upland water developments needed to exclude livestock from most of Cienega Creek. The existing water gaps (*e.g.* A1-4, Lower 49) will be used to water cattle until the adjacent water facilities are built.

It is expected that removing the direct impacts of livestock grazing will result in improved bank and channel stability, greater vegetation biomass, better water quality, and increased biodiversity

Table 2. Summary of proposed range improvement projects for southern pastures, Empire-Cienega allotment.

| Project Name | Pasture | Township | Range | Section | Units |
|---|---|---|---|---|---|
| Southern riparian fence | Mac's | 18 S | 17 E | 34, 35 | 1 mi. |
| | 500 Acre, 5 Wire | 19 S | 17 E | 3, 10, 11, 14, 15 | 7 mi. |
| Mac's Well equip & tanks[1] | Mac's, North | 18 S | 17 E | 34 SE | 1 well, 2 tanks, 0.3 mi. pipe |
| Cinco pipeline & tank | Lower Spring Water, E 5 Wire, E 500 Acre | 19 S | 17 E | 14 S2 11 SW | 1 tank, 1 mi. pipe |
| Sam's well equip & tank | A1, Lower 49, 49 Sacaton | 18 S | 17 E | 26 SW | 1 each |
| Twin Well equip & pond | North, 500 Acre | 19 S | 17 E | 10 NE | 1 well equip, 0.6 mi. pipe, gully plug |
| Box Well equip, tanks, & pipeline | E & W 500 Acre | 19 S | 17 E | 2, 3 | 1 well equip, 2 tanks, 0.3 mi. pipe |

[1] tank = represso

(Platts and Wagstaff 1984, Chaney *et al*. 1993, Armour *et al*. 1991). Plant succession and channel evolution may advance more rapidly towards potential as either Cottonwood-Willow (*Populus* spp.-*Salix* spp.) or Interior Marshland biotic communities. The vegetation classification follows Brown *et al*. (1979).

## Proposed Range Improvements

The BLM and the Donaldson's have made construction of the southern riparian pastures the highest priority. The necessary funding for the fencing material is available in 1995, and the Donaldson's have agreed to construct the fence and will proceed as soon as authorized. BLM would like the realignment of the northern riparian pastures accomplished within the next two years. Isolating the riparian zone with fencing is often the only effective way to protect streams (Ames 1977, Chaney *et al*. 1993, Platts 1990).

### Southern Riparian Pasture Development

The highest development priority for range projects is to construct riparian pasture fences which isolate the sacaton flats from Cienega Creek, from Mac's Sacaton pasture to the headwaters (see Figure 1). This would allow spring grazing of the sacaton without impacting the riparian zone. Fencing the stream would require the concurrent development of water in the sacaton pastures to replace the creek water (Table 2). Some water gaps would be used to water cattle until water

Table 3. Proposed pastures, Empire-Cienega allotment.

| Pasture | Source[1] | Use |
|---|---|---|
| Headwaters | 500 Acre | RIP |
| Headcut | 5 Wire | RIP |

| | | |
|---|---|---|
| Earth Day | Mac's | RIP |
| East 500 Acre | 500 Acre | S/F |
| West 500 Acre | 500 Acre | S/F |
| East 5 Wire | 5 Wire | S/F |
| West 5 Wire | 5 Wire | S/F |
| Picnic | Mac's | S/F |
| Lower 49 Gaps | Lower 49 | RIP |
| Dominguez | Dominguez | RIP |

[1] the old pasture that the new pasture was created from.

is developed in the sacaton pastures. The fencing would create three riparian pastures (Headwaters, Headcut, Earth Day) and five sacaton pastures (East and West Five Wire, East and West 500 Acre, and Picnic)(Table 3).

Lanes would be created at several strategic points to allow cattle to cross the creek for necessary pasture rotations. The four crossing lanes that would be created are Headwaters Lane, Gardner Lane, Bahti Lane, and Rick's Lane (Table 4). Jesse's Lane exists. The crossing lanes may be used at any time of the year for up to 10 days at a time. Cattle will be herded across the crossings. The Fresno Gap allows cattle to cross between winter pastures. The Jesse, Rick, Road, and Bahti crossings would be used mostly in the spring and fall to cross between the agricultural field area to sacaton or summer pastures. The Gardner and Headwater crossings would be used mainly in the spring to cross from sacaton pastures to sacaton or summer pastures.

Four existing wells would be used to water the sacaton pastures. Water from Mac's Well would be piped to two new repressos, one on the west side and one on the east side in Mac's Sacaton pasture. Water from Twin Well would be piped to a proposed small pond in a side drainage of Empire Gulch in the West 500 Acre pasture. Water from E-11 Well would be used in East 5 Wire and East 500 Acre pastures at one new represso or at one of the existing Cinco Ponds. Water from Sam's Well may be piped north to a represso in either the 49 Sacaton or Lower 49 pastures. If Sam's Well is used, the proposed Lower 49 Well would not be drilled.

Table 4. The proposed and existing livestock crossing lanes, Empire-Cienega allotment.

| Crossing Lane | Pasture | Legal Location |
|---|---|---|
| Headwaters Lane | 5 Wire, Hilton Sacaton | T 19 S, R 17 E, Sect. 15 |
| Gardner Lane | 500 Acre, 5 Wire | T 19 S, R 17 E, Sect. 10 |
| Bahti Lane | 500 Acre, Mac's Sacaton | T 19 S, R 17 E, Sect. 3 |
| Rick's Lane | Mac's Sacaton, A1 | T 18 S, R 17 E, Sect. 35 |
| Road Lane | Mac's Sacaton, North | T 18 S, R 17 E, Sect. 34 |

| | | |
|---|---|---|
| Jesse's Lane (existing) | Mac's Sacaton, Lower 49 | T 18 S, R 17 E, Sect. 26 |
| Fresno Gap (existing) | A3, Fresno | T 18 S, R 17 E, Sect. 23 |

**Northern Riparian Pasture Realignment**

The second management priority is to complete the riparian pasture development and realign the existing fences north of the Mac's Sacaton pasture to the Narrows along Cienega Creek (see Figure 1). In 1990, four riparian units were fenced and livestock grazing completely excluded from three (A1, A2, A3) pending the development of a livestock management plan. The new exclosures would be Lower 49 Gap and Dominguez. These exclosures are located along Cienega Creek north of the road crossing south of the agricultural fields. They are primarily in the north end of the ranch in the winter use area. The realignment of pastures with additional fencing and water development would eliminate the need for the Fresno, Dominguez, and Lower 49 Gap watering points and allow the exclusion of livestock from Cienega Creek. Cattle will use these watering points until alternate waters are developed. Cattle could not be excluded at the very north end at the Narrows where development of alternate water sources is difficult. Fresno would become a crossing lane. The development of two new wells and three tanks will be necessary before enclosing the creek (Table 5). Lower 49 Well will not be drilled if Sam's Well is successful.

Two other units were also fenced along Cienega Creek between Al and A2. These units (Bl and B2) were to be used by livestock in alternate years to provide water for the cattle and to access the Ag fields from the pastures west of Cienega Creek. These are now referred to as the Lower 49 water gaps. These watering points would not be necessary once the realignment of the northern riparian pastures is accomplished and livestock would be excluded. A sacaton pasture (Lower 49 Sacaton) would be created west of the Lower 49 exclosure.

One other riparian pasture exists which is referred to as Bahti's Bog. This unit is located south of the Ag field road crossing on Cienega Creek. It has not been used by livestock for about four years. It was constructed by the Donaldson's and nonuse has been voluntary.

Table 5. Summary of proposed range improvement projects for northern pastures, Empire-Cienega allotment.

| Project Name | Pasture | Township | Range | Section | Units |
|---|---|---|---|---|---|
| Fresno/Narrows fence realignment | Rockhouse, A3 | 18 S<br>18 S | 17 E<br>18 E | 12,14<br>7 | 1 mile<br>1 mile |
| Lower Wood Canyon well drill, equip, tanks, pipe | Rockhouse, Fresno, A3 | 18 S | 17 E | 13 SW | 1 well, 2 tanks, 0.5 mile pipe |
| Lower 49 well drill, equip, tank, pipe, fence | Lower 49 | 18 S | 17 E | 27, 23, 26, 27 | 1 well & tank; 1.5 mile fence, 1 mile pipe |

**Upland Plains Developments**

Range improvement projects (Table 6) have been proposed (memorandum of March 7, 1995) which would enhance livestock management by providing additional options and aid control and movement of livestock. The improvements are not essential, but would be considered if funding becomes available. The proposed projects include drilling 3 new wells, redrilling 1 existing well, using 3 other existing wells, constructing 6 repressos, and constructing 9 miles of fence.

**Lower Priority Upland Wells - Joint Wildlife Developments**

Water projects are proposed which would enhance availability of water to wildlife and livestock (Table 7). These seven projects are not necessary to the management of livestock on the ranch. The BLM expects that these projects could be jointly developed and funded on a priority basis.

## Proposed Monitoring

To monitor the impact of implementing the allotment management plan upon riparian plant and special status animal populations, a monitoring program will be implemented.

**Fish Population and Habitat**

1. Basin-wide type fish habitat monitoring will be conducted on at least four 0.25 mile reaches of the creek every three years to determine habitat trends.

2. A minimum of five habitats will be sampled annually at "Fall Fish Count" locations prescribed by the Arizona Game and Fish Department (AGFD). Blocknets and seines will be used for one pass sampling to determine relative abundance and population trends and to screen for exotic fishes and bullfrogs.

Table 6. Proposed range improvement projects for upland plains pastures, Empire-Cienega allotment.

| Project Name | Pasture | Township | Range | Section | Units |
|---|---|---|---|---|---|
| Mud Springs well drill, equip, tank | Upper Spring Water | 19 S | 18 E | 29 NE | 1 well & tank |
| Upper 49 well redrill, equip, tank | Upper 49 | 18 S | 17 E | 26 NW | 1 well & tank |
| Upper Road Canyon well drill, equip, tank, fence | Hilton | 19 S | 17 E | 36 NE, 26, 27, 35, 36 | 1 well, 2 tanks 3 mi. fence |
| Upper Apache division | Apache | 18 S | 18 E | 22, 27, 34 | 3 mi. fence |
| Irey Well fence | Alamo Solo | 19 S | 18 E | 20 NE | 1 mi. fence |
| Empire Horse Pasture division fence | Horse | 19 S | 17 E | 18 | 1 mi. fence |
| E5 (Gardo well) equip | Oil Well | 19 S | 17 E | 21 SE | 1 well equip |
| Alvarez well equip, tank | Johnson | 20 S | 17 E | 5 SE | 1 well equip, 1 tank |
| Test Hole wing fence | Apache | 18 S | 18 E | 28, 33 | 1 mi. fence |
| Airport Artesian well equip | North | 19 S | 17 E | 17 NW | 1 well equip |
| Midway well drill, equip, tank | North | 19 S | 16 E | 12 NE | 1 well, 1 tank |

Table 7. Proposed joint wildlife water developments for upland plains pastures, Empire-Cienega allotment.

| Project Name | Pasture | Township | Range | Section |
|---|---|---|---|---|
| Mattie well | Lower Mattie | 18 S | 18 E | 31 SW |
| Upper Wood Canyon well | Apache | 18 S | 18 E | 20 SE |
| Edwards well | Apache | 18 S | 18 E | 29 NE |
| Fergusen well | Apache | 18 S | 18 E | 20 NE |
| Upper Fresno well | Fresno | 18 S | 18 E | 19 NE |
| Enzenburg North well | North | 18 S | 17 E | 34 NW |
| Diamond A well | North | 18 S | 17 E | 33 NE |

**Special Status Avian Species**

1. Emlen line transects will be conducted to monitor avian populations in the grasslands year-round. This monitoring is already under way outside of the riparian corridor.

2. Variable circular plot avian transects in the riparian area during the nesting season (April - September) will be conducted.

3. Foliage height diversity measurements in grassland and riparian habitats to determine change in foliage densities will be conducted.

4. Raptor and special status species surveys during June to determine presence, abundance, and nesting success will be conducted.

5. Photos will be taken every other year at fixed sites in the grasslands and riparian habitats.

**Special Status Mammals**

To determine effects on lesser long-nosed bat habitat, BLM will examine the feasibility of establishing several monitoring plots to examine the recruitment of agave (*Agave* spp.) seedlings and agave reproduction in the upcoming Land Use Plan.

**Riparian Condition**

1. Riparian condition monitoring sites were established on 13 sites along Cienega Creek in 1989 and were completed again in 1994. These sites will continue to be used to assess riparian condition every five years.

2. Lanes for crossing Cienega Creek will be checked visually on an annual basis for level of disturbance and resistance to erosion.

3. All riparian areas will be evaluated for "proper functioning condition" in 1995 to evaluate the status and trend of all riparian areas within the Tucson Resource Area.

4. To obtain sufficient data for the resource management planning process, a riparian ecological site inventory will be conducted. Various riparian site types will be evaluated for present condition and potential. This data will be used to guide the planning effort for this area.

**Upland Vegetation**

1. The effectiveness of the management actions will be evaluated by monitoring upland vegetation at 21 sites on the Ranch (Table 8 and 9).

Table 8. Proposed monitoring for the Cienega Creek Interim Grazing Plan.

| Components | Method |
|---|---|
| Range condition | ecological site inventory |
| Range trend | pace frequency |
| Watershed condition | point intercept ground cover |
| Forage utilization | photo guides |

2. To obtain sufficient data for the resource management planning process, an ecological site inventory will be conducted in the uplands. Various site types will be evaluated for present condition and potential. This data will be used to guide the planning effort for this area.

## STATUS OF THE SPECIES

### Listed species/critical habitat

### Gila Topminnow

The Gila topminnow was listed as an endangered species on March 11, 1967, without critical habitat. The Gila topminnow is a small, livebearing fish found in the Gila, Sonora, and de la Concepcion River basins in Arizona, New Mexico, and Sonora, Mexico (Minckley 1973, Vrijenhoek *et al*. 1985), but is listed only in the US. It was once among the commonest fishes of the Gila River Basin (Hubbs and Miller 1941). Destruction of its habitat through water diversion, stream downcutting, backwater draining, vegetation clearing, channelization, water impoundment, and other human uses of natural resources; plus competition with and predation by nonnative fish species, most notably mosquitofish (*Gambusia affinis*), have resulted in extirpation of the Gila topminnow throughout most of its range (Meffe *et al*. 1983, USFWS 1984).

Gila topminnow and many other poeciliids can tolerate a wide variety of physical and chemical states. They are good colonizers in part because of this tolerance and in part because one gravid female can start a population (Meffe and Snelson 1989). Minckley (1969, 1973) described their habitat as edges of shallow aquatic habitats, especially where abundant aquatic vegetation exists.

Gila topminnows are known to occur in streams fluctuating from 6 to 37°C, pH from 6.6 to 8.9, dissolved oxygen levels of 2.2 to 11 milligrams/liter, and can tolerate salinities approaching those of sea-water (Meffe *et al*. 1983). Topminnows can burrow under mud or aquatic vegetation when water levels decline (Deacon and Minckley 1974, Meffe *et al*. 1983). Sonoran topminnows (*Poeciliopsis occidentalis*) 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

Table 9. Proposed upland vegetation monitoring sites on the Empire-Cienega allotment.

| Pasture | Season of Use[1] | Township | Range | Section |
|---|---|---|---|---|
| Davis | SUM | 20 S | 17 E | 14 NW |
| Hilton | SPR/SUM | | | 2 NW |
| | SUM | | | 3 NE |
| Johnson | SUM | 19 S | 17 E | 33 NE |
| Hilton | SPR/SUM | | | 25 SE |
| Lower Spring Water | SUM | | | 11 SE |
| Upper Spring Water | WIN | 19 S | 18 E | 7 SE |
| Upper Mattie | WIN | | | 5 NE |
| Upper Apache | WIN | 18 S | 18 E | 28 NE |
| Lower Apache | WIN | | | 20 NW |
| Fresno | WIN | 18 S | 17 E | 25 NE |
| Rockhouse | WIN | | | 14 NW |

| | | | | |
|---|---|---|---|---|
| Lower 49 | WIN | | | 22 SE |
| Upper 49 | WIN | | | 20 SE |
| North Pasture - N | WIN | | | 32 NW |
| North Pasture - E | SUM | 19 S | 17 E | 9 SW |
| North Pasture - W | SUM | | | 7 NW |
| Empire | COM | 19 S | 16 E | 13 NE |
| Maternity | COM | | | 24 NW |
| Enzenburg | SUM | 19 S | 17 E | 19 SW |
| Alamo Solo | SUM | 19 S | 17 E | 16 SE |

[1] WIN = winter SPR = spring SUM = summer COM = combination

protect small populations of topminnows from mosquitofish which are usually rare or absent under these conditions.

**Southwestern Willow Flycatcher**

The willow flycatcher is a small passerine bird (Order Passeriformes; Family Tyrannidae) approximately 5.75 inches long. It has a grayish-green back and wings, whitish throat, light olive-grey breast, and pale yellowish belly. Two whitish or buff wingbars are visible, the eye ring is faint or absent. The upper mandible is dark, the lower is light grading to dark at the tip. Willow flycatchers are riparian obligates, nesting in riparian thickets associated with rivers, streams, and other wetlands where dense growth of willow, *Baccharis*, buttonbush (*Cephalanthus* sp.), boxelder (*Acer negundo*), tamarisk (*Tamarix* sp.), or other plants are present, often with a scattered overstory of cottonwood. Willow flycatchers typically nest near surface water or saturated soil. At some nest sites surface water may be present early in the breeding season with only damp soil present by late June or early July (Muiznieks *et al*. 1994, Sferra *et al*. 1995). The water table must be close enough to the surface to support riparian vegetation.

The willow flycatcher is a neotropical migrant breeding in the Southwestern U.S. and migrating to Mexico, Central America, and possibly northern South America during the non-breeding season. The historical range of the willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern (Sonora and Baja) Mexico (Unitt 1987).

The Service included the willow flycatcher on its Animal Notice of Review as a category 2 candidate species on January 6, 1989 (USFWS 1989). The willow flycatcher was proposed for listing as endangered, with critical habitat, on July 23, 1993 (USFWS 1993*a*). A final rule listing willow flycatchers as endangered was published on February 27, 1995 (USFWS 1995). The listing became effective on March 29, 1995. The states of Arizona, California, and New Mexico also list the willow flycatcher as endangered (Arizona Game and Fish Department 1988, New Mexico Department of Game and Fish 1988, California Department of Fish and Game 1992). Following the review of comments received during the public comment period, the Service deferred the designation of critical habitat, invoking an extension on this decision until July 23,

1995. A moratorium on listing actions under the ESA passed by Congress in April 1995 required the Service to cease work on the designation of critical habitat until the moratorium is lifted.

Recent surveys have documented breeding populations of willow flycatchers in three states of the original seven-state range (California, Arizona, and New Mexico). Statewide surveys in Arizona during 1994 documented willow flycatchers at 21 of 322 sites surveyed. It is estimated that a total of 119 territorial males were found at the 21 extant locations (Sferra *et al*. 1995).

## Life History

The willow flycatcher is an insectivorous species, foraging within and above dense riparian vegetation, taking insects on the wing or gleaning them from foliage (Wheelock 1912, Bent 1963). No information is available on specific prey species.

Willow flycatchers begin arriving on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al*. 1993, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, Maynard 1995, Sferra *et al*. 1995). Migration routes are not completely known. However, willow flycatchers, including sub-species *E.t. brewsteri* and *E.t. adastus*, have been documented migrating through drainages in Arizona that do not currently support breeding populations, including upper San Pedro River (BLM, unpubl. data), Colorado River through Grand Canyon National Park (Sogge and Tibbitts 1992, Sogge *et al*. 1993, Sogge and Tibbitts 1994), lower Colorado River (Muiznieks *et al*. 1994, Sferra *et al*. in prep.), and Verde River tributaries (Muiznieks *et al.* 1994).

Empidonax flycatchers rarely sing during fall migration, so a means of distinguishing subspecies without a specimen is not available (Blake 1953, Peterson and Chalif 1973). However, willow flycatchers have been reported to sing and defend winter territories in Mexico and Central America (Gorski 1969, McCabe 1991). Willow flycatchers winter in Mexico, Central America, and perhaps northern South America (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994).

Willow flycatchers begin nesting in late May and early June and fledge young from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al*. 1993, Muiznieks *et al*. 1994, Maynard 1995). Willow flycatchers typically lay three to four eggs in a clutch (range = two to five). The breeding cycle, from laying of the first egg to fledging is approximately 28 days. Eggs are laid at one day intervals (Bent 1963, Walkinshaw 1966, McCabe 1991); they are incubated by the female for approximately 12 days; and young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Willow flycatchers typically raise one brood per year, but have been documented raising two broods during one season (Whitfield 1990). Willow flycatchers have been documented renesting after nest failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al*. 1993, Muiznieks *et al*. 1994, Sogge and Tibbitts 1994).

## Population Dynamics

### Population Size

Current estimates for total numbers of remaining willow flycatchers are 500 or fewer nesting pairs rangewide (Unitt 1987, USFWS 1995). Approximately 100 territorial males are estimated to occur in southern California, with most nesting groups occurring in three drainages (Whitfield 1993, Griffith and Griffith 1994). Approximately 119 territorial males were located during statewide surveys in Arizona in 1994 (Sferra *et al*. 1995). Approximately 120 territorial males were located in New Mexico during statewide surveys in 1994 (Parker and Hull 1994, Maynard

1995). A small number of territorial males (≤ 5) has been documented in both southern Utah and southwestern Colorado during 1993 and 1994 surveys; however, breeding has not been confirmed in those states (Sogge 1995*a*). Rangewide, most nesting groups are comprised of five or fewer pairs.

Population Stability

Willow flycatcher breeding populations are small and unstable. The Service believes that at current population levels, and with continuing threats, extinction of this species is foreseeable. Willow flycatchers are absent from many previously occupied areas, or are present in reduced numbers (Hubbard 1987, Unitt 1987, Sogge *et al*. 1993, Muiznieks *et al*. 1994, Sogge and Tibbitts 1994, Sferra *et al*. 1995). Former populations in Arizona on the lower Salt River, Santa Cruz River, and lower Colorado River near Yuma have been extirpated. Small groups of one to several willow flycatcher territories have been detected on the Santa Maria River, lower San Pedro River, Verde River, upper Tonto Creek, upper Salt River, upper Gila River, Little Colorado River, and the Colorado River in Marble Canyon (Sogge *et al*. 1993, Muiznieks *et al*. 1994, Sogge and Tibbitts, 1994, Sferra *et al*. 1995).

Nesting groups monitored on the Colorado River in the Grand Canyon have declined since monitoring began in 1984 (Sogge 1995*b*). In 1992, when comprehensive nest monitoring was begun, two pairs were present, with only one establishing a nest. That nest successfully fledged three flycatchers (Sogge and Tibbitts 1992). In 1993, one breeding pair, one male with two females, and six unpaired males were detected. Three nests were found, all of which were parasitized by the brown-headed cowbird (*Molothrus ater*). None were successful in rearing willow flycatchers (Sogge *et al*. 1993). Four pairs and one unpaired male occupied the Grand Canyon in 1994. Nine nests were attempted, at least four of which were parasitized by brown-headed cowbirds (cowbirds). All nesting attempts failed (Sogge and Tibbitts 1994). In summary, since 1992, nine pairs of willow flycatchers have made 13 nesting attempts, one of which was successful in fledging three willow flycatchers.

A similar trend has been observed in the Verde Valley at Clarkdale where four pairs of willow flycatchers were observed in 1992. In 1993, two pairs were present, one nest was documented, and contained a single cowbird nestling (Muiznieks *et al*. 1994). In 1994, two paired and one unpaired males were present. Two nests were detected, one of which successfully fledged two willow flycatchers, the other fledged a single cowbird (Sferra *et al*. 1995). Data from 1995 indicates that two unpaired males occupied the Clarkdale site (Sogge 1995*c*).

In California along the Kern River, the total flycatcher population declined from 44 to 27 pairs between 1989 to 1993. During that same period cowbird parasitism rates between 50 and 80 % were documented (Whitfield 1993). A cowbird trapping program begun in 1992 has reduced cowbird parasitism rates to ≤ 10 % and appears to have stabilized population numbers at the Kern River.

## Status and Distribution

Reasons for Listing

The willow flycatcher was listed as endangered in response to documented declines in both population size and amount of historic range occupied and in response to documented loss, modification, and fragmentation of riparian habitat within the willow flycatcher's range (USFWS 1993*a*, 1995). Critical habitat was proposed to provide additional protection for areas, occupied and unoccupied, necessary for the survival and recovery of this species.

Rangewide Trend

Willow flycatcher populations are small and unstable. Rangewide monitoring continues to document declines in some locations. Some populations have stabilized as a result of cowbird trapping programs.

New Threats
Additional habitat losses likely include both small- and large-scale losses of the same types as known to date (*i.e.*, habitat loss, fragmentation, and modification). The Service expects that cowbird parasitism incidents will vary spatially and temporally as a function of local cowbird population dynamics and local changes in the extent of riparian habitats.

**Lesser Long-nosed Bat**

The lesser long-nosed bat was listed as an endangered species on September 30, 1988. Critical habitat was not designated. It was originally listed as Sanborn's long-nosed bat (*Leptonycteris sanborni*). It was formally separated from the greater long-nosed bat (*L. nivalis*) as a distinct species (*L. sanborni*) by Hoffmeister (1957). Arita and Humphrey (1988) recently reviewed the taxonomic status of bats of the genus *Leptonycteris* and concluded *L. sanborni* is conspecific with *L. curasoae* of northern Venezuela and the Dutch Antilles. They recognized two subspecies of *L. curasoae*: a northern subspecies (*L. c. yerbabuenae* = *L. sanborni*) found in Mexico and southern Arizona and New Mexico, and a southern subspecies (*L. c. curasoae*) found in northern South America. Recent surveys indicate that about 150,000 individuals are likely to occur in the southwestern United States (Arizona and New Mexico) during the summer (USFWS 1993*c*).

This species occurs in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains, southeast to the Chiricahua Mountains, and thence south from Arizona to and throughout the drier parts of Mexico (Cockrum 1991). It is a seasonal resident of Arizona, believed to arrive in early April and depart in mid- to late-September. Lesser long-nosed bats do not hibernate, and they cannot withstand prolonged exposure to cold. However, it has been seen visiting hummingbird feeders in Tucson in January and February recently. Loss of roosting habitat and destruction of forage plants are the primary threats to this species (Shull 1988).

The lesser long-nosed bat is a nectar-, pollen-, and fruit-eating bat (Fleming 1986) that migrates from Mexico to southern Arizona and southwestern New Mexico. Primarily associated with dry habitats in Mexico and Arizona, this bat pollinates flowers of several agave species and disperses seeds of several columnar cacti species found in upland habitats in the Sonoran Desert and throughout its range. In Arizona, lesser-long-nosed bats feed on nectar and pollen from flowers of saguaro (*Carnegia gigantea*) and organ pipe cactus (*Lemaireocereus Thornberi*) in early summer (April and May) and agave later in the summer (July). They may feed on fruits at the end of the flowering season. Lesser long-nosed bats are known to fly long distances from roost areas to foraging areas. Riparian habitats are used for watering.

Female lesser long-nosed bats arrive in Arizona pregnant and join other females in maternity colonies sometime in April or early May. One young is born from early May to late June. The young can fly within one month of birth. The maternity colonies break up by the end of July. Males occupy separate roosts which are less well documented (Hoffmeister 1986). Their fall migration takes them to Mexico, where they breed and spend the winter.

**ENVIRONMENTAL BASELINE**

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action 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 which 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 to assess the effects of the action now under consultation.

The Empire-Cienega Ranch is situated just north of Sonoita and between the Santa Rita and Whetstone Mountains. The ranch contains 36,498 acres of public land and 37,462 acres of State owned land. The BLM is the lessee for the state-owned land, which is then sublet to the Donaldson's. The permitted grazing capacity is 1,500 animal units year-long. Licensed actual use since the BLM has acquired the property has averaged about 1,200 head year-long (U.S. BLM 1994:22). The average elevation of the ranch is about 4,600 feet. The annual rainfall is extremely variable from year to year but averages 15 inches. Thermal maximums periodically reach 100°F in the summer and freezing temperatures are common in the winter.

The public lands within the Empire-Cienega Resource Conservation Area were acquired through private land exchange. Interim management guidelines for this area were developed to preserve, protect, and enhance the multiple-use values of the Empire-Cienega RCA properties, including the extensive riparian areas along Cienega Creek. Present and past activities including cattle grazing, road building, and stream diversion have influenced stream function along Cienega Creek, thus affecting the Federally Endangered Gila topminnow.

The livestock operator on the Empire-Cienega allotment grazes cattle in sacaton pastures along the upstream reaches of Cienega Creek. These pastures, which include both the aquatic and riparian zones, in addition to the sacaton, are grazed during the late spring and summer which is the growing season for riparian vegetation. This grazing alters the plant community, bank stability, and ultimately may affect stream function and water chemistry (Armour *et al*. 1991, Platts 1991, Fleischner 1994). The present stream morphology and habitat diversity is degraded from past actions and is at risk of further degradation, and would improve once the headcut is finally stabilized and livestock practices are changed.

In 1990, the BLM, in consultation with the Service, constructed a temporary sand bag dam to prevent base flow of Cienega Creek from going down a diversion canal built in the 1970's. In the future, approximately 1.5 miles of Cienega Creek will be rehabilitated by restoring the original hydrologic functions that this diversion canal altered.

A riparian stabilization project was executed in 1991. This project included the stabilization of upland areas with erosion problems. The area was disturbed by past road construction where the road crosses the creek. The area was planted with riparian trees and seeded with native grasses.

In 1992 approximately 1/4 mile of Empire Gulch was fenced from livestock grazing and revegetated with riparian trees. This perennial stream segment is located about three miles from Cienega Creek and has a high potential for supporting a new population of topminnow.

Flooding during January and February of 1993 resulted in down-cutting (vertical destabilization) of a reach of Cienega Creek posing a serious threat to upstream native fish habitats. It is likely that this and other historic activities led to this severe erosion (Bahre 1991). However, severe weather events may be the primary cause of such erosion events (Hastings and Turner 1965). In either case, stream function can be influenced by grazing (Platts 1991, Fleischner 1994), which will be analyzed in this document. The BLM has been actively working to improve the riparian function of Cienega Creek primarily through fencing and erosion control. The general improvement in scores from riparian monitoring indicate that conditions have improved.

In 1994 the BLM, in consultation with the Service, implemented a project to stabilize an erosion head-cut on Cienega Creek near Spring Water Canyon. The erosion was started during the winter flooding of 1993. The use of log spreaders and check dams has not stopped the progress of this erosion which poses a threat to 2.5 miles of topminnow habitat.

The BLM continues to pursue land acquisitions in the watershed which will benefit the ecosystem by improving its ability to better manage the watershed and improve riparian function to benefit fish and wildlife. The acquisition program has put new lands into public ownership with aquatic resources that provide opportunities for expanding the distribution of the Cienega Creek population of Gila topminnow.

Southeastern Arizona has been influenced by Europeans and their descendants for centuries and by Native Americans for much longer (Bahre 1991). The effects of this use, though not always obvious, has been pervasive and widespread. These changes can be seen on the Empire-Cienega RCA. Cattle grazing has occurred in southern Arizona since the 1600's (Allen 1989). In the 1880's, there were 6,000 cattle and 23,000 sheep grazed on the Empire and Cienega Ranches (Wagoner 1960).

## Description of Plant Communities

### Description of Riparian Plant Communities and Condition

Over 20 miles of riparian habitat is found along Cienega Creek and its tributaries. The riparian areas provide habitat for several special status wildlife species. Cienega Creek supports areas of the rare cienega (marsh) habitat, south-western riparian deciduous woodlands, remnants of the rare mesquite bosque (woodlands), and sacaton grasslands.

Riparian areas in southeastern Arizona have undergone historic downcutting. Cienega Creek and many of its tributaries have also downcut. The probable causes for historic channel entrenchment in southern Arizona include: a more arid climate, excessive grazing, droughts followed by floods, tree cutting, and loss of beaver (Bryan 1925, Hastings 1959, Hastings and Turner 1965, Dobyns 1981). The downcut portions of Cienega Creek are confined by the channel walls which continue to affect hydrologic function. Livestock grazing up to the 1980's concentrated in the riparian and floodplain zones. This concentrated grazing limited the recruitment of woody riparian vegetation and caused degraded bank stability, thereby prohibiting proper hydrologic and riparian functioning. The improperly functioning part of Cienega Creek can negatively affect the properly functioning part.

#### Interior Marshland

Interior Marshland communities are present along Cienega Creek, Mattie Canyon, and Empire Gulch. Better watered sites support complex communities of cattail (*Typha* spp.), rushes (*Juncus* spp.), and reeds. Drier shorelines are covered by water grasses and sedges (*Carex* spp.). Herbaceous plants include lizard tail (*Anemopsis californica*), water cress (*Rorippa* spp.), and pondweeds (*Potamageton* spp.).

The marsh or "cienega" (Interior Marshland) habitat in Cienega Creek is a vestige of a more expansive cienega system in the Santa Cruz River Basin. These cienegas stretched from the present flowing portion of Cienega Creek to the historic Army outpost of Ft. Lowell (Tucson) on what is now called the Rillito River (Hendrickson and Minckley 1984). Hendrickson and Minckley (1984) described cienega communities in detail. This habitat type is characterized as occurring at middle elevations in desert grassland or oak woodland with perennial springs and

headwater springs. They are located near the head of the watershed so the probability of scouring from floods is minimal. Fire has been demonstrated to be an important factor controlling cienega plant communities historically (Davis 1994). Freshwater macrophyte communities are some of the most productive in the world (Westlake 1963).

### Cottonwood-Willow Communities

Much of the riparian vegetation along Cienega Creek is within the Cottonwood-Willow Series of the southwestern Riparian Deciduous Woodland biotic community (Brown *et al*. 1979). The dominant species include Fremont cottonwood (*Populus Fremontii*) and Goodding willow (*Salix Gooddingii*). Velvet ash (*Fraxinus velutina*) and Arizona walnut (*Juglans major*) occur along some reaches of Cienega Creek, primarily towards the northern end in the deeper canyon bottoms. Major understory species include big sacaton (*Sporobolus Wrightii*), deer grass (*Muhlenbergia rigens*), seep-willow (*Baccharis* spp.), sedges (*Carex* spp.), and rushes.

### Mesquite Bosques

Mesquite bosques occur on the loamy bottom sites along stream terraces and at major drainages.

### Big Sacaton Grasslands

Almost pure stands of big sacaton occur on the level floodplains, low stream terraces, and first and second order tributaries of Cienega Creek. These sacaton flats benefit from overbank flooding as well as subirrigation from the water table.

### Current Riparian Condition

A summary of the perennial stream reaches in the RCA is: Cienega Creek, 8.0 miles, Lower Mattie Canyon, 1.1 miles, and Empire Gulch, 1.5 miles perennial stream and wetlands. Riparian condition was rated using the Phoenix Riparian Area Condition Evaluation (RACE) procedure in 1988 and again in 1993. The rating is derived from four primary attributes that indicate the relative level of riparian function: streambank soil alteration rating, streambank vegetation stability rating, subsurface water status, and woody species regeneration rating. Each attribute is weighted equally. The minimum rating is 1.0, the maximum is 4.0, and a minimum score of 3.0 is required for a satisfactory rating. The ratings show that the trend is largely stable with slight upward changes (Table 10). Areas with winter grazing (Segments CC-59A and B) show a satisfactory rating and upward trend. Unsatisfactory ratings still occur in half the segments which are grazed during the growing season.

## Description of the Upland Plant Communities

The Empire-Cienega allotment is located within the Southeast Arizona Basin and Range Major Land Resource Area in the upper end of the 12 to 16-inch precipitation zone. The vegetation on the 74,000-acre allotment is predominantly within the Chihuahuan Semidesert Grassland biotic community (Brown *et al*. 1979, Brown 1984). These semidesert grasslands are perennial grass-shrub dominated rangelands positioned above the Chihuahuan Desertscrub type and below the Madrean Evergreen Woodlands. The majority of the upland rangeland appears to be in good condition and the apparent trend is upward. No formal inventory and monitoring of range condition has been established yet.

Table 10. Riparian Area Condition Rating monitoring results, Cienega Creek, Pima County, Arizona.

| Stream Segment | Location | Pastures | Season of Use[2] | Rating[1] | | Trend |
|---|---|---|---|---|---|---|
| | | | | 1988 | 1993 | |
| CC-59A | Apache Canyon to Narrows | Apache-Rockhouse | WIN | 2.50 U | 3.25 S | up |
| CC-59B | Fresno Canyon to Apache Canyon | Apache-Rockhouse | WIN | 3.25 S | 3.50 S | up |
| CC-59C | Bedrock Falls to Fresno Canyon | Rockhouse-Triangle | WIN | 4.00 S | 3.60 S | down |
| CC-59D | Pump Canyon to Bedrock Falls | Rockhouse-Triangle | WIN | 3.00 S | 3.25 S | up |
| CC-59E | Cienega Falls to Pump Canyon | Rockhouse-Fresno | WIN | 3.25 S | 2.75 U | down |
| CC-59F | Mattie to Cienega Falls | Fresno-Lower 49 | WIN | 2.75 U | 3.00 S | up |
| CC-59G | Cold Springs to Mattie Canyon | Fresno-Lower 49, A2 | WIN/ RIP | 3.25 S | 4.00 S | up |
| CC-59H | N. Ag Fields to Cold Springs | Fresno-Lower 49, A4 | WIN/ RIP | 2.75 U | 3.25 S | up |
| CC-59I | Panama Canal to N. Ag Fields | Mac's-North, Picnic, Earth Day | SPR/ SUM | 2.50 U | 3.75 S | up |
| CC-59J | Oak Tree Canyon to Panama Canal | 500 Acre-North, Bahti | SPR/ SUM | 2.25 U | 2.90 U | up |
| CC-59K | Spring Water Canyon to Oak Tree Canyon | 500 Acre-North, Headcut | SPR/ SUM | 2.25 U | 3.00 S | up |
| CC-59L | Gardner Canyon to Spring Water Canyon | 500 Acre-5 Wire, Headcut, Headwaters | SPR | 2.25 U | 3.00 S | up |
| CC-59M | Headwaters to Gardner Canyon | 5 Wire, Headwaters | SPR | 3.25 S | 2.25 U | down |

[1] S = Satisfactory U = Unsatisfactory
[2] WIN = winter SPR = spring SUM = summer COM = combination

## Chihuahuan Semidesert Grassland

The Chihuahuan Semidesert Grassland is the most prevalent plant community in the area and usually occurs between 3,600 and 4,600 feet. Characteristic perennial grass species include black grama (*Bouteloua gracilis*), sideoats grama (*B. curtipendula*), plains lovegrass (*E. intermedia*), cane beardgrass, threeawns (*Aristida* spp.), curly mesquite (*Hilaria belangeri*), and big sacaton. These grasses are intermixed with various succulents such as yuccas (*Yucca* spp.),

agaves, beargrass (*Nolina microcarpa*), and sotols (*Dasylirion* spp.). In some areas along Cienega Creek mesquite has invaded the grassland type. Shrubs such as burroweed, whitethorn acacia, Mormon tea (*Ephedra* spp.), and wolfberry (*Lycium* spp.) occur in varying densities.

The Chihuahuan Desertscrub occurs in scattered patches in this area, primarily in the foothills of the Empire and Whetstone Mountains on limestone soils at elevations from 3,300 to 4,900 feet. Whitethorn acacia and sandpaper bush (*Mortonia scabrella*) may be dominant shrubs. Varying amounts of leaf and stem succulents including agaves, yuccas, and ocotillo (*Fouqueria splendens*) are often present. Many semidesert grassland species occur where these communities intergrade.

## Madrean Evergreen Woodland

The Madrean Evergreen Woodland communities are found in the Empire and Whetstone Mountains between 3,900 and 4,400 feet. The most prevalent vegetation is Emory Oak (*Quercus Emoryi*)(bellota) and Arizona white oak (*Q. Arizonica*), with an understory of grama grasses, tanglehead (*Heteropogon contortus*), green sprangletop (*Leptochloa dubia*), and other grasses and forbs. Both cacti and leaf succulents of the semidesert grassland and scrubland communities are found to varying degrees within this type.

The area is characterized by gently sloping, dissected old alluvial fans and a nearly level, broad valley floor along Cienega Creek. The visual aspect changes from a rolling grass plains landscape at the headwaters of Cienega Creek near Sonoita, to steep rocky canyons as the creek flows north through the foothills of the Empire Mountains toward Pantano Wash.

## Current Upland Watershed Condition

Transects were done in 1974 by Dr. Phil Ogden (Smith *et al*. 1975) in a remote sensing project on the Empire Ranch. Watershed condition transects were done by the BLM Phoenix District in 1991 (Table 11). Random transects were run throughout the Empire-Cienega Ranch. Point data was recorded and ground cover was used as an index of watershed condition.

Based on watershed data, watersheds on the RCA are considered to be in satisfactory condition. Overall, the watersheds exhibit a low susceptibility to erosion due to the high amount of coarse fragments in the surface and the existing vegetative cover, but there are major exceptions. The data below indicate a stable trend. The deep clay and loamy soils adjoining portions of Cienega Creek and some of the major tributaries are highly susceptible to gully erosion and soil piping. Several areas have large active gullies and deep holes resulting from continuing soil movement.

Table 11. Watershed condition monitoring results, Empire-Cienega RCA, Pima and Santa Cruz Counties, Arizona.

| Transect Location[1] | Year | % Bare Ground | % Gravel and Rock | % Vegetation Cover | Rating[2] |
|---|---|---|---|---|---|
| Clay Bottom (1)[1] | 1974 | 30 | 0 | 70 | S |
| Loamy Bottom (15) | | 25 | 0 | 75 | S |
| Gravelly Bottom (33) | | 28 | 17 | 55 | S |
| Sacaton Bottom (8) | | 28 | 3 | 69 | S |
| Slopes (17) | | 11 | 47 | 42 | S |

Table 11. Watershed condition monitoring results, Empire-Cienega RCA, Pima and Santa Cruz Counties, Arizona.

| Transect Location[1] | Year | % Bare Ground | % Gravel and Rock | % Vegetation Cover | Rating[2] |
|---|---|---|---|---|---|
| Limy Slopes (2) | | 12 | 51 | 37 | S |
| Loamy Terraces (44) | | 30 | 28 | 42 | S |
| Limy Terraces (11) | | 27 | 31 | 42 | S |
| Clay Swales (1) | | 20 | 5 | 75 | S |
| Cobbly Slopes (28) | | 19 | 43 | 38 | S |
| Limy Ridges (2) | | 15 | 40 | 45 | S |
| Slopes (28) | | 14 | 42 | 44 | S |
| Limy Slopes (6) | | 16 | 45 | 39 | S |
| Slopes (8) | | 16 | 43 | 41 | S |
| Limy Slopes (1) | | 5 | 56 | 39 | S |
| Slopes (5) | | 12 | 44 | 44 | S |
| Limy Slopes (2) | | 8 | 41 | 51 | S |
| Slopes (18) | | 10 | 33 | 57 | S |
| Limy Slopes (6) | | 10 | 35 | 55 | S |
| Slopes (10) | | 9 | 38 | 53 | S |
| Limy Slopes (2) | | 12 | 38 | 50 | S |
| Slopes (6) | | 12 | 34 | 54 | S |
| Limy Slopes (1) | | 10 | 65 | 25 | S |
| AVERAGE | 1974 | 17 | 34 | 49 | S |
| Fresno Canyon (1) | 1991 | 16 | 50 | 34 | S |
| Apache Canyon (1) | | 8 | 42 | 50 | S |
| Wood Canyon (6) | | 18 | 35 | 47 | S |
| Spring Water Canyon (3) | | 19 | 27 | 54 | S |
| Mattie Canyon (9) | | 27 | 22 | 51 | S |
| Oak Tree Canyon (3) | | 16 | 12 | 72 | S |
| Upper Cienega (4) | | 24 | 7 | 69 | S |
| Gardner Canyon (3) | | 29 | 5 | 66 | S |
| Empire Gulch (2) | | 21 | 11 | 68 | S |
| AVERAGE | 1991 | 20 | 23 | 57 | S |

Table 11. Watershed condition monitoring results, Empire-Cienega RCA, Pima and Santa Cruz Counties, Arizona.

| Transect Location[1] | Year | % Bare Ground | % Gravel and Rock | % Vegetation Cover | Rating[2] |
|---|---|---|---|---|---|

[1] (#) - indicates the number of stands sampled (transects) per site
[2] Satisfactory condition is based on 35 % or less bare ground and the absence of active erosional features.

**Status of the Species within the Action Area**

**Listed Species/critical Habitat**

Gila Topminnow

Cienega Creek is one of the last places in Arizona supporting an intact native fish fauna which is uncontaminated by exotic fish. Cienega Creek provides habitat essential for the survival for the Gila topminnow. It is one of nine remaining natural topminnow sites (Bagley *et al*. 1991), and one of only three natural sites not contaminated by mosquitofish. Protection of Cienega Creek from nonnative fish incursion and protection and restoration of Gila topminnow habitat in the creek is considered fundamental to the survival and recovery of the species (USFWS 1994*b*).

In addition, Cienega Creek supports by far the largest population of topminnow in the U.S. A fall population estimate for Cienega Creek was about 2.5 million topminnow, conservatively, for 6.5 miles of perennial habitat sampled. Another 1.1 miles of topminnow habitat in Mattie Canyon and 0.9 miles in Empire Gulch, tributaries to Cienega Creek, were not included in this estimate. Some areas of warmer groundwater discharge held extremely high densities of topminnow (566/square meters)(Simms and Simms 1992).

Open water fish and amphibian habitats along Cienega Creek and its tributaries Mattie Canyon and Empire Gulch include small, shallow off-channel ponds; deep, narrow, vertical walled pools; shallow, bowl shaped pools; low gradient riffles; narrow, swift runs; water falls; cascades; sheet flow over bedrock slabs; and dense marsh. Common fish habitat associations on Cienega Creek

Table 12. Summary of fall fish monitoring data 1989 through 1994, Cienega Creek, Pima County, Arizona. Fish numbers do not represent population estimates but, rather, depletion totals (% of years total catch).

| Year | No. Sites | Total Fish | Number (%) | | | POOCOC/ Sq.ft. |
|---|---|---|---|---|---|---|
| | | | POOCOC[1] | AGCH[2] | GIIN[3] | |
| 1989 | 5 | 8,456 | 7,819 (92.5) | 611 (7.2) | 26 (0.3) | 5.3 |
| 1990 | 3 | 651 | 440 (67.6) | 210 (32.3) | 1 (0.1) | 0.7 |
| 1992 | 5 | 12,421 | 10,602 (85.4) | 1,756 (14.1) | 63 (0.5) | 4.1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1993 | 8 | 4,043 | 1,669 (41.3) | 2,308 (57.1) | 66 (1.6) | 3.2 |
| 1994 | 8 | 9,172 | 7,563 (82.5) | 1,503 (16.4) | 106 (1.1) | 2.5 |
| [1] POOCOC = Gila topminnow [2] AGCH = Longfin dace [3] GIIN = Gila chub | | | | | | |

are deep, vertical walled, slit-like pools connected by narrow, swift runs surrounded by several feet of marsh on both sides. Riffles with gravel or cobble substrate are less common. Mattie Canyon has a more typical pool, riffle, and run habitat association. Marsh habitat is less developed along this tributary. Empire Gulch has a minimal base flow with large pools connected by marsh or runs. Stream gradients are low, usually less than 1%.

Fine textured alluvium (silt, sand, and clay) and marsh adapted plants fill shallow channels with low banks and wide flood plains. These aquatic habitats are bordered by Goodding willow, cottonwood, ash, and other riparian trees. The broad floodplains are covered with extensive stands of sacaton grass.

Fish habitat was inventoried in 1989 and 1990 using a basin type survey method where all habitat on perennial portions of Cienega Creek were measured. The habitats were broken into categories with the following percentages based on length: Marsh 49.9%, pool 22.1%, glide 13.0%, riffle 11.6%, rapid (fast run) 1.6%, backwater pool 1.1%, and all others (cascade, fall, chute, run) 0.7%. All pool habitat types lumped together equal 36.2%. Pool habitats are abundant; these are used heavily by all three species of fish. This mix of habitats suggests that habitat diversity is adequate. However, studies concerning stream habitat diversity and desert fishes is limited.

The fall fish inventory was conducted annually over a five year period in selected sites throughout Cienega Creek (Table 12). Sites were blocked from ingress and egress and systematically sampled until approximately 90 % of the Gila topminnow were removed. These data indicate that relatively large numbers of Gila topminnow and longfin dace are consistently collected but that average density varies widely. This information suggests that the habitat supports a large fall topminnow population in Cienega Creek. Because adult Gila chub are not effectively caught with seines, this data largely represents the incidental capture of juvenile chub.

Simms and Simms (1992) found the densities of Gila topminnow in Cienega Creek, 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 substrates.

## Southwestern Willow Flycatcher

### Numbers of Individuals/populations in the Action Area Affected

Cienega Creek may provide suitable habitat for the endangered southwestern willow flycatcher. The BLM has banding records of Willow Flycatchers along Cienega Creek during September of 1988-90, and 1992. However, there are no breeding records for this species from Cienega Creek. Breeding season surveys conducted in June 1993 by BLM biologists did not locate any breeding individuals on Cienega Creek.

### Sensitivity to Change

The flycatcher is sensitive to change in this area because there are no nearby breeding territories

and the reduced extent of quality riparian habitat. Cienega Creek and some of its tributaries may contain suitable southwestern willow flycatcher habitat. Other potential habitat occurs on the San Pedro River, Santa Cruz River, and Sonoita Creek.

The extent of riparian habitat, its distribution, continuity, and vegetative species composition have been largely altered in the Southwest (Phillips *et al.* 1964, Carothers *et al.* 1974, Rea 1983, Johnson and Haight 1984, Katibah 1984, Johnson *et al.* 1987, Unitt 1987, General Accounting Office 1988, Szaro 1989, Dahl 1990, State of Arizona 1990). Changes in the extent and composition of riparian habitat decreases the suitability and carrying capacity for flycatchers, thereby reducing the numbers of flycatchers that can occupy an area. These effects have resulted in a contraction of the range occupied by the willow flycatcher, a reduction in the number of flycatcher populations rangewide, and isolation of flycatcher populations potentially changing historical emigration and immigration patters and severing genetic exchange among populations.

Resilience

The resilience of habitat and the flycatcher are pertinent aspects of the species' survival. The flycatcher has declined in both extent of range occupied and population size as a result of habitat loss, modification, and fragmentation, and cowbird parasitism. The proposed action has the potential to increase suitable habitat and may increase cowbird parasitism. These factors, combined with the status of the flycatcher in the action area, indicate that this species' resilience to the effects associated with the proposed action is high.

Lesser Long-nosed Bat

There are late summer records of lesser long-nosed bats caught over riparian areas on the Empire-Cienega RCA. There are no known roost sites of this species in the immediate vicinity of the RCA. The late summer records were probably migrating individuals (Yar Petryszyn, University of Arizona, pers. comm., BE).

There are known migratory roosts of lesser long-nosed bats on U.S. Forest Service lands in the vicinity of the RCA, and there is agave foraging habitat on the RCA and surrounding lands. The agave habitats are primarily grassland dotted with Palmer agave (*Agave Palmeri*) and occasionally Parry agave (*A. Parryi*). These habitats occur throughout much of the upland areas of the RCA. The highest quality agave habitat occurs on the Loamy Hills range site (USDA 1994). On this range site Palmer agaves may make up 2-10% of the plant composition by weight, and Parry agaves up to 1% when the site is in excellent condition.

## Effects of the Action

Because the Interim Grazing Plan is only supposed to be in effect for a short time, until a Resource Management Plan Amendment is done for the RCA, any delay in concluding the Amendment is a concern. The longer the period covered by the Interim Grazing Plan (IGP), the greater the effects of the proposed action. Therefore, since no firm deadline for the Interim Grazing Plan is given, we assume the IGP will remain in effect not more than five years after the date of this opinion. The probable impacts generated by the implementation of the proposed livestock grazing plan are described below. The impacts of the proposed grazing system and the impacts of the proposed range improvements will be analyzed.

**Direct and Indirect Effects**

Impacts of the Proposed Livestock Grazing

Livestock grazing alters the species composition of communities, disrupts ecosystem functioning, and alters 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. Changes resulting from implementation of the proposed Interim Grazing Plan should be more pronounced in the riparian areas. Changes in the uplands should be limited as the proposed action is extremely similar to the present grazing situation.

Expected Effects to Soils

Past continuous yearlong livestock grazing (>15 years ago) on the Empire-Cienega Ranch affected watershed hydrologic function by removing protective vegetation and by soil trampling. 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 1989, Guthery *et al.* 1990, Orodho *et al*. 1990). Continuous yearlong grazing also resulted in large sacrifice areas around water sources, headcuts and soil piping, and creation of established trails to and from points of livestock concentrations on the RCA.

The proposed grazing management should improve the protection of upland and riparian soils, by increasing the vegetative ground cover, plant vigor, and litter components. Riparian soil and bank stability should be greater (Skovlin 1984, Kovalchik and Elmore 1992). The condition of upland soils will remain static or continue their present trend. The increase in the taller bunch grasses would increase ground cover, produce better soil shading, reduce evaporation by wind, and produce greater stability by increasing the biodiversity of the existing plant communities (Arizona Interagency Range Committee 1970). Less soil will be exposed to the erosive effects of wind and water. Higher seral plant communities that could be expected due to improved management would contain the taller bunch grasses such as plains lovegrass, sideoats grama, and cane beardgrass. These species are deeper rooted than the lower seral species like curly mesquite and threeawns, and will hold the soils together better.

The primary impacts to the soils would be: less water erosion and sediment yield, increased water retention, decreased soil erosion. The possible increase in ground cover would increase interception and infiltration of precipitation, reducing overland flow and sediment transport off-site (Orodho *et al*. 1990, Armour *et al*. 1991). The work of Rich and Reynolds (1963) in central Arizona indicated that 40 % utilization of perennial grasses caused no measurable change in runoff or erosion compared with no grazing.

The possible improvement in upland range condition under the proposed management would result in an increase in the density and vigor of perennial grass plants (Orodho *et al*. 1990). The increase in plant densities and size of plants would slow overland flow of water, impede formation of rills and gullies, and trap sediments. With the improved infiltration of moisture into the soil, and the reduced evaporation resulting from the potential accumulation of plant litter, more water will be retained for use by plants on-site (Hanks 1965, Dwyer *et al*. 1984).

The periodic concentration of livestock numbers in the pastures being utilized, particularly around water sites, would cause localized compaction of soil and trampling of vegetation for short periods (2 to 6 weeks). The disturbance of these sites would increase the opportunity for

erosion and sediment transport and continue longer than the cattle are present. This impact could affect as much as 60 acres around the 30 existing and proposed water developments.

Studies by Dadkhah and Gifford (1980) in the west show that trampling by livestock causes a decline in infiltration rates, but regardless of trampling, sediment yields remain uniform after grass cover reaches 50 %. The data from 1991 on the existing watershed condition indicate the current vegetation cover (all live plants) averages 57 % on the Empire-Cienega (Table 9).

Expected Effects to Vegetation

Continuous yearlong livestock grazing before the Donaldson's management resulted in a reduction of some of the desirable perennial grasses (*e.g.* plains lovegrass and cane beardgrass) and an in-crease of invasive shrubs (*e.g.* mesquite and burroweed). This occurred because it allowed maxi-mum opportunity for cattle to graze preferred plants selectively (Szaro 1989), resulting in undue intensity and frequency of defoliation of these species putting them at a competitive disadvantage.

## Upland Plant Communities

The proposed rotational livestock grazing strategy should provide the opportunity for the continued stabilization and improvement of the upland plant communities. A system which provides ample rest periods and grazing deferments, should improve plant vigor, herbage production, and slowly over time, change the species composition to 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 and present trends.

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. In fact, light or moderate grazing may stimulate plant growth (Ellison 1960), because removal of plant material containing carbohydrate reserves may increase photosynthetic activity to replace the lost material (Humphrey 1958*b*). However, a review of the effects of herbivory on grazed plants conducted by Belsky (1986), illustrated there is little evidence to show that grazing benefits plants. Other authors, including Ellison (1960), have reached the same conclusion (Jameson 1963, Silvertown 1982).

Improved range condition due to improvement in plant density and vigor, hence potential production, has been indicated in studies on the Santa Rita Experimental Station south of Tucson. The principles of grazing systems that include periodic rest phases to benefit the forage plants have been substantiated on the Santa Rita Experimental Range as well as by numerous range scientists (Schmutz 1977, Martin 1978, Van Poolen and Lacey 1979). The converse result has been found in other arid ecosystems (Blackburn *et al.* 1982, Weltz and Wood 1986).

## Riparian Plant Communities

Once the southern riparian pastures are constructed and the northern pastures are realigned, the proposed management would exclude livestock grazing from all but the northern 1.5 miles of the perennial portions of Cienega Creek, and exclude grazing from all perennial portions of Mattie Canyon. Some water gaps will be used for a short time until alternate water sources are available. One-quarter mile of Empire Gulch will remain ungrazed.

The 1.5 miles of Cienega Creek, which would still be grazed by livestock, would only be grazed

during the winter when the impacts are usually less than grazing during other seasons (Platts 1989, 1990; Kovalchik and Elmore 1992). RACE data on this reach indicates that conditions have continued to improve under the current management where winter use grazing has been implemented (Table 10). Vegetation and streambanks would continue to be affected.

The construction and use of four lanes to allow cattle to cross Cienega Creek for pasture rotation will have some short-term impacts to the vegetation on up to 2.5 acres of riparian habitat. When cattle are crossing the creek, vegetation and banks will be trampled, and some plants grazed. Cattle would probably only use an individual lane once a year for a few hours up to 10 days.

The overall impact to riparian communities of the proposed interim grazing plan would be light due to exclusion of livestock from most of the riparian zones on the Empire Ranch. However, Cinco Ponds and Empire Gulch would still receive warm season grazing. Erosion could begin at cattle crossing lanes. Should the erosion act as a nick point, it could spread. However, the expected results would be for plant succession within the excluded riparian areas to progress rapidly towards the potential natural community (Platts and Wagstaff 1984, Elmore 1992). This should either be towards the cottonwood-willow community or the interior marshland complex. Grazed areas would move toward succession more slowly or remain in an earlier ecological state.

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). Cienega and stream habitat along Cienega Creek is currently protected through proper watershed function. The watershed evaluation conducted by the BLM Phoenix District hydrologist and soil scientist indicate that cover is relatively high and that active erosion and erosion potential is minimal under the existing grazing treatment (Table 7). Comparable data was collected in 1974 by Phil Ogden. An evaluation of both data sets indicates a stable trend. Under a continuation of similar activities at similar levels to the present, the potential for negative impact from watershed degradation which can effect fish habitat through excess sedimentation or erosion from exacerbated flood peaks is not evident.

## Sacaton Plant Communities

The proposed livestock management of the sacaton pastures continues their use, primarily in the spring before the summer monsoons. The base herd of 700 to 1,500 cattle would be in a pasture for 4 to 6 weeks depending on the vegetation condition and production, then moved to the next pasture. Livestock densities would be high, but the duration would be relatively short.

The sacaton can produce an enormous volume of forage in good years (up to 6,500 pounds/acre of air dry herbage)(USDA 1988). If the plants are subjected to long periods of no grazing or exclusion from fire, old vegetative growth will accumulate in the aerial portion of the plants, reducing their photosynthetic efficiency and decreasing production (Savory 1988:154). The concentrated spring grazing usually promotes fresh growth and prevents the build up of the old vegetative material. The high intensity-short duration grazing allows the rapid harvest of this forage and maximizes the rest period after grazing.

The BLM conducted a field check of condition of sacaton bottoms in relation to grazing. Reduced sacaton density and erosion was evident mainly where stream or arroyo channel incision occurred. Grazed pastures (especially 500 Acre) showed little sign of erosion or loss of cover that would indicate damage to floodplain function (Heady 1984). The BLM Phoenix District wrote a watershed activity plan that begins an erosion monitoring procedure at Wood Canyon (sacaton bottom) (U.S. BLM 1989). The evaluation in this plan indicated that the soils in the floodplain are highly susceptible to erosion. However, it was concluded that soil piping

due to channel incision was largely responsible for erosion of this site rather than surface disturbance and that roads may aggravate the erosion. Grazing of sacaton pastures at the proposed levels in the floodplain of Cienega Creek is not likely to have a significant negative affect on floodplain function.

In addition, because the cattle will be present for a relatively short duration, the potentially poisonous (Cross 1971, Taylor *et al*. 1991) effect of livestock waste on fish is not expected to present a serious threat along Cienega Creek. In addition, wetlands are noted for their ability to remove pollutants (Johnston *et al*. 1990).

Water Resources

Expected benefits from the potentially improved condition of the uplands and the improved riparian zones include the following: Aggrading the base level of Cienega Creek, improved riparian condition, and an increase in recharge of the aquifer in the valley (Elmore 1992). The decreased runoff and improved water retention would reduce peak flood flows and result in a slower release of water through the system (Elmore and Beschta 1987, DeBano and Schmidt 1989, Kovalchik and Elmore 1992). There may also be an observed increase in the subirrigation of loamy terraces adjacent to Cienega Creek as the base level increases.

Impacts of Proposed Range Improvements

Summary of Proposed Range Improvements

| | |
|---|---|
| 13 | well developments |
| 7 | existing wells |
| 14 | repressos constructed |
| 1.5 | miles of pipelines installed |
| 20.5 | miles of fence constructed |
| 4 | crossing lanes |

Soil disturbance would increase in two ways as a result of the proposed development of the range improvements. Initial minor disturbance caused by movement to and from the development sites could occur. The actual construction of the 14 earthen reservoirs (repressos), and 1.5 miles of water pipeline would create a temporary disturbance through soil movement and compaction.

Approximately two acres would be disturbed in construction of the 1.5 miles of water pipeline. Construction of the repressos would disturb about five acres of surface soils. The disturbance associated with the pipelines should be temporary, and should naturally revegetate within 2 to 3 years. About half the disturbance associated with the repressos would be permanent due to water storage, soil compaction, and trampling of vegetation by livestock (Andrew 1988).

The initial phase of constructing the proposed 20 miles of fencing would increase the opportunity for localized water erosion due to soil disturbance. The impacts would be temporary and sediment yield should be negligible.

The initial construction of the four crossing lanes on Cienega Creek should have negligible impact to the soils. The intermittent use of these lanes to allow cattle to cross the creek for

pasture rotation would have adverse short term impacts to the approximately 2.5 acres involved. The soil would be trampled, causing decreased bank stability and would increase the opportunity for localized water erosion due to soil disturbance. Decreased bank stability is frequently the first indicator of livestock presence in a riparian area (Platts 1990, Overton *et al*. 1994) and can occur immediately (Platts and Nelson 1985). Moist streambanks are more susceptible to livestock trampling than are dry streambanks (Marlow and Pogacnik 1985).

The crossing lanes would be constructed by installing a fence perpendicular to the creek about 100 feet from an existing fence. Therefore, each lane would be approximately 100 by 300 feet (0.7 acres). The cattle would be pushed through the lane by cowboys on horseback when it is time to change pastures. It is expected that the herd of 700 to 1,500 cattle would be moved through the lane in groups of 400 to 700 animals. Each group would take about an hour to push through the lane. At most the lane would receive use for up to 10 days once each year. There would be some lanes which may not be used yearly.

Surface Water

The long term benefits of the proposed intensive grazing management should improve the vegetative condition of the range. This improved condition should slightly decrease the runoff potential of the range (DeBano and Schmidt 1989, Orodho *et al*. 1990, Chaney *et al*. 1993) within the Empire Ranch. As plant density increases, more of the available moisture infiltrates into the soils and is either moved as groundwater through the watershed, or is utilized by plants on site and less runs off.

The quality of the surface water in Cienega Creek is basically good. It is reasonable to expect that fencing most of the creek from livestock would result in improved water quality from removal of livestock-induced pollutants such as sodium chloride, low dissolved oxygen, or nitrates resulting from the chemical breakdown of manure (Tiedemann *et al*. 1987, Platts 1990, Armour *et al*. 1991). The increased bank stability from reduced livestock trampling would decrease sediment loading (Kovalchik and Elmore 1992).

The increase in vegetative cover and biomass would increase the roughness coefficient of the stream channel, decreasing stream velocities which would reduce destructive erosion and sediment loading. The increase in riparian vegetation would also increase the filtering effect, thereby further reducing sediments in the surface water (Elmore 1992).

The base surface flow of Cienega Creek ranges from 0.31 cubic feet per second (cfs) to 1.10 cfs above Oak Tree Canyon. The stream gains flow downstream with a range of 0.17 cfs to 2.8 cfs below Mattie Canyon (BLM files, September 1988 to March 1993). Currently, when the cattle rely solely on Cienega Creek for water, they drink about 15,000 gallons per day (10 gallons per minute) directly from the surface flow. It is reasonable to expect that the surface flow of the creek would be less affected from withdrawal of the water from further up the watershed.

Ground Water

The proposed repressos should not effect surface water drainage, as they will be located outside of drainages. If a pond in an Empire Gulch side drainage is used to water cattle, little additional impacts to the surface flow would occur and the dam would act as a sediment trap. A similar impact from the use of Cinco ponds as a stock watering source may occur.

The small increase in groundwater use should not create measurable effects in the aquifer associated with Cienega Creek (Ben Lomeli, BLM, pers. comm., BE). Minor changes involving

water levels and water quality in the areas may be anticipated, but these effects would be highly localized. The increased use of groundwater results from the proposed pumping of 20 wells used at different times. The wells will replace the current use of water from Cienega Creek.

Pumping proposed at each well would average 15 gallons per minute (approximately 20,000 gallons/day). Water is pumped with an electric submersible pump into earthen reservoirs about 50 feet in diameter to a depth of 3 to 4 feet (50,000 gallons). An amount of 50,000 gallons constitutes a 2 to 3 day supply of water. Sometimes several different primary wells are pumped to distribute the herd more evenly over a large grazing unit, or one well may be used to fill repressos at different locations. One of these primary waters may be used for 2 to 8 weeks. It is estimated, considering the transmissivities and the size of the aquifers, the withdrawal of 15 gallons/minute for stock watering would produce only small drawdowns in the immediate vicinity of the wells.

When it is time to rotate the cattle to a different area, a different primary water is made ready, and gates are opened to move the cattle. Once the last cattle are out, the gates are closed and the water in the represso is allowed to evaporate. The potential evaporation rate in the Sonoita area is approximately six feet per year (John Donaldson, pers. comm., BE). Depending upon rainfall and surface runoff received, the repressos should dry up naturally in 1 to 3 months after pumping is stopped. A represso may contain water for up to six months, longer in very wet years. The seasonal basis of these water sources reduces the probability of contamination by illegal transplants of nonnative fishes by the public. Because the repressos will eventually dry after use, chance of a population of nonnative fish from becoming established is small.

## Effects to Listed Species/Critical Habitat

### Gila Topminnow

Cienega Creek is the best remaining natural habitat for the Gila topminnow in the State with the remarkable attributes of cienega habitat that is not heavily impacted by major development or presence of exotic fish and bullfrogs.

The fencing of the riparian corridor along Cienega Creek would result in improved riparian function and condition along at least five additional miles of Cienega Creek including the headwaters area. Platts (1991) gave riparian fencing and the later exclusion of cattle one of the highest scores for maintaining fish habitat quality when compared to other treatments. Some of the advantages he reported included the use of simpler grazing strategies on uplands to meet forage objectives and that livestock distribution can be controlled. He also points out that drawbacks include reluctance by the livestock industry to accept the option, and improperly managed uplands can affect the stream.

As a result of improved riparian function and increased overbank flow, increased shallow aquifer water capacity and recharge may result. This would provide more reliable water flow and enhanced riparian development. Upstream improvement may benefit downstream segments through indirect and cumulative positive impacts such as reduction of flood peak discharge, attenuation of flood discharge, and increased base discharge (Hendrickson and Minckley 1984).

The soils along much of Cienega Creek are vulnerable to erosion. Factors thought to be important to the destabilization of cienegas in the region in the last century are loss of vegetative cover that stabilized watershed function and stream stability (Hendrickson and Minckley 1984, Bahre 1991, Fleischner 1994). By excluding livestock from riparian pastures, the probability that large floods will cause catastrophic erosion that results in stream channel entrenchment is reduced significantly (Hendrickson and Minckley 1984, Kovalchik and Elmore 1992). This is

important since the ability of the flood plain to absorb flood energy has been severely reduced in many stream segments due to past stream incision and concomitant loss of floodplain function. Crossing lanes in entrenched channels may have a greater likelihood of acting as nick points. Since floods can no longer spread out over large areas, the energy is concentrated and increases the capacity of flooding to cause bank erosion and the possible mobilization of topminnow downstream. Topminnow are weak swimmers relying on areas with low velocity to avoid strong currents (Meffe 1983). Flooding has removed topminnow populations in the past (Brooks 1985).

Increased vegetation has been documented to increase instream cover, overhanging cover, buffer streams from incoming sediment and other pollutants, build a sod of herbaceous plants that form undercut banks, buffer temperature extremes, increase habitat complexity, and provide terrestrial insect prey for fish (Rinne 1988, Platts 1991). This should benefit the Gila topminnow.

The amount of open water may decrease with the loss of livestock impacts which accentuated the ability of floods to scour away vegetation and soil. However, it is anticipated that flood events will have sufficient energy to maintain open water and habitat diversity without the aid of disturbance from livestock. If disturbance is not sufficient, Cienega Creek may function like the lower portion of Empire Gulch. The lower portion of Empire Gulch is choked with bulrush and other vegetation to the point that open water is limited and stagnation resulting in poor water quality and food production is suspected. Without flows to flush this habitat, pools fill with sediment and organic debris clogs water volume leaving little opportunity for fish habitation.

Hendrickson and Minckley (1984) state that the balance between aggradation and degradation of the channel is important for perpetuation of cienega habitat. They suggest that succession may lead to the deposition of a mound over perennial stream segments. They propose that in some cases maintenance of open water may require artificial deepening or control of vegetation by unnatural means such as cattle grazing.

Open water in the form of pools is thought to be perpetuated naturally by floods that scour disturbed areas (nick points) creating a localized headcut erosion that moves upstream until equilibrium is reached (Hendrickson and Minckley 1984). Davis (1994) demonstrated through pollen and charcoal analysis of sediments in seven cienega systems that fire was a regular disturbance factor historically. This disturbance likely led to the increased ability of flooding to scour open water and remove large quantities of vegetative matter choking these habitats. Since both fire and livestock grazing will be largely eliminated (BLM fire policy and fencing) from cienega habitat, the quantity and quality of open water could decrease substantially.

The effect of excluding livestock from riparian and aquatic habitat is likely to be positive to Gila topminnow by improving habitat stability. However, there is potential for long term negative im-pacts associated with cienega ecological succession by the reduction of habitat diversity. Should the level of flood disturbance prove to be inadequate to provide open water habitat, cattle grazing might be used to enhance the effects of flooding to provide open water and pool formation. Such an action would require additional consultation under the Endangered Species Act (ESA).

The lower most portion of Empire Gulch will still be grazed during the growing season. Since cattle prefer using stream bottoms, impacts to the small topminnow population are likely to include creation of anoxic conditions and other water quality degradation by stirring bottom sediments and releasing metabolic wastes, trampling of banks, and reduction in stability (Overton *et al*. 1994). However, consumption of vegetation coupled with lessened bank stability may allow for floods to increase habitat diversity and reduce the extent of choked and stagnant water conditions. The effect of continued livestock grazing has the potential for both positive

and negative impacts to Gila topminnow populations in Empire Gulch. Changes in Empire Gulch could affect Cienega Creek at the confluence of the two streams.

Approximately 1.5 miles of perennial Cienega Creek will be grazed during the winter. The riparian condition data presented above shows an improving trend in the two stream segments to be grazed in the winter (Table 10). Continuation of the existing winter use should not overly degrade desirable habitat features such as vigorous plant growth and good bank stability.

The "repressos" are anticipated to dry up naturally in 1 to 3 months after the pumping is stopped. Only a few stock waters on the allotment catch rain runoff that allows for extended persistence (Simms 1991). Of these, none have perennial surface water. However, some larger tanks on the ranch that are designed to catch runoff may hold water almost yearlong in wet years. These tanks pose a somewhat larger risk but should not hold a population of fish or bullfrogs (*Rana catesbeiana*) for very long after establishment. The risk posed by the use of existing waters and the development of new waters to the fish community in Cienega Creek is small. However, the potential for exotic fish and bullfrogs to be put into the repressos exists. Subsequent flooding could move the exotic fish and bullfrogs into occupied topminnow habitat and lead to impacts to topminnows. This could be catastrophic to the topminnow population.

Topminnows and other native fish populations have been negatively impacted by exotic fish species (Minkley and Deacon 1968, Meffe *et al.* 1983, Minckley *et al.* 1977). Mosquitofish have been especially damaging to topminnow populations (Meffe *et al.* 1982, Brown and Abarca 1992). Populations of Sonoran topminnow have been extirpated within one year after mosquitofish were discovered (Minkley and Deacon 1968, Schoenherr 1974).

Most introductions of non-native fish have been legally done by State fish and wildlife agencies to establish sport fisheries. However, illegal introductions of non-native fishes are routinely made by the public. Release of non-native fish by the public has been a major factor in the spread of these species (Moyle 1976*a*, 1976*b*). Non-native fish are transported for bait and sporting purposes (Moyle 1976*a*, 1976*b*), for mosquito control (Meffe *et al.* 1983), and release of aquarium fishes (Deacon *et al.* 1964). Release of non-native fish into the repressos is considered an indirect effect.

The four lanes devised to allow for the crossing of approximately 1,500 cows and their calves are anticipated to disturb up to 100 feet of fish habitat in each lane. This is less than 1% of the available fish habitat. It is reasonable to expect alteration of stream banks, riparian plants, and fish habitat within these lanes. Short term effects include excess turbidity and trampling of a small number of fish, including Gila topminnow. In the lanes, hoof action can stir sediments causing the accumulated detritus and anoxic sediments to lower dissolved oxygen levels; this may cause stress or direct mortality to fish (Cross, 1971, Hendrickson and Minckley 1984).

Long term effects of the lanes may include a local loss of habitat diversity, bank erosion, and reduced riparian function at the crossings and up and downstream. There is the remote chance that nick points resulting from soil disturbance in the lanes could be acted on by large flood events and trigger erosion. Extensive headcutting has the potential to alter habitat diversity and flood plain function leading to entrenchment. Existing and future headcuts are a major management concern on Cienega Creek. Headcuts could result in a long term reduction in habitat quality for Gila topminnow. The likelihood of such an outcome from the use of lanes is difficult to predict but seems remote.

The lanes that cross entrenched portions of the stream are probably the most likely to cause problems. There are seven proposed and existing crossings, four of which cross entrenched stream

channels. Fresno Gap and Gardner Lane are below major tributaries and receive lots of sediment. Headwaters Lane crosses an entrenched stream channel where flood flows are less severe than more downstream sections. Rick's Lane is also entrenched and probably has the greatest potential to act as a nick point. Rick's Lane is in the portion of the stream that is dewatered due to the Panama Canal. When natural flow is restored, Rick's Lane will need to be monitored closely.

The biological planning process can be used to avoid lanes that pose a risk of erosion and to ensure that lanes are rested as needed to minimize the potential for erosion. The use of lanes to move livestock across the creek is likely to adversely affect the Gila topminnow and other fishes through mortality from trampling and stress associated with extreme turbidity or lowered oxygen levels. The use of existing crossings will reduce the amount of habitat that is disturbed.

The above analysis indicates that the overall effects of the proposed grazing will be to continue the upward or stable trend for riparian and watershed condition on the Empire-Cienega Ranch. The direct impacts of livestock on the riparian and aquatic habitats of Cienega Creek will be lessened.

Overall, the project effects should be beneficial to the Gila topminnow population in Cienega Creek in comparison to previous grazing methods. The construction of riparian pastures would result in improved livestock control in riparian and aquatic habitats. The quality of those riparian and aquatic areas rested from livestock grazing are anticipated to improve. Implementation of the interim grazing plan is likely to adversely affect the Gila topminnow primarily from impacts concentrated in creek crossing lanes, the grazing of lower Empire Gulch and lower Cienega Creek, and the possible introduction of exotic fish and bullfrogs into the repressos.

Southwestern Willow Flycatcher

The potential effects of cattle grazing on the willow flycatcher include nest disturbance, vegetation loss, trailing, and cowbird parasitism. Because cattle will not actually be grazing within known occupied habitat, the direct loss of nests is not germane to this opinion.

While fencing of potentially suitable habitat will prevent direct loss of vegetation by cattle grazing, the proposed action will likely adversely affect the willow flycatcher by increasing or maintaining the number of cowbirds in the area. The Service believes that the proposed action will facilitate colonization of potentially suitable habitat by cowbirds, and that colonization will decrease the suitability of that habitat for future expansion of willow flycatcher populations.

Concentrations of livestock at tanks, corrals, nutrient supplements, and areas with extensive shade may increase the number of cowbirds in an area, and subsequently the amount of cowbird parasitism. Although willow flycatchers have not been documented nesting within the project area, individuals have been banded. The breeding season for cowbirds occurs earlier than that of the willow flycatcher, so those cowbirds attracted to the area may already be preparing to lay eggs when willow flycatchers arrive.

Human activities, such as livestock grazing and expansion of agriculture, have facilitated the expansion of the cowbird's range westward. Bock and others (1993) found that 40 % of the riparian bird species they examined, including the willow flycatcher (various subspecies), were negatively affected by livestock grazing. Klebenow and Oakleaf (1984) listed the willow flycatcher (*E. t. adastus*) among bird species that declined from abundant to absent in riparian habitats degraded in part by overgrazing.

Parasitism rates of up to 100 % (proportion of nests parasitized) have been documented for

willow flycatchers in parts of Arizona (Sogge *et al*. 1993), further contributing to the decline of this species. To ensure the survival and recovery of the willow flycatcher, efforts to preserve and restore habitats and reduce the level of brood parasitism will be required.

Where studied, high rates of cowbird parasitism of the flycatcher have coincided with population declines, or at least resulted in reduced or complete elimination of nesting success by the flycatcher. In California, parasitism rates ranged from 50 to 80 % between 1987 and 1992, when the population decreased 27 % (Whitfield 1990; Harris 1991; Whitfield and Laymon, Kern River Research Center, unpub. data). A parasitism rate of 100 % was documented for the flycatcher in the Grand Canyon during 1993, when no young were fledged (Sogge *et al.* 1993).

The Service believes that indirect effects of the proposed activities may result in a decrease in potential for flycatcher productivity on the Empire-Cienega RCA. Conversely, the reduction in grazing within the riparian zone of Cienega Creek may lead to an increase in extent and quality of suitable habitat.

Lesser Long-nosed Bat

Based on our review of lesser long-nosed bat life history and the life histories of the paniculate agaves which provide foraging habitat, we believe that the current and proposed grazing management with the proposed riparian fencing and waters may adversely affect the agave community and the lesser long-nosed bat population.

Livestock grazing may impact establishment of agave seedlings. Young agaves are very suscepti-ble during the first two years to trampling, grazing, and drying (L. Slawson, Desert Botanical Garden, pers. comm., BE). Rocks and vegetation may provide some protection and function as nurseries for young agaves. Shade and increased moisture provide microclimates under vegeta-tion or against rocks which aid germination and seedling establishment. In some areas of the RCA, grass plants probably function as nurse plants for agaves during the early stages. In areas which are grazed heavier, proper microclimates may not be present for seedling establishment and ample cover to protect against trampling or grazing may be lacking (Slawson, pers. comm., BE).

Grazing may also impact agaves' sexual reproduction. Palmer agaves may take 10-15 years to produce a flower stalk. When agaves start a flower stalk, they shunt all sugar into it. If the stalk is grazed off, the plant will not have reserves to produce another stalk and will not sexually reproduce. Plants usually die after beginning the stalk. Agaves are also able to reproduce asexually, but this is less common in Palmer agaves. The emergence of the flower stalk varies. It may be as early as March, but April and May are the most critical months. By June, the stalks are usually tall enough to avoid grazing (Slawson, pers. comm., BE).

There is essentially no research on the effects of grazing on agave seedlings. In a study area near Sonoita (not on the RCA), two-thirds of the agave stalks had been grazed off, which would probably impact recruitment (Slawson, pers. comm., BE). There is a need to establish long term study plots to look at recruitment of agave and the effects of grazing and to determine what effects, if any, this has on lesser long-nosed bat populations.

On the RCA, the loamy hills range site which supports the highest quality agave sites occurs in portions of the upper North pasture, the Upper and Lower Spring Water pastures, and the Hilton pasture. Agaves also occur on other range sites primarily on the southern half of the RCA in less dense stands. The Hilton pasture is usually used in the summer after the agave flower stalks have grown out of reach. The North pasture and Upper and Lower Spring Water pastures can be used in winter, and cattle may be present in some years during the April-May period when the agave

stalks are most susceptible to grazing.

When the sacaton pastures are utilized, April-May grazing in upland pastures with agaves is usually avoided or occurs less often. Seedling agaves in all pastures could be susceptible to grazing or trampling by livestock. However, cattle are rotated through these pastures so the pastures receive seasonal or annual rest which would provide protection for new seedlings that year. Utilization levels of the grasses are kept within 40-60%, but the utilization levels on agave stalks are unknown.

Numerous agave stalks are visible each year in the uplands of the RCA indicating that many agaves are able to reproduce. Information on young agaves is lacking. Surrounding areas including Ft. Huachuca and U.S. Forest Service lands also provide agave stands.

**Cumulative Effects of the Proposed Action**

Cumulative effects are those effects of future non-Federal (State, local government, or private) activities on endangered or threatened species or critical habitat that are reasonably certain to occur during the Federal activity subject to consultation. Future Federal actions are subject to the consultation requirements established in Section 7 and, therefore, are not considered cumulative in the proposed action.

In addition to the public and State Trust lands which make up the grazing allotment, several parcels of private land occur within the allotment boundaries. The 320-acre parcel of private land in Fresno pasture is grazed as a part of the pasture.

Adjacent to the allotment are also National Forest Lands and extensive private lands, which include the town of Sonoita. Areas around Sonoita have been subdivided and are being developed as "ranchettes". Potential impacts associated with growth in the Sonoita area include changes in the watershed/water balance of the Cienega Creek subbasin, the presence and transport of exotic fish and bullfrogs, and increased recreation in the RCA. Ground water use in the Sonoita area would increase with growth and runoff patterns would also change. Sedimentation associated with land clearing activities and increased runoff may also occur. How much of the area could be developed and at what densities, is not foreseeable. Additional uses that could occur on private lands are livestock grazing and small scale agriculture.

Adjacent National Forest Lands are managed for multiple use. The primary uses are recreation and grazing and are not subject to cumulative effects analysis.

**Summary**

The environmental baseline shows that the project area has undergone extensive modification both historically and currently. The Gila topminnow has few extant natural populations and Cienega Creek is by far the largest natural population remaining. The southwestern willow flycatcher would experience improved habitat suitability, but increased likelihood of nest parasitism. In analyzing the effects of the action, it was demonstrated that the proposed action will have some impacts on lesser long-nosed bats and their habitats, specifically on agaves. The cumulative effects appraisal illustrates that the ecosystem of which the RCA is a part, is experiencing a broad array of pressures associated with human activities.

## CONCLUSION

After reviewing the status of the Gila topminnow, southwestern willow flycatcher, and the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed interim grazing plan, and the cumulative effects, it is the Service's biological opinion that the interim grazing plan, as proposed, is not likely to jeopardize the continued existence of these species. No critical habitat has been designated for any of these species; therefore, none will be affected.

## INCIDENTAL TAKE

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined 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 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. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. 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 a prohibited taking if 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 the agency so 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. The BLM has a continuing responsibility to regulate the activity covered by this incidental take statement. If the BLM (1) fails to require the 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, or (2) fails 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 Service anticipates that the proposed Cienega Creek IGP will result in incidental take of Gila topminnow and southwestern willow flycatchers. Incidental take of the Gila topminnnow will be difficult to detect for the following reasons: dead fish are difficult to find, cause of death may be difficult to determine, and losses may be masked by seasonal fluctuations in numbers or other causes. However, take of Gila topminnow may occur from livestock use of the seven crossing lanes and two riparian pastures that are grazed through trampling or changes in water quality (*ie*. increased sedimentation); and introduction of exotic fish or bullfrogs into the proposed repressos and making their way to Cienega Creek. Take will be considered exceeded if: (1) more than 10 dead Gila topminnow are found annually at all crossing lanes and the riparian pasture that is grazed, when cattle are present; (2) if exotic fish or bullfrogs are put into the repressos and then make their way into Cienega Creek; (3) if headcuts originate in or near the crossing lanes; (4) and if the grazed portion of Cienega Creek is found to be in unsatisfactory condition. In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Gila topminnow.

The Service believes that the proposed action will increase the probability of nest parasitism of the flycatcher by cowbirds if flycatchers establish a breeding population on the RCA. Take

anticipated to occur from cowbird parasitism would be one flycatcher nest annually. No take of any other species besides topminnow and flycatcher is anticipated.

## REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the take of Gila topminnow and southwestern willow flycatcher.

1. Conduct all proposed actions in a manner which will minimize take of Gila topminnow and southwestern willow flycatchers and will minimize the suitability of the area for cowbird habitation.

2. Monitor the fish community and habitat including crossing lanes, grazed riparian zones, and repressos to document levels of incidental take and to check for the introduction of exotic fish and bullfrogs.

3. Maintain complete and accurate records of fish and avian populations and habitat monitoring of both the riparian zone and uplands and all actions taken to implement the terms and conditions of this biological opinion.

### Terms and Conditions for Implementation

To be exempt from the prohibitions of Section 9 of the Act, the BLM Safford District, Tucson Resource Area is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary and should be included in any permit or lease.

1. The following terms and conditions implement reasonable and prudent measure 1.

    1.1. Implement the interim grazing plan as outlined in the BO description of the proposed action, with the exceptions found below.

    1.2. The timing, use, year-long rest, and grazing deferment of the various pastures will be as described. For example, the southern pastures will be used in the summer, deferred in the winter, and several of these pastures will receive yearlong rest each year. Riparian exclosures will be excluded from grazing.

    1.3. Livestock numbers on the allotment shall not exceed 1,500 animal units year-long.

    1.4. The fencing and construction of the five new riparian exclosures (Lower 49, Headcut, Headwaters, Dominguez, Earth Day) and the six sacaton pastures (Sacaton, East and West Five Wire, East and West 500 Acre, Picnic) will be as specified in the Environmental Assessment.

    1.5. The three existing and four proposed crossing lanes shown in Table 3 of the BO may be used. In addition, the road crossing lane shown on the EA map (T 18 S, R 17 E, Sect. 34) shall be used in rotation with the other seven proposed and existing lanes. Use of the crossing lanes will be determined through the biological planning process as described in the proposed action. Each lane can be used up to twice per year and all cattle must be moved through the lane within 10 days. Cattle must not be allowed to remain in the riparian zone of the riparian zone.

1.6. Existing riparian exclosures and water gaps will not be available to cattle (Karen Trap, A1, A2, A3, A4, Bahti's Bog, Lower 49 Gaps) after adjacent waters are completed. Construction of repressos should begin next to the water gaps. All proposed riparian exclosures and water gaps will be fenced to exclude cattle within one year from the date of this opinion.

1.7. The fences of all riparian exclosures shall be inspected and maintained at least twice annually.

1.8. The 14 new wells, 6 well equip or redrills, and the associated pipelines must be located as specified in this BO.

1.9. All new repressos must be located to minimize the likelihood of floods moving exotic fish and bullfrogs into topminnow habitat.

a. Repressos should be located outside of the current 100-year floodplain when possible.

b. Repressos shall be located outside of the active channel except for Rattlesnake Tank, and tanks in Empire Gulch and Cinco Ponds.

c. Repressos shall be constructed so runoff from precipitation captured by each represso is minimal.

d. The maximum water depth in a represso may not exceed four feet at any spot.

e. The repressos shall be used only when required to water cattle and shall be allowed to dry when no longer needed to water cattle.

f. If repressos do not dry within six months after use ends, they shall be drained.

g. Repressos should be located so access to the public, and potential for unauthorized release of non-native fish and bullfrogs, is minimized.

1.10. The locations of the proposed upland plains developments shall be as specified in Tables 6 and 7 of this BO.

1.11. Implement grazing rotation and pasture use and riparian exclosures and pastures within one year of the date of this opinion.

1.12. Because the IGP is only supposed to be in effect for a short time, until a Resource Management Plan Amendment is done for the RCA, any delay in concluding the Amendment is a concern. The longer the period covered by the IGP, the greater the possibility for introduction of non-native fish and bullfrogs. Therefore, since no deadline for the IGP is given, if the IGP remains in effect more than five years after the date of this opinion, the result would be a change in the agency action and reinitiation of section 7 consultation will be required.

2. The following terms and conditions implement reasonable and prudent measure 2.

2.1. BLM shall conduct basin-wide type fish habitat monitoring on at least four 0.25 mile reaches of the creek every three years to determine habitat trends.

2.2. A minimum of five habitats will be sampled annually in specified "Fall Fish Count" sites prescribed by the AGFD. Blocknets and seines will be used for one pass sampling to determine relative abundance and populations trends and to screen for exotic fishes and bullfrogs.

2.3. Riparian condition monitoring sites established in 1989 and reread in 1994 will be assessed every five years.

2.4. Visually inspect and photograph the crossing lane and the area downstream from the lane for dead fish and sloughed banks in the period beginning with the first day of use to the day after use (1-11 days). The inspections should be earlier rather than later.

2.5. Visually inspect and photograph the grazed portion of Cienega creek near the Narrows annually for negative impacts to riparian condition caused by grazing.

2.6. Visually inspect each represso six months after use to look for evidence of exotic fish and bullfrogs and to determine if draining the represso is necessary (Term and Condition 1.9.f). If a sufficient dataset has built that shows these inspections to be unnecessary, BLM may cease this action after concurrence with the Service.

2.7. When the Biological Work Group meets, employ them to determine if the IGP is meeting its stated goals and objectives, and if the crossing lanes and the grazed portion of Cienega Creek are undergoing unacceptable degradation.

3. The following terms and conditions implement reasonable and prudent measure 3.

3.1. Maintain complete and accurate records of fish populations and habitat monitoring of both the riparian zone and uplands. Report on actions taken to implement the terms and conditions of this biological opinion. The report will include the dates that repressos are used, the dates they are inspected after use, and if any evidence of exotic fish or bullfrogs are found.

3.2. Copies of the records required in 3.1 above shall be provided annually to the Service on November 1.

3.3. Conduct annual surveys for willow flycatchers before December 31, 1997, on Cienega Creek and its tributaries that may provide suitable habitat (*ie.* Empire Gulch, Mattie Canyon). The survey must follow the southwestern willow flycatcher survey protocol (Tibbitts *et al.* 1994). Personnel conducting the surveys must have attended one of the flycatcher training sessions held annually.

a. If flycatchers are detected, determine their breeding status using the following criteria:

- repeated presence of a non-singing southwestern willow flycatcher, or a southwestern willow flycatcher using vocalizations other than the primary song next to an individual exhibiting territorial behavior;
- observation of a southwestern willow flycatcher carrying nesting material;
- observation of southwestern willow flycatchers copulating;
- verification of a willow flycatcher nest;
- observation of a southwestern willow flycatcher carrying food items; and
- observation of a juvenile southwestern willow flycatcher.

b. If breeding status is confirmed or suspected, continue monitoring efforts by visiting breeding locations at least once during each of the three 10-day periods of June and July or until observation indicates that southwestern willow flycatcher have stopped breeding efforts. Collect breeding and habitat data as outlined in the survey protocol (Tibbitts *et al.* 1994) and submit the completed data forms to AGFD Partners in Flight Program.

c. If flycatcher breeding status is confirmed or suspected, begin a brown-headed cowbird trapping program in the following year by April 1, using established protocols. Once a breeding flycatcher pair is located, assume nesting will occur in subsequent years and conduct trapping program through the end of July, or until the southwestern willow flycatcher breeding season ends (if earlier than July 31).

i. Determine the number and location of traps based on the distribution of willow flycatcher along the drainage, but include a minimum of two traps.

ii. Check all traps at least once each day; individual traps should be checked at approximately the same time each day.

iii. Maintain data on the brown-headed cowbird trapping program, including:
- date trapping is initiated and stopped;
- locations of traps marked on a topographic map;
- variations from established protocol;
- number and sex of brown-headed cowbirds and non-target species captured;
- date of each capture.

iv. Euthanize all captured brown-headed cowbirds in a humane manner; dispose of the dead birds properly.

v. Report to the Service each year on the survey and trapping program.

d. Monitor for signs of nest parasitism such as cowbirds fledging from flycatcher nest(s). If parasitism does occur, reinitiate consultation with the Service to alter management of mitigation measures as needed.

## CONSERVATION RECOMMENDATIONS

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

1. As has been previously discussed and agreed upon, the BLM should begin consultation on road maintenance in the Empire-Cienega RCA. Road maintenance and road closures should be addressed in the land use plan.

2. The BLM should explore the feasibility of using metal tanks instead of dirt repressos for watering livestock. While more expensive, the installation of metal tanks is less destructive and can be less susceptible to breach by flooding. Also, metal tanks would be easier to

remove exotic fish and bullfrogs from. In addition, as few repressos as possible should be used each year and they should be used for as short a period as possible.

3. The BLM should identify unoccupied sites on the Empire-Cienega RCA that are suitable for Gila topminnow. Populations apart from Cienega Creek are beneficial in that they provide refugia in case something happens to the Cienega Creek population. This effort should be in consultation and coordination with the Service, AGFD, and Cienega Creek allotment permittee.

4. The BLM should conduct a riparian ecological site inventory as planned. This data will aid planning and management for this area.

5. The water quality parameters of Cienega Creek should be monitored. This information will indicate the status and success of the IGP.

6. Vegetation utilization by livestock should be measured and monitored, especially in the grazed riparian are of Cienega Creek. Should problems arise, this information can be related to the condition of the watershed and riparian zones and could be used to identify potential causes and remedies.

7. The BLM should begin research regarding the effects of cattle grazing on paniculate agaves, and thus, lesser long-nosed bats. This research should include a thorough literature review of all pertinent sources. It should also include a robust field research program to determine the effects of cattle grazing on paniculate agaves at least on the project site. The field research should also include other areas or sites to determine differences in effects to agaves that may occur under various grazing regimes. An exclosure that includes agaves would be very helpful in this regard.

8. The BLM should determine how often lesser long-nosed bats use the RCA and the agaves occurring there. It is also important to determine how significant a food resource the agaves are to the bat populations in the area.

9. The land use plan in preparation should address management strategies that enhance the probability of southwestern willow flycatchers establishing a breeding population on the Empire-Cienega RCA. The establishment of a breeding population of willow flycatchers on the RCA may constitute new information that would require reinitiation of consultation. In addition, management of candidate (and former candidate) species should be addressed in the land use plan.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

## REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the 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 maintained (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 later modified in a manner that causes an ffect

to the listed species or critical habitat 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. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

This concludes formal consultation on the actions outlined in the January 24, 1995, request for formal consultation on the proposed Cienega Creek Interim Grazing Plan for the Empire-Cienega Allotment. If we can be of further assistance, please contact Doug Duncan or Ted Cordery.

/s/ Sam F. Spiller

cc: Arizona State Director, Bureau of Land Management (AZ 932)
Director, Fish and Wildlife Service, Washington, D.C. (DDS) [cc:Mail R9FWE_DDS]
Regional Director, Fish and Wildlife Service, Albuquerque, NM (GM:GSV/LCR)
Field Supervisor, Fish and Wildlife Service, Carlsbad, CA
Field Supervisor, Fish and Wildlife Service, Ventura, CA
Field Supervisor, Fish and Wildlife Service, Albuquerque, NM
Field Supervisor, Fish and Wildlife Service, Austin, TX
State Supervisor, Fish and Wildlife Service, Salt Lake City, UT
Assistant State Supervisor, Fish and Wildlife Service, Grand Junction, CO
Director, Arizona Game and Fish Department

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2-21-95-F-177

# SUMMARY
# BIOLOGICAL OPINION AND CONFERENCE REPORT ON CIENEGA CREEK INTERIM GRAZING PLAN

**Date of the opinion/report:** January 8, 1996

**Action agency:** U.S. Bureau of Land Management, Safford District, Tucson Resource Area

**Project:** Biological Opinion and Conference Report on the proposed Cienega Creek Interim Grazing Plan.

**Listed species and critical habitats:** Gila topminnow (*Poeciliopsis o. occidentalis*), southwestern willow flycatcher (*Empidonax traillii extimus*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*).

**Biological opinion:** Proposed action is not likely to jeopardize the continued existence of the Gila topminnow, southwestern willow flycatcher, and lesser long-nosed bat.

**Incidental take statement:**

**Level of take anticipated:** The Service anticipates incidental take of Gila topminnnow will be difficult to detect for the following reasons: dead fish are difficult to find, cause of death may be difficult to determine, losses may be masked by seasonal fluctuations in numbers or other causes. However, take of the topminnow can be anticipated when grazing causes a reduction in water quality, which could cause fish mortality or moribundity. The Service believes that the proposed action will increase the probability of nest parasitism of the flycatcher by cowbirds, if flycatchers establish a breeding population. Take anticipated to occur from cowbird parasitism would be one flycatcher nest annually. No take of any other species is anticipated.

**Reasonable and prudent measures and terms and conditions:** Reasonable and prudent measures: 1) Conduct all proposed actions in a manner which will minimize take of Gila topminnow and southwestern willow flycatcher and will minimize the suitability of the area for cowbird habitation; 2) Monitor the fish and avian community and habitat to document levels of incidental take and to check for the introduction of exotic fish; 3) Maintain complete and accurate records of fish and avian populations and habitat monitoring and all actions taken to implement the terms and condition of this biological opinion.

**Conservation recommendations:** Nine recommendations are made. In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.