United States Department of the Interior
U.S. Fish and Wildlife Service
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AESO/SE
2-21-99-F-300 February 28, 2002

Mr. Karl Siderits
Forest Supervisor
Tonto National Forest
2324 East McDowell Road
Phoenix, Arizona 85006

Dear Mr. Siderits:

Attached is the final biological opinion for ongoing grazing management on 20 allotments on the Tonto National Forest. Your March 30, 1999, request for formal consultation pursuant to the Endangered Species Act of 1973, as amended, was received March 30, 1999. By letter of May 25, 1999, we requested more information and requested a 60-day extension to the 90-day consultation period. You responded to our information request by letter dated July 9, 1999, and concurred with our request to extend the consultation period. You also changed the effect determinations for the Mexican long-nosed bat (*Leptonycteris nivalis*) to no effect. Your letter dated February 25, 2000, changed the proposed action and the effect determinations for about 10 allotments.

Also, your June 21, 2000, letter contained an amendment to the biological evaluation, and your July 11, 2000, letter provided additional information. The amendment made major changes to the proposed action. Livestock were removed from six allotments, other parts of the proposed action were changed, and many species effect determinations were changed. Because of these major changes, the date of initiation for this formal consultation is June 21, 2000, the date the biological assessment amendment was received by our office. As a result of various changes to the original biological assessment, this biological opinion now covers proposed livestock grazing on 20 allotments. We released a draft biological opinion on February 19, 2001. We received comments on that draft on June 6, 2001, and August 23, 2001.

We also incorporated your March 12, 2001, and April 2, 2001, biological assessments (USDA Forest Service 2001a, USDA Forest Service 2001b) of the effects of the Forest's ongoing grazing on critical habitat of loach minnow (*Tiaroga cobitis*) and spikedace (*Meda fulgida*) for those allotments which were already in consultation (7/K, Buzzard Roost, Christopher

Mountain/Ellinwood, Deadman Mesa, Devil's Canyon, H-4, Payson/Cross V, Seventy Six, Star Valley, and Tonto Basin). Our biological opinion concludes consultation on loach minnow and spikedace critical habitat for these ten allotments.

The following listed species are addressed in this consultation: lesser long-nosed bat (*Leptonycteris curosoae yerbabuenae*), desert pupfish (*Cyprinodon macularius*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), southwestern willow flycatcher (*Empidonax traillii extimus*), Mexican spotted owl (*Strix occidentalis mexicana*), bald eagle (*Haliaeetus leucocephalus*), Colorado pikeminnow (*Ptychocheilus lucius*), woundfin (*Plagopterus argentissimus*), Arizona agave (*Agave arizonica*), Arizona hedgehog (*Echinocereus triglochidatus*) bonytail chub (*Gila elegans*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), spikedace with critical habitat, loach minnow with critical habitat, and the razorback sucker (*Xyrauchen texanus*).

We recommend that the Tonto National Forest package all reports and monitoring data required or recommended in this biological opinion into an annual report due December 1 of each year. The first annual report will be due December 1, 2002. We suggest this reporting date for all past and future opinions so that only one report would be required for all consultations, greatly simplifying your efforts to assemble this information and our efforts to assimilate it.

We would like to suggest a strategy for completing consultation for remaining allotments on the Forest. We suggest a programmatic approach that would in one opinion: 1) address all remaining allotments for which grazing activities may affect listed species or critical habitat, 2) make the term of the proposed action long, for instance 10 years, and not tie it to permit issuance for individual allotments, and 3) the opinion would be programmatic in that it would address the grazing program, but all grazing and grazing-related activities (including range improvement project construction and maintenance) would be addressed and covered under section 7 to the project level. We may also want to include the 20 allotments in this new consultation for the purpose of specifically addressing range improvement projects and extending the term of the proposed action to match whatever term we agree upon for the remaining allotments. As changes in allotment management are made in the future, these changes could be addressed by amendments or reinitiation of consultation. Our experience is that such an approach is much more efficient in regard to staff time than our current approach of consulting on batches of allotments of varying term, or consultation on individual allotments. It is also the most efficient way to ensure the Forest and its permittees have adequately addressed Endangered Species Act compliance. We look forward to working with you on a programmatic grazing consultation.

We have assigned log number 2-21-99-F-300 to this consultation. Please refer to that number in future correspondence on this consultation. If you have questions regarding this letter or the

opinion, please contact Glen Knowles (602/242-0210) or Sherry Barrett (520/670-4617). We appreciate your assistance and cooperation in the completion of this biological opinion, as well as your continuing efforts in the conservation of listed species.

Sincerely,

/s/ David L. Harlow
Field Supervisor

Enclosure

cc's w/enclosure:
Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Flagstaff, AZ
Office Supervisor, Fish and Wildlife Service, Flagstaff, AZ
Supervisor, Arizona Fishery Resource Office, Pinetop, AZ

Director, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Mesa, AZ
Director, Arizona Cattle Growers Association, Phoenix, AZ
Center for Biological Diversity, Tucson, AZ
Forest Guardians, Santa Fe, NM

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BIOLOGICAL OPINION

On-going and Long-term Grazing
on the Tonto National Forest

Arizona Ecological Services Field Office
U.S. Fish and Wildlife Service

AESO/SE 2-21-99-F-300

February 28, 2002

BIOLOGICAL OPINION

Ongoing and Long-term Grazing on the Tonto National Forest

This biological opinion was prepared by the U.S. Fish and Wildlife Service (Service) based on our review of the proposed Ongoing and Long-term Grazing on the Tonto National Forest (Forest), as amended, in Arizona (Maricopa, Gila, Yavapai, Pinal counties), and its effects on the endangered bonytail chub (*Gila elegans*) with critical habitat, threatened loach minnow (*Tiaroga cobitis*) with critical habitat, endangered Colorado pikeminnow (*Ptychocheilus lucius)* with critical habitat, endangered razorback sucker (*Xyrauchen texanus)* with critical habitat, threatened spikedace (*Meda fulgida)* with critical habitat, endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*), endangered desert pupfish (*Cyprinodon macularius)* with critical habitat, endangered woundfin (*Plagopterus argentissimus),* endangered Arizona agave (*Agave arizonica*), endangered Arizona hedgehog cactus (*Echinocereus triglochidatus* var. *arizonica*), endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), threatened bald eagle (*Haliaeetus leucocephalus*), endangered cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), threatened Mexican spotted owl (*Strix occidentalis lucida*) with critical habitat, and endangered southwestern willow flycatcher (*Empidonax traillii extimus*), pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), as amended (Act).

The Forest also requested Service concurrence that the proposed action may affect, but is not likely to adversely affect listed species or is not likely to jeopardize proposed or experimental, non-essential populations. The Service concurs with all of these determinations for bonytail chub, loach minnow, razorback sucker, spikedace, Gila topminnow, desert pupfish, woundfin, Arizona agave, Arizona hedgehog cactus, lesser long-nosed bat, bald eagle, southwestern willow flycatcher, Mexican spotted owl, Colorado pikeminnow, and woundfin for specific allotments. The basis for our concurrences is found in Appendix B.

The American peregrine falcon was removed from the Federal list of Endangered and Threatened Wildlife on August 25, 1999 (US Fish and Wildlife Service 1999a). Federal agencies are no longer required to consult with the Service under section 7 of the Act in the event activities they authorize, fund, or carry out affect peregrine falcons. However, removal of the protection of the Act will not affect the protection afforded all peregrine falcons under the Migratory Bird Treaty Act. In addition, the Act requires monitoring of the species for at least five years after delisting. This monitoring will consist, at a minimum, of annual occupancy surveys, assessing productivity, determining contaminant concentrations, and monitoring levels of take of peregrine falcons for falconry purposes (US Fish and Wildlife Service 1998d). The Service is currently developing a monitoring plan which will be available in the near future.

Since the initiation of consultation, the proposed listing for the Chiricahua dock was withdrawn (US Fish and Wildlife Service 1999b). Therefore, conferencing for the plant is no longer necessary. The Forest should continue species protection using current conservation actions.

This biological opinion and conference report is based on information provided in the March 1999 biological assessment (BA), correspondence between the Service and the Forest, numerous

telephone and personal communications, field investigations, and other sources of information. The proposed action was modified or clarified in letters from the Forest to the Service on July 9, 1999, February 25, 2000, June 21, 2000, July 11, 2000, in comments on the draft biological opinion received on June 6, 2001, and August 23, 2001, and in other communications listed within. References cited in this biological opinion are not a complete bibliography of all literature available on the species of concern, livestock grazing and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Because of the length of this biological opinion we have included a table of contents.

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CONSULTATION HISTORY

The Tonto National Forest Plan (USDA Forest Service 1985) was the subject of a formal section 7 consultation, resulting in a non-jeopardy biological opinion dated December 6, 1985 (2-21-83-F-012). Numerous grazing projects (i.e., pipelines, fences), grazing permits, and allotment management plans (AMPs) on the Forest have undergone site-specific formal and informal consultation. A number of other actions on the Forest that might affect the environmental baseline have also been through consultation.

Existing Forest Plans in the Forest Service's Southwestern Region (which includes the Forest) underwent formal consultation for their effects to Mexican spotted owl and designated critical habitat (November 25, 1996; non-jeopardy biological opinion 000032RO). New standards and guidelines for the Mexican spotted owl and northern goshawk (*Accipiter gentilis*) proposed as Forest Plan amendments were also addressed in a formal consultation (November 25, 1996; non-jeopardy biological opinion 000031RO). The proposed action for the second consultation was the implementation of the amended standards and guidelines on all Forests. In considering the effects of the proposed action, the Service assumed "that activities will be planned within the bounds of the amended guidelines for the Mexican spotted owl as well as the grazing management guidelines. General utilization standards for given range conditions and management strategies are provided in the guidelines for grazing management, with the provision that they be applied in the absence of more specific guidelines currently established through site-specific National Environmental Policy Act (NEPA) analysis for individual allotments" (pgs. 23-24). Therefore, if no NEPA analysis of forage utilization guidelines has been done, the utilization table in the amended Forest Plan is supposed to apply. Although these previous consultations were not site-specific evaluations, they did provide direction for the implementation of site-specific grazing management. The Southwest Region of the Forest Service was enjoined from applying these utilization guidelines in an injunction filed May 24, 2000 (Arizona Cattlegrowers Association; *et al.* v. Towns; *et al.*; CIV 97-1868 PHX RCB). .

The Forest Plans, as amended, for all Southwestern Region Forests have been consulted on for species other than the Mexican spotted owl. The biological opinion was completed December 19, 1997 (000087RO). Management direction on the Forest, including livestock grazing, was considered in the consultation; however, project-level consultations were still required for actions such as issuing grazing permits.

A biological opinion on livestock grazing on 21 allotments in the Southwestern Region was completed on February 21, 1999 (000089R). Five allotments on the Forest were included in that consultation, but are not among those considered in this consultation.

Previous consultations on livestock grazing for the Dos S unit of the Sunflower allotment have addressed impacts to Mud Springs and the Gila topminnow population there. The action consulted on earlier has not changed, and the effects of the action are not different. Previous consultations concluded the species was not likely to be jeopardized and incidental take as a result of livestock gaining access to the exclosure was not anticipated.

In 1998, a lawsuit was filed (December 14, 1998, Southwest Center for Biological Diversity vs. United States Forest Service, CIV98-600-TUC-JC) alleging that the US Forest Service had violated section 7(d) of the Endangered Species Act by authorizing, implementing, managing, and directing certain grazing allotments before completing the required consultations. Specifically, on the Tonto National Forest the lawsuit named numerous allotments, including the 20 consulted on here, lacking current section 7 consultation. The plaintiffs requested the agency take the necessary actions to initiate and complete consultation with the Service on the individual allotments to insure that such grazing allotments do not adversely affect listed species or destroy or adversely modify designated critical habitat. In response to this litigation, you produced a biological assessment (USDA Forest Service 1999) of the effects of the Forest's ongoing grazing on listed species for 25 allotments on March 31, 1999.

We received your initial request for formal consultation on March 31, 1999. This original request was for the following allotments: A Cross, Bohme, Bronco, Buzzard Roost, Cartwright, Christopher Mountain, Cross V, Deadman Mesa, Devil's Canyon, Ellinwood, H-4, Jones, Millsite, New River, OW, Payson, Pinto Creek, Poison Springs, Roosevelt, Seventy Six, Seven Slash K, Sierra Ancha, Sleeping Beauty, Star Valley, Sunflower, and Tonto Basin[1].

We requested more information about various elements of the proposed action and requested a 60-day extension to the 90-day consultation period on May 25, 1999. You provided additional information about the proposed action, concurred with our request for an extension, and changed effect determinations for the Mexican long-nosed bat (*Leptonycteris nivalis*) to no effect on July 9, 1999. Later, you changed the proposed action and the effect determinations for about 10 allotments on February 25, 2000, which included adding the Bellvue allotment to the consultation. Your June 21, 2000, letter contained an amendment to the biological assessment and evaluation that outlined current on-going management on 13 allotments, making major changes to the proposed action, including removal of livestock from six allotments and changes to the effects determinations for a number of species. The six allotments which were subsequently removed from the consultation were 7/K, A Cross, Poison Springs/Sierra Ancha, Cartwright, and Tonto Basin. Because of these major changes, the date of initiation for this formal consultation was changed to June 21, 2000, the date the biological assessment amendment was received by our office. A subsequent letter on July 11, 2000, provided further clarification and corrections to the June 21, 2000, amendment.

We released a draft of this biological opinion on February 19, 2001. We received comments on the draft on June 6, 2001, from the Forest and the applicants. Our files do not indicate that we received a complete list of designated applicants for the consultation, but a list of those applicants that commented on the draft biological opinion was provided. These included:

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[1] Although this equates to 26 individual allotments, the Forest consistently refers to these as 25 allotments in their biological assessment (USDA Forest Service 1999). The Forest often combines allotments for management reasons which can cause the actual number of allotments in question to become confusing. For the purposes of this consultation, we will count each individual allotment separately, and will refer to allotments managed together as one unit where appropriate.

Dwight Cooper, Roosevelt Allotment	E.K Delph, OW Allotment
Phelps Dodge, Bohme and Sleeping Beauty Allotmetns	Daniel G. Fenn, Buzzard Roost Allotment
Troy Neal, Seventy Six Allotment	Clifford Johnson, Cartwright Allotment
Connie Brown, H-4 Allotment	John Whitney, Sunflower Allotment
George T. Cline Equity Trust, Tonto Basin Allotment	T.E. Scartaccini for Asarco, Devil's Canyon Allotment
Dorothy Cline Wells Trust, Tonto Basin Allotment	Hal Earnhardt, Star Valley, Payson, and Cross V allotments
Prior Sanborn, Sierra Ancha and Poison Springs Allotment	Steve Brophy, Jones Allotment
Jessie Haught for Dwight Cooper, Roosevelt Allotment	Law Offices of Fennemore Craig representing the Arizona Cattle Growers
William Martin, Millsite Allotment	

Additionally, you received comments from several non-applicants: Tom Hale (Gila County Cattle Growers), Tommie Martin (Higher Ground), Martin Taylor (Center for Biological Diversity), and Jeff Burgess. Due to the volume of comments, we verbally requested clarification from you as to which comments we should specifically address. You provided a list of specific comments we should address on August 20, 2001, which included comments from Patti Fenner of the Cave Creek Ranger District, and applicants Dwight Cooper, Troy Neil and Daniel Fenn.

The Globe and Cave Creek districts further modified the proposed actions for the Pinto Creek and Bronco allotments respectively (we received letters on November 28, 2001, December 17, 2001, and January 10, 2002). A letter we received from Cave Creek Ranger District on December 26, 2001, clarified proposed changes in management of the New River allotment, and provided a new draft management plan for the Blackjack and New River allotments. The New River allotment was subsequently removed from this consultation.

The Forest's August 20, 2001, letter to the Service also addressed the utilization limit for herbaceous riparian vegetation . The Forest indicated that the "50 percent or <1/3 plant foliar height" standard was probably no longer correct and should be addressed in the opinion. Discussions with Forest staff (Janet Johnson, Mike Ross, and Patti Fenner, Tonto National Forest, pers. comms. 2001) revealed that based on monitoring data, and to maintain satisfactory riparian condition, a 30 percent (of plant biomass) utilization rate had been implemented for herbaceous riparian vegetation. The riparian herbaceous utilization standard has therefore been changed throughout the document to the 30 percent standard to reflect current management.

In 2000, two lawsuits were filed (Center for Biological Diversity vs. United States Forest Service CIV00-594TUC-JC, CIV00-679TUC-JCC) alleging that the US Forest Service had violated section 7(d) of the Act by authorizing, implementing, managing, and directing certain grazing allotments before completing the required consultations. Specifically on the Tonto National Forest, the lawsuits named 14 allotments lacking current section 7 consultation for loach minnow and/or spikedace critical habitat (Cedar Bench, Deadman, Del Shay, Diamond Butte, Gisela, Greenback, Hardt Creek, Indian Gardens, Seventy-six, Skeleton Ridge, Soldier Camp, Star Valley, Tonto Basin, and Walnut grazing allotments). Among other requests, the plaintiffs requested the agency take the necessary actions to initiate and complete consultation with the Service on the individual allotments to insure that such grazing allotments do not destroy or adversely modify designated critical habitat for the two fishes. In response to this litigation, you produced biological assessments (USDA Forest Service 2001a, USDA Forest Service 2001b) of the effects of the Forest's ongoing grazing on critical habitat of loach minnow (*Tiaroga cobitis*) and spikedace (*Meda fulgida*) on March 12, 2001, and April 2, 2001. For those allotments which were already a part of this consultation (Buzzard Roost, Christopher Mountain/Ellinwood, Deadman Mesa, Devil's Canyon, H-4, Payson/Cross V, Seventy Six, and Star Valley), we incorporated your analysis and address critical habitat on those allotments herein[2].

Guidance criteria issued August 25, 1998, (USDA Forest Service 1998) are used to evaluate effects to listed species resulting from proposed issuance of 10-year (long-term) grazing permits. The Forest utilized these long-term guidance criteria in their analyses referred to above and throughout the document. We used these long-term guidance criteria to evaluate the Forest's analyses and generate this biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The action proposed by the Forest and being analyzed in this biological opinion is the continued grazing of domestic livestock on 20 allotments (Table 1). Roads, prescribed fire, or other range projects are not included in the proposed action. The proposed livestock grazing is for 10 years or until the permit expires. Some of these allotments may have new grazing management alternatives before 10 years, in which case the Forest will reinitiate as needed. The Forest forecasts livestock use through the year 2004 except where the Forest specifically states otherwise. The number of livestock forecast for 2004 will apply until the end of the period, 2012.

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[2]The Service does not consult separately on critical habitat; rather we consult on the species and analyze effects to critical habitat if it occurs in the action area. In this consultation, the Forest produced separate analyses for spikedace and loach minnow critical habitat because critical habitat was designated after the initial biological assessment and evaluation was completed, a side effect of the long time frames associated with such a large opinion. Under more normal circumstances, the action agency would produce only one analysis for the species, which would include effects to critical habitat, if applicable.

The proposed use is the same as the permitted use for most of the allotments. Any future changes to proposed seasons of use, permitted or proposed numbers, permitted or projected Animal Months (AMs), or vegetation utilization will require the Forest Service to analyze the effects of that action. Additional section 7 consultation may be required. Utilization will be monitored and livestock will be moved when use limits are approached.

The proposed action is the continuation of current management, with changes made in various correspondence as outlined in the Consultation History section. Details of proposed grazing management by allotment are found in Tables 2-17 of Appendix A. Stocking rates are determined by dividing the capable acres by the AMs. Soil condition is determined using only the area considered capable range, and does not include "no capability" areas (USDA Forest Service 1999:II-11). If at the end of 10 years some of these allotments have not had a change in management, additional section 7 consultation will probably be needed. Allotments where the Forest determined that the proposed action is not likely to adversely affect listed species must have an annual confirmation that the guidance criteria are still being met (USDA Forest Service 1998). The proposed action includes direction found in the amended Forest Plan (USDA Forest Service 1985, 1996a).

Riparian area management guidance is found in Forest Service Manual 2526 (USDA Forest Service 1983) and Bazan (1998) as modified during consultation. The guidance in its current form includes:

- limit streambank impact to less than 20 percent of alterable bank;
- limit use on herbaceous plants to less than 30 percent of plant species biomass;
- within top third of trees and shrubs less than 6 ft tall, limit use to less than 50 percent of leaders;
- salting should not occur within 0.25 mile of water, riparian areas, stream channels, or projects;
- riparian pastures should not be used as holding facilities, for trailing livestock, or for drought relief. Use should occur in the winter according to the general guidelines; and
- degraded riparian vegetation should be moved toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.

Annual Operating Instructions (AOIs) for all allotments will remain unchanged after any terms and conditions from this biological opinion are included. Any changes in the proposed action and in AOI's or permits will require the Forest to analyze the new proposed action to decide if there are additional effects to listed species not considered in the 1999 BA, BA amendments, and this biological opinion. Changes in the proposed action may require reinitiation of consultation.

Fence and water development construction and maintenance and other physical range projects are not addressed in this consultation to the project level. These projects should be the subject of further section 7 analysis. Future section 7 analysis of range projects should consider the aggregative effects of all range projects in addition to the baseline formed by this consultation. However, because range improvement projects (including the construction and maintenance of some Forest roads, cattle guards, gates, fences, pipelines, tanks, cattle troughs, etc.) are interrelated and interdependent actions, that is they would not occur "but for" the proposed action of a grazing permit, the effects of those improvements are among the effects of the proposed action and must be evaluated herein. We have incorporated into our analysis the general effects of these future actions and will consult on them specifically as they occur.

ENVIRONMENTAL BASELINE - OVERVIEW

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 that are contemporaneous with the consultation process. The environmental baseline defines the status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. This section discusses the baseline of the Forest and the general area containing the 20 allotments.

The effects of livestock management on the landscape are related to numerous factors (Holechek *et al.* 1998). Environmental parameters such as precipitation, temperature regimes, vegetation types, and growing season provide the basics upon which a grazing program is developed (Schmutz 1977). Abiotic factors include soils, climate, geography, and topography. Stocking rates, season of use, utilization levels, class of livestock, and rotation patterns comprise livestock management choices. Grazing utilization levels assigned to the various allotments on the Forest generally range from 30 to 60 percent for uplands. Utilization limits for riparian areas are given in the proposed action. These levels are applied widely across the allotments and often do not account for site-specific range, watershed, or soil conditions. The amended Forest plan established standards and guidelines for grazing activities that are to apply when site-specific information is lacking. When site-specific information is available, the amendment is considered discretionary and the Forest may develop other standards. The Forest attempts to use site-specific information so the standards from the amended plan often do not apply. However, the corollary of having site-specific information is to apply site-specific information in analysis and development of grazing standards. The Southwest Region of the Forest Service was enjoined from applying the amended Forest plan standards and guidelines for utilization in an injunction filed May 24, 2000 (Arizona Cattlegrowers Association; *et al.* v. Towns; *et al.*; CIV 97-1868 PHX RCB). The Forest often applies the maximum utilization limits as provided for within the Forest Plan despite the condition of an individual allotment. For example, a recent environmental assessment for the Greenback allotment proposes expensive fencing, while acknowledging the present poor condition of the allotment and that the proposed action will not allow allotment condition to improve (Terrell 1999). In addition, the issue of site-specific information within the amended Forest Plan can be extended to the need for information on how

grazing practices affect listed species and other resources. The amended Forest plan grazing management standard states that forage use by grazing ungulates will be maintained at or above a condition that assures recovery and continued existence of threatened and endangered species.

Reviews of grazing literature for southwestern habitats support the need to limit levels of utilization (Martin 1973, 1975; Holechek *et al.* 1998; Holechek *et al.* 1999). Martin and Cable (1974), working on the Santa Rita Experimental Range in southern Arizona, found that perennial grass vigor declined when average utilization for a ten-year period exceeded 40 percent. Jerry Holecheck and his colleagues have published several important new papers, and a revision of Holecheck *et al.'s* grazing textbook was published in 1998 (Holecheck *et al.* 1998). Among the important findings in these new papers and the revised textbook are that Chihuahuan desert scrub and semi-desert grasslands can sustain about 40 percent use of annual herbage production. Use in drought years may approach 55-60 percent, while use in wet years may be 20-25 percent. However, routine stocking rates should be conservative, resulting in an average of 30-35 percent use with some destocking in drought years (Holechek *et al.* 1999). Holechek *et al.* (1998) found that the following average utilization rates are appropriate for maintaining range condition: 25-35 percent (desert scrub), and 30-40 percent (semi-desert grassland, pinyon-juniper woodland, mountain shrubland, oak woodland, and coniferous forest). Within these ranges, several factors determine whether a low, medium, or high value should be selected. Holecheck *et al.* (1998) suggest that, on ranges in good condition with relatively flat terrain and good water distribution, the higher utilization limit may be appropriate. If the range is in poor or fair condition, or the allotment has thin soils, rough topography, and poor water distribution, the lower utilization rate may be appropriate. Galt *et al.* (2000) hold the opinion that a 25 percent harvest coefficient is a sound idea for most western rangelands. Because of better ecological condition and forage production, cattle productivity is substantially higher in conservatively stocked pastures than in more intensely grazed scenarios. Holecheck *et al.* (2000) found that short-duration grazing, if stocking rates are conservative or moderate, can facilitate improved management of livestock, and it gives ranchers more control over how specific parts of their ranch are grazed as compared to continuous grazing. However, short-duration, high intensity grazing, as promoted by Allan Savory (1988) and others, has failed in the Southwest.

Reviews of grazing on the Tonto National Forest were published by Croxen (1926) and Alford (1993). Cattle were moved into the area that is now the Tonto Forest after the Civil War and the ranges were fully stocked by 1890. In 1900, an estimated 1.5-2.0 million cattle were on what is now the Tonto Forest; which is more than 50 times the currently permitted stocking rate. Croxen (1926) documents extreme resource degradation at that time. Once resources were depleted, cattle died by the thousands and rangelands were damaged for many years thereafter. Croxen (1926) documented loss of grasslands, invasion of shrubs, gullying, and deterioration of riparian areas. In regard to Tonto Creek and other streams, Croxen (1926) notes: "There were perennial grasses on the mesas along Tonto Creek where only brush grown (sic) at the present time. Mr. Packard (a long time resident) says that Tonto Creek was timbered with the local creek bottom type of timber from bluff to bluff, the water seeped rather than flowed down a series of sloughs, and fish over a foot in length could be caught with little trouble. Today, this same creek bottom is little more than a gravel bar from bluff to bluff. Most of the old trees are gone, some have

been cut for fuel, many others cut down for the cattle during drouths and the winter when the feed was scarce on the range, and many have been washed away during the floods that have rushed down this stream nearly every year since the range started to deplete. The same condition applies to practically every stream of any size on the Tonto." With establishment of the National Forest in 1905, resource management improved, but many years were needed to construct the livestock waters, fences, and other improvements necessary to adequately manage cattle (Alford 1993). Forest planning and increased interest in rangeland improvement in the 1970s initiated a series of changes that have resulted in dramatic improvement of overgrazed rangelands. Nevertheless, a long history of poor management has created long-term changes on the landscape that are still healing. Alford (1993) acknowledged that resource management problems remain, but positive results have been achieved in recent years.

Range condition categories used by the Forest correspond to standard range terms as follows: high = excellent, moderately high = good, moderately low = fair, low = poor to very poor. Range condition measures vegetation similarity to potential natural community. These classifications are further defined by their trend, as downward, static, or upward. Data on range condition and trend on the allotments are presented in Tables 2-17, Appendix A. Condition and trend for many allotments are unknown (USDA Forest Service 1999).

Degraded rangelands are missing plant species that under natural conditions are present, or plant species abundances are altered from natural conditions. The plant species used for determining range condition are those commonly used by livestock[3]. Soil condition is described as the ability of water to infiltrate soil, resistence to erosion, and recycling of nutrients. Condition classes reflect soil disturbance resulting from a management practice and maintenance of soil productivity. Condition classes are defined as follows (USDA Forest Service 1999: Appendix A):

Satisfactory:
Soil condition shows that the inherent productive capacity of the soil resource is being sustained with respect to soil function. Management practices do not reduce soil function. Proper soil function results in the ability of the soil to maintain resource values and sustain outputs.

Impaired:
Soil condition indicates a reduction of the soil's inherent productive capacity with respect to soil function. The ability of the soil to function properly has been reduced. An impaired category should signal land managers that there is a need to evaluate existing management practices, take corrective actions where necessary, and to investigate the ecosystem further to decide the degree and cause in decline in soil function.

Unsatisfactory:
Soil condition indicates that degradation exists. A loss of the soil's inherent productivity capacity has occurred. Soil productivity is not being sustained with respect to soil function. A

[3]See the Society for Range Management's glossary of range management terms (Range Term Glossary Committee 1974).

reduction of soil function results in the inability of the soil to maintain resource values and sustain outputs. Soils rated in the unsatisfactory category are a high priority for land managers to evaluate and change management practices.

Noncapable:
Soils on slopes greater than 40 percent where current soil loss exceeds the rate of soil loss that should occur while sustaining inherent site productivity. These soils are unsuited for cattle use.

Soil condition on the 20 allotments is 48 percent satisfactory, 34 percent impaired, and 19 percent unsatisfactory (Table 18).

The Tonto National Forest contains five Ranger Districts in Gila, Pinal, Maricopa, and Yavapai counties in central Arizona. The Forest covers 2,800,000 acres. There are 104 grazing allotments on the Forest. Of these, nine are closed to livestock grazing or not grazed. Other allotments have been closed temporarily due to drought conditions.

The 20 grazing allotments included in this consultation encompass 574,021 acres. Of this area, 404,265 acres are capable (of being used by livestock). The other 169,756 acres are considered non-capable, generally due to steep or very rocky terrain. Livestock rarely use these areas, although they are usually not fenced off from the rest of the allotment.

The vegetation communities in the 20 allotments are mostly Sonoran Desert scrub, interior chaparral, or pinyon-juniper woodland. There are smaller amounts of pine-oak, ponderosa pine, and various riparian types (USDA Forest Service 1999: Table 2).

Term permit numbers for the 20 allotments are about 4,876 adults and 1,454 yearlings, and 2001 permitted numbers are about 3,095 adults, 150 yearlings, and 6 horses. The term permit stocking rate is about 8.3 acres per AM and 2001 permitted stocking rate was about 15.0 acres per AM. Yearlings are counted as 0.6 AUMs and horses 0.5 AUMs for determining stocking rates.

EFFECTS OF THE ACTION - OVERVIEW

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

A large body of research and literature exists on the effects of livestock grazing, positive, negative, or neutral, on numerous ecosystems and can be found in several bibliographies (Ffolliott *et al.* no date, Willoughby 1997, Southwest Center for Biological Diversity 1995, 1999, Burgess 1999, Forest Guardians 1999). The following section identifies some general effects that livestock grazing has on ecosystems, habitat types, and species groups. Livestock grazing effects to specific species will be discussed in the sections to follow.

The extensive and intensive effects of livestock grazing on soil and vegetation have been documented often. All grazing, including that of domestic livestock, can alter vegetation composition, structure, and biomass; cause soil erosion and compaction, reduce water infiltration rates, and increase runoff (Klemmedson 1956, Ellison 1960, Arndt 1966, Gifford and Hawkins 1978, Webb and Stielstra 1979, Guthery *et al.* 1990, Orodho *et al.* 1990, Belsky *et al*. 1999, Jones 2000). Livestock grazing effects to native southwestern fishes and their habitats have been long recognized (Chamberlain 1904, Miller 1961, Hendrickson and Minckley 1984, Minckley *et al.* 1991).

Direct Effects

The main direct effects from cattle are the grazing of plants and trampling of vegetation and soils (Marlow and Pogacnik 1985). These impacts can affect both riparian zones and uplands. Grazing can also affect vegetation communities and ecosystem functioning (Shreve 1931, Niering *et al.* 1963, Abouholder 1992). Physical damage to Arizona hedgehog cactus from livestock has been noted (USDA Forest Service 1996).

Livestock may directly affect fish through trampling (Roberts and White 1992) or ingestion of adults, larvae, or eggs. Trampling of adult fish is probably rare, except in localized situations, or with smaller fish such as Gila topminnow. Livestock waste is potentially poisonous to some fish (Cross 1971, Taylor *et al.* 1991).

Indirect Effects

Livestock grazing alters the species composition of communities, disrupts ecosystem functioning, and alters ecosystem structure (Fleischner 1994, Belsky *et al.* 1999, Jones 2000). 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 growth in some plants (Ellison 1960), because removal of plant material containing carbohydrate reserves may increase photosynthetic activity to replace the lost material (Humphrey 1958). A review of the effects of herbivory on grazed plants conducted by Belsky (1986) found little evidence to show that grazing benefits plants ecologically. Other authors, including Ellison (1960), have reached the same conclusion (Jameson 1963, Silvertown 1982). However, Holechek (2001) conducted a review of grazing studies and found that "there is strong scientific evidence that managed grazing plays a critical role in maintaining and improving rangelands in arid and semi-arid regions for a variety of uses and ecosystem services" such as maintaining a higher diversity of wildlife species. Holecheck qualified this statement by saying that the beneficial effects of grazing were most likely to occur under light to conservative grazing intensities, and that moderate grazing of 50 percent utilization of forage would result in deterioration in semi-arid grasslands, desert and coniferous forest rangelands. Light to conservative grazing intensities corresponded to an average of 32 percent utilization (for 25 studies) and conservative grazing is considered to be pasture-wide average use of 35 percent utilization (Holechek 2001).

Grazing can alter the availability of prey for certain predators by removing herbaceous vegetation which serves as food and cover for small mammals (Ward and Block 1995). Grazing can also alter fire regimes, which may have positive or negative effects to listed species, but is generally deleterious to ecosystem functioning (Bahre 1991).

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

Impacts to vegetation and litter from livestock grazing can affect watershed condition and function (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989a, Belnap 1992, Belsky and Blumenthal 1997). Heavy grazing effects are well known and can be severe (Guthery *et al.* 1990, Platts 1990). Conflicting information exists about the effects of more moderate grazing schemes (Gifford and Hawkins 1978, Blackburn 1984). Studies by Dadkhah and Gifford (1980) in the western United States show trampling by livestock causes a decline in infiltration rates, but despite trampling, sediment yields remain uniform after grass cover reaches 50 percent. Holechek (2001) conducted a review of grazing studies and found that "there is strong scientific evidence that managed grazing plays a critical role in maintaining and improving rangelands in arid and semi-arid regions for a variety of uses and ecosystem services" such as maintaining a higher diversity of wildlife species. Holecheck qualified this statement by saying that the beneficial effects of grazing were most likely to occur under light to conservative grazing intensities, and that moderate grazing of 50 percent utilization of forage would result in deterioration in semi-arid grasslands, desert and coniferous forest rangelands. Light to conservative grazing intensities corresponded to an average of 32 percent utilization (for 25 studies) and conservative grazing is largely considered to be pasture-wide average use of 35 percent utilization (Holechek 2001).

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

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

Livestock grazing in riparian areas can cause changes in plant species composition (Ryder 1980, Schulz and Leininger 1991, Stromberg 1993a), reduce structural complexity (Ohmart and Anderson 1986), reduce understory, and replace native species with nonnative species (Krueper 1995). Greater soil erosion and compaction, changed flooding regimes, and decreased water quality also result from livestock presence in riparian areas (Lusby *et al.* 1971, Lusby 1979, DeBano and Schmidt 1989b, Szaro 1989, Armour *et al.* 1991, Platts 1991, Fleischner 1994). Cattle disrupt streambanks through chiseling, sloughing, compaction, and collapse. This in turn can lead to wider and shallower stream channels (Armour 1977, Platts and Nelson 1985a, Platts 1990, Meehan 1991). These changes in channel morphology will affect fish habitat elements (Bovee 1982, Rosgen 1994). Livestock damage to riparian and aquatic zones occurs shortly after livestock entry into the area and occurs at all levels of use (Marlow and Pogacnik 1985, Platts and Nelson 1985b, Goodman *et al.* 1989). Even after rest, the recovery of streambanks and vegetation may be halted or lost soon after cattle return (Duff 1979, Platts and Nelson 1985b). Degradation of aquatic habitat is also a factor in the invasion and establishment of non-native aquatic species (Courtenay and Stauffer 1984, Arthington *et al.* 1990, Soule 1990, Aquatic Nuisance Species Task Force 1994).

A commonly acknowledged impact of livestock grazing is increased sediment production and transport (Platts 1990, Johnson 1992, Weltz and Wood 1994). Negative impacts of sediment to fish and fish habitat is well documented (Newcombe and MacDonald 1991, Barrett 1992, Megahan *et al.* 1992). Gila topminnow and Yaqui chub are not especially sensitive to sediment loads. However, excess sediment may cause the change or loss of habitat used by fish. Excess sediment can also smother invertebrates, reducing production and availability of fish food. Smaller aquatic habitats can be lost entirely by filling with sediment. Livestock grazing has also been shown to increase nutrients in streams (Kaufman and Krueger 1984).

Rinne (1999) points out the problems associated with many of the studies that show the possible impacts of livestock grazing to riparian and aquatic habitats and fishes. However, these studies represent the best available information on the subject.

Interrelated and Interdependent Effects

Following 50 CFR 402.14(g), the Service is required to consider all effects of the proposed action, which refer to "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02). The Service's Section 7 Handbook provides further guidance on the definition of "interrelated and interdependent actions" by establishing the following rule: Determining if an action is interrelated or interdependent depends on the "but for" test. Ask whether the Federal, State, or private activity could occur "but for" the proposed action.

As discussed previously, range improvements (e.g. construction and maintenance of some Forest roads, cattle guards, gates, fences, corrals, pipelines, tanks, cattle troughs, etc.) are not part of the proposed action. However, because range improvement projects are interrelated and interdependent actions, that is they would not occur "but for" the proposed action of a grazing permit, we consider them a part of the proposed action.

Construction, operation, and maintenance of range improvement projects can have a variety of effects on listed species and their habitats. These effects include direct effects resulting from construction activities and indirect effects as these projects affect cattle distribution and use. For instance, fence or pipeline construction create linear strips of disturbance, which may cross streams or other sensitive areas. Soils and vegetation may be disturbed, listed animals in the area could be disturbed, and listed plants could be crushed or excavated. Once in place, fences, waters, and corrals are likely to influence the distribution and use patterns of cattle. They are typically built to improve distribution, so that utilization levels may decrease in some areas, but use is also likely to increase in others, with varying effects to species. If roads are built or maintained wholly or in part for grazing operations, they may facilitate public access into areas, with subsequent increases in off-highway vehicle use, human-caused fire frequency, trash dumping, and related problems. More permanent cattle waters are sometimes stocked illegally with game or bait fish, and crayfish and bullfrogs can colonize or be introduced to such waters. If these species then spread to habitats of native listed fishes, they will prey on and alter the habitats of those fishes.

Range improvement projects should be the subject of further section 7 analysis. Future section 7 analysis of range projects should consider the aggregative effects of all range projects in addition to the baseline formed by this consultation.

In some cases, grazing that occurs on private or State inholdings in or adjacent to the allotments in consultation, may be interrelated or interdependent to the proposed action, and thus the effects of grazing those lands are among the effects of the proposed action. Examples would include small parcels that are grazed in conjunction with the Federal allotment and no fences are in place between the Federal and non-Federal parcels. In such a case, if the Federal lands were not grazed, grazing on the smaller, non-Federal parcel might not be feasible, and thus would not occur, but for, the Federal action. Effects of grazing these private or State parcels within or adjacent to the allotments are similar to the effects described in the effects sections for each species addressed herein.

SCOPE OF THE CONSULTATION

This consultation was to initially cover the effects of the ongoing livestock grazing program on 25 allotments on the Forest. The consultation now covers 20 allotments after the numerous changes made to the proposed action (see Consultation History). The proposed action is set by term grazing permits, and is further defined by Annual Operating Plans/Instructions. The time-frame of the proposed action varies by allotment and is up to 10 years. We assumed the life of the proposed action was 10 years unless specified otherwise by the Forest. Tonto National Forest

has an obligation under section 7(a)(2) of the Act and 50 CFR 402.14(a) to review all of its actions to decide if they may affect a listed species or critical habitat. If the Forest Service determines an action may affect or a listed species or designated critical habitat, they must consult with the Service if the effects of the action have not undergone consultation.

LOACH MINNOW *(Tiarogа cobitis*)

Status of the Species

The loach minnow was listed in 1986 as threatened (US Fish and Wildlife Service 1986a) without critical habitat. The loach minnow recovery plan was approved in 1991 (US Fish and Wildlife Service 1990a). Critical habitat was designated in 1994 (US Fish and Wildlife Service 1994a), but was set aside by the New Mexico District Court (Coalition of Arizona-New Mexico Counties for Stable Economic Growth vs. U.S. Fish and Wildlife Service, No. 95-1285-M Civil D.N.M., filed 4 March 1997), and then revoked by the Service (US Fish and Wildlife Service 1998b). Critical habitat was redesignated on April 25, 2000 (US Fish and Wildlife Service 2000a).

The loach minnow is endemic to the Gila River basin of Arizona and New Mexico, and Sonora, Mexico. Historic range included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila rivers (Minckley 1973, Sublette *et al.* 1990). It is believed to be extirpated from Mexico. Competition and predation by non-native fish and habitat destruction have reduced the historic range of the loach minnow by nearly 85 percent (Miller 1961; Williams *et al.* 1985; Marsh *et al.* 1989; US Fish and Wildlife Service 1986a, 1994b). Present populations are geographically isolated and inhabit the upstream ends of their historic range.

In Arizona, the loach minnow is generally rare to uncommon where it is found: Aravaipa Creek (Pinal and Graham Counties), limited reaches of the White River (Gila County) and the North and East Forks of the White River (Navajo County), the Three Forks area of the Black River, throughout the Blue River, Campbell Blue Creek, sporadic in Eagle Creek, and in the San Francisco River between Clifton and the New Mexico border (Greenlee County)(Marsh *et al.* 1990, Velasco 1994, Bagley *et al.* 1995, Bagley *et al.* 1996). In New Mexico, the loach minnow has become very rare in substantial portions of its remaining range. The species still occurs in the upper Gila River, including the East, Middle, and West Forks, the San Francisco and Tularosa rivers, and Dry Blue Creek. Life history information can be found in the recovery plan (US Fish and Wildlife Service 1990a), listing documents (US Fish and Wildlife Service 1986a), and other references cited there.

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 current 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.

No known occupied habitat occurs on the Forest. Historic range includes the Verde and Salt rivers (US Fish and Wildlife Service 1990a). Potential habitat on the Forest includes Salt River, Verde River, Tonto Creek, Fossil Creek, and Sycamore Creek (USDA Forest Service 1999). The existing loach minnow population in the Black River is upstream of the Forest, on the White Mountain Apache Reservation and Apache-Sitgreaves National Forest. Loach minnow were released into Seven Springs Wash in 1970, but did not persist. Critical habitat has been designated on the Forest on parts of Tonto, Gun, and Rye creeks. A very small portion of the Forest is in the watershed of the middle Gila River, which is also critical habitat (US Fish and Wildlife Service 2000a).

All of the potential habitat on the Forest is suboptimal for loach minnow because of physical habitat degradation and the presence of non-native fish. Degraded aquatic habitat is a major factor in the establishment and domination by non-native fish species of a fish community (Courtenay and Stauffer 1984, Arthington *et al.* 1990, Soule 1990, Aquatic Nuisance Species Task Force 1994, Moyle and Light 1996).

The proposed reauthorization of livestock grazing permits on National Forest System Lands includes major areas of the Forest, including the lower Verde River (below Bartlett Dam), lower Tonto Creek (below Gisela), Salt River (above Roosevelt Lake), and tributaries and upland watersheds. The historic and current condition of these areas establishes the baseline for evaluating effects to the loach minnow from the proposed livestock management on a landscape as well as individual allotment basis. Of the 20 allotments included in the proposed action, three are specifically considered here. The Forest had determined that the proposed management of three allotments were likely to adversely affect the loach minnow: the Seventy Six, Star Valley, and Sunflower allotments. The Forest determined the proposed action on two allotments, Deadman Mesa and H-4, may affect, but were not likely adversely affect, the loach minnow, and two allotments, Buzzard Roost and Payson/Cross V, were determined not likely to adversely affect critical habitat (interpreted here as not likely to affect the species; see Appendix B). Many of the remaining allotments, especially those in the Tonto Creek and Salt River watersheds, have contributed to the current habitat degradation and depressed status of the loach minnow in these areas, and provide data to establish the baseline conditions.

Livestock grazing has damaged about 80 percent of stream and riparian ecosystems in the western United States (US Bureau of Land Management 1994). Livestock grazing affects watershed hydrology, stream channel morphology, soils, vegetation, wildlife, fish and other riparian-dependent species, and water quality at both local and landscape scales. Although these areas are only 0.5 to 1.0 percent of the overall landscape, a disproportionately large percentage of all desert, shrub, and grassland plants and animals depend on them (US General Accounting Office 1988, Chaney *et al.* 1990, Ohmart 1996). The large-scale introduction of livestock 100 to 200 years ago caused a disturbance with many ripple effects. Livestock seek out water, succulent forage, and shade in riparian areas leading to trampling of streambanks, overgrazing of riparian vegetation, soil erosion, loss of streambank stability, declining water quality, and drier, hotter

conditions (Belsky *et al.* 1999). These changes have reduced habitat for riparian plant species, fish, and wildlife, thereby causing many native species to decline. Such modifications can lead to large-scale changes in adjacent and downstream ecosystems (Belsky *et al.* 1999).

One of the most significant adverse impacts within western riparian systems has been the perpetuation of improper grazing practices (Hastings and Turner 1965, Ames 1977, Glinski 1977, Marlow and Pogacnik 1985). Chaney *et al.* (1990) noted that initial deterioration of western riparian systems began with severe overgrazing in the late nineteenth century. For the last 75 years, the Forest has acknowledged the continued damage cattle have done to riparian areas, upland tributaries, and ranges.

The effects of both past and ongoing grazing activities on the forest have had a profound effect on Tonto Creek and its associated riparian habitat (Ganda 1999). Similarly, other watersheds on the Tonto, such as the Salt and Verde rivers, have been impacted by grazing, and there has been little improvement to the overall Salt, Tonto, and Verde watersheds under modern range management (GAO 1988, Alford 1993). Recreation, development, and dams have also affected the riparian habitat of the loach minnow (US Fish and Wildlife Service 2000a). These effects are evident by the poor soil and riparian conditions reported, over-utilization of riparian areas, increase in frequency and size of flood events, and ultimately, the absence of loach minnow throughout miles of streams on the Forest. The habitat that does develop is hindered in its quality by the direct and indirect effects of cattle grazing to the watershed. Habitat that persists, in spite of grazing, is in danger of being further altered by increased flood flows, sedimentation, and altered stream morphology. By not allowing riparian vegetation to develop, there is no rehabilitation of stream banks or prevention of erosion. As a result, the conditions of these streams are in a perpetual state of decay (see references in previous paragraph).

Tonto Creek and Rye Creek have potential loach minnow habitat and designated critical habitat (US Fish and Wildlife Service 2000a). The Seventy Six allotment contains or is next to 8.0 miles of Tonto Creek and 0.5 miles of Rye Creek (USDA Forest Service 2001b). The Star Valley allotment contains 9.5 miles of critical habitat on Tonto Creek (USDA Forest Service 2001b). The poor condition of Tonto Creek is well known (Ganda, 1999), though the BA does not provide riparian condition for much of the creek. Tonto Creek on the Seventy Six allotment was recently reported as unsatisfactory for riparian and watershed condition (USDA Forest Service 2001a), although recent fencing and exclusion of cattle from the creek on the allotment will probably improve condition in the future.

Sycamore Creek has about 4 miles of potential loach minnow habitat on the Sunflower allotment, Dos S unit. The riparian condition of Sycamore Creek is unsatisfactory as is the soil condition of the allotment. This reach of Sycamore Creek was previously grazed by livestock yearlong.

Effects of the Action

The determination of adverse effect for the Sunflower and Seventy Six allotments was based on the presence of critical habitat (Tonto Creek), potential habitat (Sycamore Creek), and unsatisfactory watershed condition. Tonto Creek has been fenced and excluded from livestock within the Seventy Six allotment. Although this is only a small portion of the Tonto Creek

watershed, fencing and exclusion will obviously benefit riparian condition within the Seventy Six allotment. Fencing and excluding cattle from Tonto Creek on the Seventy Six allotment will protect riparian vegetation and allow it to regenerate. This in turn will promote the development of streambanks and improve stream morphology. These benefits will significantly reduce the effects of grazing in the Seventy Six allotment on loach minnow.

The Forest conducted a separate analysis of the effects of on-going grazing on spikedace and loach minnow critical habitat in 2001 (USDA Forest Service 2001a, USDA Forest Service 2001b). The Forest used guidance criteria, which were concurred with by the Service, to determine effects to critical habitat. That analysis identified only the Star Valley allotment as having adverse affects to loach minnow critical habitat. We must however also consider adverse affects to the critical habitat on the Seventy Six allotment as well because of the Forest determination that the action is likely to adversely affect the species and the occurrence of critical habitat on that allotment. The Star Valley allotment contains 9.5 miles of loach minnow critical habitat on Tonto Creek. The Seventy Six allotment contains 8.0 miles of critical habitat on Tonto Creek and 0.5 miles of critical habitat on Rye Creek.

According to the guidance criteria, several factors must be met to conclude grazing is not likely to adversely affect loach minnow critical habitat (USDA Forest Service 1998). These are:

1. Livestock are permitted on the allotment within the watershed that contains critical habitat, and;

2. Livestock do not have direct access to critical habitat, perennial streams, or perennial interrupted streams within the allotment, and;

3. Based on data collected within the last 10 years, upland areas subject to livestock grazing have watershed conditions that are "satisfactory," with either a stable or upward trend in indicators of soil and vegetative conditions using accepted Forest Service methodologies, and;

4. Based on recent data using accepted Forest Service evaluation methods, aquatic and riparian conditions, including constituent elements of critical habitat, in the watershed are in satisfactory condition and improving, and;

5. Appropriate methods of monitoring aquatic and riparian conditions, including constituent elements of critical habitat, are in place.

The Forest determined that grazing on the Star Vally allotment was likely to adversely affect critical habitat because not all of the guidance criteria were met, largely due to the unsatisfactory condition of soils on the allotment. Livestock do not have direct access to critical habitat in Tonto Creek on Star Valley allotment due to steep bluffs. However, the soils on the Star Valley allotment are largely in unsatisfactory condition (49 percent satisfactory). Riparian conditions are not rated, but utilization limits for upland and riparian vegetation and streambank alteration are in place. Compliance monitoring will be done, although methods minimally address constituent elements of loach minnow critical habitat.

Grazing by livestock has been a main use within these watersheds for more than 100 years, with substantial alteration of watershed vegetation, soil, erosion, and hydrologic characteristics. Water development and inter-basin water transfers have altered the volume and timing of flows. In addition, residential and ranch operations, groundwater pumping, irrigated croplands, and roads impact the streams (USDA Forest Service 1999).

The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland and watershed effects, have been well documented and discussed (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994, Belsky *et al.* 1999). Livestock grazing activities in the uplands can contribute to changes in surface runoff quantity and intensity, sediment transport, soil chemistry, and infiltration and water holding capabilities of the watershed; flood flows may increase in volume while decreasing in duration, and low flows may decrease in volume and increase in duration (Brown *et al.* 1974, Gifford and Hawkins 1978, Johnson 1992). Reduced herbaceous vegetation leads to accelerated soil loss due to increased exposure of soils to precipitation events and reduced sediment filtering capabilities of the vegetation (Erman *et al.* 1977, Mahoney and Erman 1981, Osborne and Kovacic 1993). Hoof action can cause loss of cryptobiotic soil crusts, soil compaction, erosion, and gullying (Klemmedson 1956, Ellison 1960, Arndt 1966, Gifford and Hawkins 1978, Webb and Stielstra 1979, Harper and Marble 1988, Marrs *et al.* 1989, Orodho *et al.* 1990, Schlesinger *et al.* 1990, Bahre 1991, McClaran and Anable 1992). Litter is reduced by trampling and churning into the soil thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). Overuse of vegetation by livestock can cause changes to plant root structures, and alter plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio *et al.* 1994). These conditions may increase sediment delivery into the stream (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994), change the way in which flood flows interact with the stream channel, and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation.

Human-caused impacts and episodic high flow events have altered hydrologic conditions within the watersheds. Destabilization of stream channels has exacerbated flood damage with loss of riparian vegetation, unstable streambanks, and a wide floodplain and channel. Besides habitat alterations, non-native aquatic species have been introduced and have adversely affected native fishes through predation and competition.

Changes in streamflow and hydrologic cycles have caused reductions in the presence of riparian vegetation. The rarity in some streams of native fish shows the existing habitat degradation and increased presence of detrimental non-native species. Any actions that contribute to further degradation of the habitat are cumulative to this existing environmental baseline and are therefore of greater consequence to these species.

Sediment deposition may eliminate the under-cobble pockets needed by loach minnow, making potential habitat unsuitable. Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy *et al.* 1981, Wood *et al.* 1990, Newcombe and

MacDonald 1991, Barrett 1992, Megahan *et al.* 1992, Waters 1995, Newcombe and Jensen 1996). Excessive sediment may smother invertebrates, reducing fish food production and availability. Excessive sediment buries gravel, cobble, and coarse sand substrates. Loach minnow and their eggs are particularly vulnerable to substrate sedimentation that reduces available habitat and smothers eggs (Propst *et al.* 1988).

The short lifespan of the loach minnow, coupled with the relatively low fecundity of the species, make it vulnerable to serious adverse effects from activities that may only impact the species' habitat for relatively short times, especially during the spawning season. Any situation that eliminated or greatly reduced a year-class would severely deplete recruitment to a population. For example, excessive sedimentation during the spawning season might suffocate a large portion of that year's reproductive effort. In the succeeding year, total reproductive effort would be diminished. The net effect would be a major reduction in population size (Propst *et al.* 1988).

Loach minnow are adversely affected by activities that contribute to altering the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, despite season, but increase as number of livestock and length of time the cattle are present increases (Marlow and Pogacnik 1985). The way in which the effects of livestock grazing are manifested and the size of the effects in the watershed, is dependent on local site conditions. Range condition, considered with soil, watershed, and riparian condition, is assumed to be closely correlated with ecological condition and function.

Cumulative Effects

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

The Tonto Creek and Sycamore Creek watersheds have private lands within or next to the National Forest. Ongoing activities occurring on these private lands that would be cumulative to the proposed action include residential use, recreational use, roads, livestock grazing, and irrigated cropping. No data are available at this time to estimate the level of impacts from those activities on these streams and their fish. However, these activities probably contribute to the degraded condition of these watersheds and fish habitat.

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

Conclusion

After reviewing the status of the loach minnow, the environmental baseline for the project, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the ongoing grazing activities on the Seventy Six, Sunflower, and Star Valley allotments are not likely to jeopardize the continued existence of the loach minnow. This is because loach minnow does not presently occur in the area, no releases of loach minnow are planned, and livestock are excluded from Tonto and Rye Creeks.

The proposed action is not likely to destroy or adversely modify designated critical habitat for the loach minnow on the Seventy Six, Sunflower, or Star Valley allotments. This is based on the exclusion of livestock from Tonto and Rye creeks, and absence of critical habitat in the Star Valley allotment.

INCIDENTAL TAKE STATEMENT

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

The Service does not anticipate any incidental take of loach minnow resulting from this proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal Agencies to use their authorities to further the purposes of the Act 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 habitats, to help implement recovery plans, or to develop information.

1. Reestablish loach minnow into suitable streams on the Forest in cooperation with the Service and the Arizona Game and Fish Department (AGFD)(Recovery plan task 6, US Fish and Wildlife Service 1990a).

2. Implement other parts of the loach minnow recovery plan as appropriate.

3. Manage designated critical habitat on the Forest so that the constituent elements are maintained, or are encouraged to develop.

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 implementation of any conservation actions.

SPIKEDACE *(Meda fulgid*a)

Status of the Species

Spikedace was listed in 1986 as threatened (US Fish and Wildlife Service 1986b) without critical habitat. Critical habitat was subsequently designated (US Fish and Wildlife Service 1994b), then set aside by the New Mexico District Court (Coalition of Arizona-New Mexico Counties for Stable Economic Growth vs. U.S. Fish and Wildlife Service, No. 95-1285-M Civil D.N.M., filed March 4, 1997) and revoked by the Service (US Fish and Wildlife Service 1998b). Critical habitat was redesignated on April 25, 2000 (US Fish and Wildlife Service 2000a). The spikedace recovery plan was approved in 1991 (US Fish and Wildlife Service 1991a).

Spikedace is endemic to the Gila River system of Arizona, New Mexico, and Sonora, Mexico. Habitat destruction, and competition and predation from introduced non-native fish species are the primary causes of the species decline (Miller 1961, US Fish and Wildlife Service 1991a). Its distribution was formerly widespread in large and moderate-sized rivers and streams of mid-elevation within the Gila River drainage, including the Gila, Salt, and Verde rivers and their major tributaries upstream of the Phoenix metropolitan area, and the Agua Fria, San Pedro, and San Francisco river systems. In Arizona, spikedace now occurs only in Aravaipa Creek, Eagle Creek, the upper Verde River, and the mainstem Gila River in Pinal County; in New Mexico, it is now restricted to the mainstem Gila River and its East, Middle, and West forks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Barrett *et al.* 1985, Bestgen 1985, Marsh *et al.* 1990, Sublette *et al.* 1990, Jakle 1992). Life history information can be found in the recovery plan (US Fish and Wildlife Service 1991a) and in the references cited there.

The effects of historic and present perturbations in the Gila River basin have resulted in fragmentation of spikedace range and isolation of remnant spikedace populations. Recent taxonomic and genetic work on spikedace show there are substantial differences in morphology and genetic makeup among remnant spikedace populations. Anderson and Hendrickson (1994) found that spikedace from the Verde River are morphologically distinguishable from all other spikedace populations, being the most distinct from the spikedace in Aravaipa Creek, while spikedace from the upper Gila River and Eagle Creek populations have intermediate measurements. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992).

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 current 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.

No known occupied habitat occurs on the Forest. Historic range included the Verde and Salt rivers and Tonto Creek (US Fish and Wildlife Service 1991a). The existing spikedace population in the Verde River is upstream of the Forest, above Cottonwood. Potential habitat on the Forest includes Cave, Lime, Fossil, Sycamore, Tonto, Gun and Rye Creeks (USDA Forest Service 1999). Spikedace were released into Seven Springs Wash in 1970, but did not persist. Critical habitat has been designated on the Forest on parts of Tonto, Gun, and Rye creeks. A very small portion of the Forest is in the watershed of the middle Gila River, which is also critical habitat (US Fish and Wildlife Service 2000a).

All of the potential habitat (including critical habitat) on the Forest is suboptimal for spikedace because of physical habitat degradation and the presence of non-native fish. Degraded aquatic habitat is a major factor in the establishment and domination by non-native fish species of a fish community (Courtenay and Stauffer 1984, Arthington *et al.* 1990, Soule 1990, Aquatic Nuisance Species Task Force 1994, Moyle and Light 1996).

The proposed reauthorization of livestock grazing permits on National Forest System Lands includes major areas of the Forest, including the lower Verde River (below Bartlett Dam), lower Tonto Creek (below Gisela), Salt River (above Roosevelt Lake), and tributaries and upland watersheds. The historic and current condition of these areas establishes the baseline for evaluating effects to the spikedace from the proposed livestock management on a landscape as well as individual allotment basis. Of the 20 allotments included in the proposed action, three are specifically considered here. The Forest had determined that the proposed management of three allotments may likely adversely affect the spikedace or its critical habitat: the Seventy Six, Star Valley, and Bronco allotments. The Forest determined that proposed management on two allotments, Deadman Mesa and H-4, may affect but are not likely adversely affect the loach minnow, and two allotments, Buzzard Roost and Payson/Cross V, may affect but are not likely to adversely affect critical habitat (see Appendix B). Many of the remaining allotments, especially those in the Tonto Creek and Salt River watersheds, have contributed to the current habitat degradation and depressed status of the loach minnow in these areas, and provide data to establish the baseline conditions.

The effects of both past and ongoing grazing activities on the forest have had a profound effect on Tonto Creek and associated riparian habitat (Ganda 1999). Similarly, other watersheds on the Tonto, such as the Salt and Verde rivers, have been impacted by grazing, and there has been little

improvement to the overall Salt, Tonto, and Verde watersheds under modern range management (GAO 1988, Alford 1993). Recreation, development, and dams have also affected the riparian habitat of the spikedace (US Fish and Wildlife Service 2000a). These effects are evident by the poor soil and riparian conditions reported, over-utilization of riparian areas, increase in frequency and size of flood events, and ultimately, the absence of spikedace throughout miles of streams on the Forest. The habitat that does develop is hindered in its quality by the direct and indirect effects of cattle grazing to the watershed. Habitat that persists, in spite of grazing, is in danger of being further altered by increased flood flows, sedimentation, and altered stream morphology. By not allowing riparian vegetation to develop, there is no rehabilitation of stream banks or prevention of erosion. As a result, the conditions of these streams are in a perpetual state of decay (see references in previous paragraph).

Portions of Tonto Creek and Rye Creek are designated as critical habitat (US Fish and Wildlife Service 2000a). The Seventy Six allotment contains or is next to 8.0 miles of Tonto Creek and 0.5 miles of Rye Creek (USDA Forest Service 2001b). The Star Valley allotment contains 9.5 miles of critical habitat on Tonto Creek (USDA Forest Service 2001b). The poor condition of Tonto Creek is well known (Ganda 1999), though the BA does not give the riparian condition for much of the creek. Tonto Creek on the Seventy Six allotment was recently reported as unsatisfactory for riparian and watershed condition (USDA Forest Service 2001a), although recent fencing and exclusion of cattle from the creek on the allotment will probably improve condition in the future.

Cave Creek has about 1 mile of potential spikedace habitat on the Bronco allotment. The riparian condition of Cave Creek is unsatisfactory and the soil condition of the allotment is satisfactory (USDA Forest Service 1999).

Effects of the Action

The determination of adverse effect to spikedace for the Bronco and Seventy Six allotments was based on the presence of potential habitat and unsatisfactory watershed condition. Potential habitat on the these allotments includes Cave Creek, Tonto Creek, and Rye Creek (USDA Forest Service 1999, 2000). The Forest conducted a separate analysis of the effects of on-going grazing on spikedace and loach minnow critical habitat in 2001 (USDA Forest Service 2001a, USDA Forest Service 2001b). The Forest used guidance criteria, which were concurred with by the Service, to determine effects to critical habitat. That analysis identified only the Star Valley allotment as having adverse affects to spikedace critical habitat. We must however also consider adverse effects to the critical habitat on the Seventy Six allotment as well because of the Forest's determination that the action is likely to adversely affect the species, and the occurrence of critical habitat on that allotment. The Star Valley allotment contains 9.5 miles of spikedace critical habitat on Tonto Creek. The Seventy Six allotment contains 8.0 miles of critical habitat on Tonto Creek and 0.5 mile of critical habitat on Rye Creek.

According to the guidance criteria, several factors must be met to conclude grazing is not likely to adversely affect loach minnow critical habitat. These are:

1. Livestock are permitted on the allotment within the watershed that contains critical habitat, and;

2. Livestock do not have direct access to critical habitat, perennial streams, or perennial interrupted streams within the allotment, and;

3. Based on data collected within the last 10 years, upland areas subject to livestock grazing have watershed conditions that are "satisfactory," with either a stable or upward trend in indicators of soil and vegetation conditions using accepted Forest Service methodologies, and;

4. Based on recent data using accepted Forest Service evaluation methods, aquatic and riparian conditions, including constituent elements of critical habitat, in the watershed are in satisfactory condition and improving, and;

5. Appropriate methods of monitoring aquatic and riparian conditions, including constituent elements of critical habitat, are in place.

The Forest determined that grazing on the Star Valley allotment was likely to adversely affect critical habitat because not all of the guidance criteria were met for a determination that grazing was not likely to adversely affect the spikedace, largely due to the unsatisfactory condition of soils on the allotment. Livestock do not have direct access to critical habitat in Tonto Creek due to steep bluffs. The soils on the Star Valley allotment are largely in unsatisfactory condition (49 percent satisfactory). Riparian conditions are not rated, but utilization limits for upland and riparian vegetation and streambank alteration are in place. Compliance monitoring will be done, although methods minimally address constituent elements of spikedace critical habitat.

Grazing by livestock has been a main use within the watersheds for more than 100 years (Alford 1993), with substantial alteration of watershed vegetation, soil, erosion, and hydrologic characteristics. Water development and inter-basin water transfers have altered the volume and timing of flows. In addition, residential and ranch operations, groundwater pumping, recreation, irrigated croplands, and roads impact the streams (USDA Forest Service 1999).

The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland and watershed effects, have been well documented and discussed (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994). Livestock grazing activities in the uplands can contribute to changes in surface runoff quantity and intensity, sediment transport, soil chemistry, and infiltration and water holding capabilities of the watershed; flood flows may increase in volume while decreasing in duration, and low flows may decrease in volume and increase in duration (Brown *et al.* 1974, Gifford and Hawkins 1978, Johnson 1992). Reduced herbaceous vegetation leads to accelerated soil loss due to increased exposure of soils to

precipitation events and reduced sediment filtering capabilities of the vegetation (Erman *et al.* 1977, Mahoney and Erman 1981, Osborne and Kovacic 1993). Hoof action can cause loss of cryptobiotic soil crusts, soil compaction, erosion, and gullying (Klemmedson 1956, Ellison 1960, Arndt 1966, Gifford and Hawkins 1978, Webb and Stielstra 1979, Harper and Marble 1988, Marrs *et al.* 1989, Orodho *et al.* 1990, Schlesinger *et al.* 1990, Bahre 1991, McClaran and Anable 1992). Litter is reduced by trampling and churning into the soil thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). Overuse of vegetation by livestock can cause changes to plant root structures, and alter plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio *et al.* 1994). These conditions may increase sediment delivery into the stream (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994), change the way in which flood flows interact with the stream channel, and exacerbate flood damage to banks, channel bottoms, and riparian vegetation.

Human-caused impacts and episodic high flow events have altered hydrologic conditions within the watersheds. Destabilization of stream channels has exacerbated flood damage with loss of riparian vegetation, unstable streambanks, and a wide floodplain and channel. Besides habitat alterations, non-native aquatic species have been introduced and have adversely affected native fishes through predation and competition.

Changes in streamflow and hydrologic cycles have caused reductions in the presence of riparian vegetation. The rarity in some streams of native fish shows the existing habitat degradation and increased presence of detrimental non-native species. Any actions that contribute to further degradation of the habitat are cumulative to this existing environmental baseline and are therefore of greater consequence to these species.

Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy *et al.* 1981, Wood *et al.* 1990, Newcombe and MacDonald 1991, Barrett 1992, Megahan *et al.* 1992, Waters 1995, Newcombe and Jensen 1996). Excessive sediment may smother invertebrates, reducing fish food production and availability.

Indirect effects from modification of the watershed, stream channel, streambanks, and riparian zone result in short and long-term adverse effects to spikedace. The physical damage caused by livestock to streambanks and stream channels often results in increased channel width to depth ratios which increases riffle habitat, but may decrease the amount of "shear zones," the transitional habitat between fast and slow water favored by adult spikedace (Propst *et al.* 1986). Bank configuration, soil type, and soil moisture content influence how much damage livestock do, with moist soil being more vulnerable to damage (Marlow and Pogacnik, 1985, Platts 1990). The excessive sediment buries gravel, cobble, and coarse sand substrates. As noted by other research, turbidity and bedload varies by location, and strongly suggests influence of other activities such as road maintenance and travel.

In 2001, Tonto Creek within the Seventy Six allotment was fenced and excluded from livestock. Although this is only a small portion of the Tonto Creek watershed, fencing and exclusion will obviously benefit riparian condition within the Seventy Six allotment. Although this is only a

small portion of the Tonto Creek watershed, fencing and exclusion will obviously benefit riparian condition within the Seventy Six allotment. Fencing and excluding cattle from Tonto Creek on the Seventy Six allotment will protect riparian vegetation and allow it to regenerate. This in turn will promote the development of streambanks and improve stream morphology. These benefits will significantly reduce the effects of grazing the Seventy Six allotment on spikedace.

Cumulative Effects

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

The Cave Creek, Tonto Creek, and Sycamore Creek watersheds have private lands within or next to the National Forest. Ongoing activities occurring on these private lands that would be cumulative to the proposed action include residential use, recreational use, roads, livestock grazing, and irrigated agriculture. No data are available at this time to estimate the level of effects from those activities on these streams and their fish.

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

Conclusion

After reviewing the current status of the spikedace, the environmental baseline for the project, the anticipated effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the ongoing grazing activities on the Seventy Six, Bronco, and Star Valley allotments are not likely to jeopardize the continued existence of the spikedace, and are not likely to destroy or adversely modify designated critical habitat. This is based on the lack of spikedace presently occurring in the area, no releases of spikedace are planned, and livestock are excluded from critical habitat on Tonto and Rye Creeks.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited taking under the Act if such taking meets the terms and conditions of this Incidental Take Statement.

The Service does not anticipate any incidental take of spikedace resulting from this proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal Agencies to use their authorities to further the purposes of the Act 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 habitats, to help implement recovery plans, or to develop information.

1. Reestablish spikedace into suitable streams on the Forest in cooperation with the Service and AGFD (Recovery plan task 6, US Fish and Wildlife Service 1991a).

2. Implement other parts of the spikedace recovery plan as appropriate.

3. Manage designated critical habitat on the Forest so that the constituent elements are maintained, or are encouraged to develop.

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 implementation of any conservation actions.

GILA TOPMINNOW (*Poeciliopsis occidentalis occidentalis*)

Status of the Species

Gila topminnow was listed as endangered in 1967 without critical habitat (US Fish and Wildlife Service 1967). Only Gila topminnow populations in the United States, and not in Mexico, are listed under the Act. The reasons for decline of this fish include past dewatering of rivers, springs, and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing non-native fishes (Miller 1961, Minckley 1985). Other listed fish suffer from the same impacts (Moyle and Williams 1990). Life history information can be found in the 1984 recovery plan (US Fish and Wildlife Service 1984a), the Draft Revised Gila Topminnow Recovery Plan (Weedman 1998), and references cited in these plans.

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

Gila topminnow was listed in 1967 as *Poeciliopsis occidentalis*. The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). *P. o. occidentalis* is known as the Gila topminnow, and *P. o. sonoriensis* is known as the Yaqui topminnow. *Poeciliopsis occidentalis*, including both subspecies, are collectively known as the Sonoran topminnow. Both subspecies are protected under the Act.

Historically, the Gila topminnow was abundant in the Gila River drainage and was one of the most common fishes of the Colorado River basin, particularly in the Santa Cruz system (Hubbs and Miller 1941). Today, the species is reduced to only 15 naturally occurring populations. Presently, only 12 of the 15 recent natural Gila topminnow populations are considered extant (Table 19) (Weedman and Young 1997). Only three (Cienega Creek, Monkey Spring, and Cottonwood Spring) have no non-native fish present. There have been at least 175 wild sites stocked with Gila topminnow, however, topminnow persist at only 18 of these localities. Of the 18, one site is outside topminnow historic range and four now contain non-native fish (Weedman and Young 1997).

The Sonoran Topminnow Recovery Plan (US Fish and Wildlife Service 1984a) established criteria for down- and de-listing. Criteria for down-listing were met for a short period. However, due to concerns regarding the status of several populations, down-listing was delayed. Subsequently, the number of reestablished populations dropped below that required for down-listing, where it has remained. The Yaqui topminnow is now included within the Yaqui Fishes Recovery Plan (US Fish and Wildlife Service 1995a). A draft revised recovery plan for the Gila topminnow is available (Weedman 1998). The plan's short-term goal is to prevent extirpation of the species from its natural range in the U.S. and reestablish it into suitable habitat within historic range. Downlisting criteria require a minimum of 82 reestablished populations, some of which must persist at least 10 years.

The status of the species is poor and declining. Gila topminnow has gone from being one of the most common fishes of the Gila basin to one that exists at not more than 30 localities (12 natural and 18 stocked). Many of these localities are small and highly threatened. The theory of island biogeography can be applied to these isolated habitat remnants, as they function similarly (Meffe 1983, Laurenson and Hocutt 1985). Species on islands are more prone to extinctions than continental areas that are similar in size (MacArthur and Wilson 1967). Meffe (1983) considered extinction of Gila topminnow populations almost as critical as extinctions of recognized species. Moyle and Williams (1990) noted that threatened native fish in California tend to be endemic, restricted to a small area, part of fish communities with fewer than five species, and found in isolated springs or streams. Gila topminnow has most of these characteristics.

Federal actions have contributed to the degraded environmental baseline of the Gila topminnow. Federal actions requiring section 7 consultations affecting the Tonto National Forest, and others in the Gila River basin have contributed to the lowered baseline. An indication of the poor environmental baseline of the Gila topminnow is that two previous formal consultations have resulted in jeopardy opinions. Although the reasonable and prudent alternatives removed jeopardy, not all adverse effects are removed by implementation of the reasonable and prudent alternatives. Other Federal actions, and non-Federal actions that have not undergone section 7 consultation, also have unmitigated adverse effects that contribute to the degraded baseline.

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 current 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.

Besides the environmental baseline overview described earlier in this biological opinion, the environmental baseline of extant and potential sites is important in considering the effects of the proposed livestock grazing on conservation of the Gila topminnow. Many historic and continuing activities on or near the 20 allotments have affected the environmental baseline for Gila topminnow. These activities include, but are not limited to, recreation, roads, development, mining, and water diversion. These activities have, in general, a negative effect on the watershed. The Gila topminnow section of the BA gives an accounting of past and current effects and cumulative effects (USDA Forest Service 1999).

The Forest determined that grazing management on two allotments, Deadman Mesa and Cross V, may affect, but is not likely to adversely affect, Gila topminnow. Deadman Mesa is along Fossil Creek in the Verde River drainage and the Cross V allotment includes portions of the East Verde River. These allotments contain unoccupied potential habitat for the topminnow. Please see Appendix B for the analysis of these allotments.

The Forest determined that grazing management on 11 allotments may affect, and is likely to adversely affect, the topminnow. These allotments can be placed into three groups:

1) those with extant populations (Occupied Sites, 1 allotment);

2) those with sites identified as having potential or suitable habitat (Potential, Unoccupied Sites, 5 allotments); and

3) those with no identified sites but with unsurveyed potential habitat (Other Riparian Areas, 5 allotments).

Occupied Sites

The only extant populations occur on the Sunflower allotment at Hidden Water Spring and Mud Springs (Table 20).

The Sunflower allotment is divided into four units. The ecological condition of the Desert unit is poor with a static trend, and soil condition is unsatisfactory. There is no riparian habitat in the Desert unit. The Cottonwood unit is in fair ecological condition with a static trend, and both soil and riparian conditions are unsatisfactory. Soil and riparian condition on the Cline unit are unsatisfactory, ecological condition has not been recorded, and utilization is higher than allowed in some riparian areas. The Dos S unit has unsatisfactory riparian and soil condition, and the ecological condition has not been established.

The Gila topminnow population at Mud Springs, stocked in 1982, has had a tenuous existence. The population survived only in a cement trough for about 10 years, has undergone severe bottlenecks of only a few fish, and even has appeared to have failed once (Weedman and Young 1997). Topminnow were removed from the trough in 1997 and placed into one of the four potholes dug in 1997. Additional topminnow from Boyce-Thompson Arboretum were stocked into two potholes in 1997, mixed with about 20 remaining topminnow. These activities and livestock grazing were covered under an earlier non-jeopardy BO on the AMP for the Dos S unit (US Fish and Wildlife Service 1994c, 1996a). Mud Springs is very near Highway 87 and has a road leading to it. Mesquite Wash and Rock Creek have been identified as unoccupied suitable and potential habitat (Bazan 1999).

Gila topminnow were reestablished into Hidden Water Spring in 1976. Hidden Water Spring is the longest continually surviving reestablished topminnow population and thus, is extremely important (Weedman and Young 1997). Hidden Water Spring is in a designated wilderness area, so human impacts are small. Livestock do have access to the site. The BA notes that past livestock grazing has had severe impacts on streambank stability and riparian vegetation. The Forest believes grazing impacts may restrict quantity of water in the spring run (USDA Forest Service 1999). Though no roads lead to Hidden Water Spring, vehicles can travel down Cottonwood Creek to Cane Springs Canyon. There is also a road into the upper drainage of Cane Springs Canyon. Riparian areas on the Sunflower allotment that have not been evaluated for Gila topminnow suitability include, Picadilla, Alder, Cottonwood, Boulder, Camp, Sycamore, and Pine creeks, and Cane and Tejanos springs.

Potential, Unoccupied Sites

Five allotments identified as having suitable or potential Gila topminnow habitat are Bronco, Devil's Canyon, Millsite, Pinto Creek, and Roosevelt. The Bronco allotment has a part of Cave Creek running through it. Cave Creek is considered suitable Gila topminnow habitat and is recommended for restocking (Weedman and Young 1997). Gila topminnow were stocked into Cave Creek in 1965. Topminnow apparently later dispersed into Cave Creek from fish stocked into Seven Springs Wash. It appears that the 1993 flood, the largest on record for Cave Creek, eliminated or severely reduced Gila topminnow (Weedman and Young 1997). Topminnow might still occur in the Cave Creek/Seven Springs Wash complex. Fish species, including Gila topminnow, have seemed to disappear from a site, only to reappear later. Cave Creek is subject to many impacts besides livestock grazing. Roads traverse the canyon bottom, three campgrounds are near the confluence with Seven Springs Wash, a ranch is at Ashdale, and recreation is heavy. There are roads in the upper and lower sections of Cave Creek.

The unnamed reservoir at T1S, R13E, Sections 32/33, on the Devil's Canyon allotment is potential Gila topminnow habitat. Mosquitofish occur in the tank, and roads, including Highway 60, are nearby. Devil's Canyon allotment has satisfactory soil condition, ecological condition is unknown, and riparian condition is unsatisfactory.

The ecological condition of Bronco allotment is 10 percent high, 80 percent moderately high, 9 percent moderately low, and the riparian condition (1 percent of allotment) is low and moderately low. Riparian condition is unsatisfactory for Cave Creek. Cottonwood Creek's riparian condition is unknown. Cottonwood Creek may have unoccupied suitable or potential habitat. Rock Tank Spring is an extirpated topminnow site. Other riparian areas have not been evaluated as Gila topminnow habitat.

Gila topminnow were stocked into Pilot Tank on the Millsite allotment in 1983. Pilot Tank has been declared extirpated, but Benson Spring, which used to supply Pilot Tank, is proposed for reestablishment of topminnow although the permanence of the water is unknown (Weedman and Young 1997). Mesquite Tank #1 was also stocked and subsequently declared extirpated. Benson Spring is accessible to livestock and is near two roads. Ecological condition of the Millsite allotment is poor with about 67 percent in static trend and 33 percent in an upward trend. Condition on three riparian areas is unsatisfactory and is unknown for four others. These riparian areas have not been evaluated for their suitability as Gila topminnow habitat. Soil condition is unsatisfactory. Upland utilization is 60 percent on mountain mahogany (*Cercocarpus* spp.) and jojoba (*Simmondsia chinensis*).

The west fork of Pinto Creek on the Pinto Creek allotment has been recommended for stocking with Gila topminnow (Weedman and Young 1997). Other areas have not been surveyed to determine their potential as Gila topminnow habitat. Pinto Creek allotments' ecological condition is unknown. Riparian condition in the west fork of Pinto Creek is unsatisfactory, as it is for Pinto Creek. Soil condition is also unsatisfactory. A road reaches the lower portion of the creek. These two riparian areas, and SF Pine Creek and Yellowjacket Spring, have not been evaluated for their suitability as Gila topminnow habitat.

Other Riparian Areas

Another five allotments, or allotment management units, (Bohme/Sleeping Beauty/Bellvue, H-4, Jones, Seventy Six, Star Valley) are likely to adversely affect Gila topminnow because unoccupied potential habitat may occur, but suitability evaluations have not been done, potential habitat is not excluded from livestock, and riparian condition is unsatisfactory or unknown (USDA Forest Service 1998, 1999). The BA (USDA Forest Service 1999) states that unoccupied potential or suitable habitat could occur in Tonto Creek on the Seventy Six allotment. Other allotments have riparian areas that have not been evaluated for suitability as Gila topminnow habitat. A population at an unnamed spring on H-4 allotment has been declared extirpated.

The original Tonto National Forest plan range standards for the management units involved would generally be met by the proposed action, although the proposed usage is uniformly allowed at the upper end, and riparian standards are not usually met. The Region-wide guidelines for range utilization from the 1996 Forest Plan amendment are not being used. Site-specific information and the rationale for the higher utilization levels were not furnished to the Service.

Effects of the Action

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Effects to Gila topminnow from the proposed action differ for each allotment, but are additive when viewed for the species as a whole. They also vary for extant and potential sites. The seriously imperiled status of Gila topminnow, together with the degraded environmental baseline on the Forest, make small adverse effects to the species and their habitat a serious concern. As the draft revision of the Gila topminnow recovery plan points out, the status of this species relates recovery and downlisting to long-term goals. The short-term goal is simply to prevent the extinction of the species within the Gila basin (Weedman 1998). Delisting is not considered possible at this time.

General effects of livestock grazing on watershed function and stream channels were discussed earlier in this opinion and are applicable to the allotments being considered here. Analysis of the effects of livestock grazing on fish and fish habitat requires analysis of subtle, indirect effects of long-term gradual changes in watershed function, riparian and aquatic communities, and stream channel morphology. The long-term additive aspect of grazing impacts, combined with the short-term limited data available on range condition and fish and fish habitat make an empirical

analysis of the effects of grazing and grazing management difficult and often misleading (Rinne 1999). However, extrapolations of hydrologic and biologic principles and site-specific research data provide a large body of evidence linking degradation of watersheds, stream channels, aquatic and riparian communities, and fish habitat and populations in western North America to grazing and grazing management (Leopold 1924, Leopold 1951, York and Dick-Peddie 1969, Hastings and Turner 1980, Dobyns 1981, Kauffman and Krueger 1984, Skovlin 1984, Kinch 1989, Chaney *et al.* 1990, Platts 1990, Armour *et al.* 1991, Bahre 1991, Meehan 1991, Fleischner 1994, Ohmart 1996, Sidle and Sharma 1996, Cain *et al.* 1997, Fitch and Adams 1998, Belsky *et al.* 1999, Rinne 1999). Because of increased soil compaction and erosion, loss of cryptobiotic crusts, decreased vegetation cover, and decreased infiltration; poor watershed conditions result in "flashier" and more erosive streams defined by prolonged low flows with decreased volumes and shortened flood events with higher volumes (Gifford and Hawkins 1978, Weltz and Wood 1994, Harper and Marble 1988, Orodho *et al.* 1990, Schlesinger et al 1990, Elmore 1992, Johnson 1992, Waters 1995).

Effects to Gila topminnow from the proposed action include both direct, immediate effects, and long-term, indirect, and additive effects. Effects would generally occur through five mechanisms: 1) watershed and hydrologic alteration, 2) physical destruction and alteration of streambanks, channels, and the water column, 3) alteration of the riparian vegetation community, 4) alteration of the faunal community, and 5) effects from non-grazing and structural elements. Effects of the action will be discussed in the following order: 1) occupied sites, 2) sites recommended for reestablishment, 3) sites identified as potential unoccupied habitat, and 4) other riparian areas that have not been identified as habitat.

Occupied Sites

The two occupied Gila topminnow sites on the Sunflower allotment may be affected by livestock grazing directly and indirectly. The extant Mud Springs Gila topminnow population is in the Dos S unit of the Sunflower allotment. Mud Springs is fenced and excluded from livestock grazing. Previous consultations on livestock grazing for the Dos S AMP have addressed impacts to Mud Springs and the Gila topminnow population there. The action consulted on earlier has not changed, and the effects of the action are not different. However, no incidental take was anticipated as a result of livestock gaining access to the exclosure. Mud Springs is in a seep area on the slope of a hill in the intermittent Rock Creek drainage.

Hidden Water Spring is in the Cottonwood unit of the Sunflower allotment. The riparian area was fenced from livestock (Lisa Bizios, Tonto National Forest, pers. comm., 1999). Hidden Water Spring is in Cane Spring Canyon, which has a watershed greater than 6,000 acres, and has very steep canyon topography in portions of the drainage. Livestock grazing at Hidden Water Spring has been noted as "moderate" in 1997, evident but not damaging in 1996, heavy in 1993 (Service files), and heavy in 1989 (Stefferud 1989). Gila topminnow have persisted in this 200-500 ft stretch of water since 1976. It is apparently prone to flooding because of the size of the watershed and the canyon the site is in. It appears existing riparian and aquatic vegetation mitigates this effect, although herbaceous cover is lacking (Weedman and Young 1997, USDA

Forest Service 1999). Any loss of riparian and aquatic vegetation could prove catastrophic for this Gila topminnow population. Much of the Cane Spring drainage is in a designated wildemess area. Livestock grazing is the main use of the watershed, with small amounts of recreation occurring.

Although these sites are exclosed from livestock, exclosures do not keep livestock out all of the time. Direct mortality may occur during reconstruction or maintenance of existing or future cross-channel fences, during trampling of stream channels by livestock, and incidental consumption of small topminnow during livestock watering.

Although there are many questions yet unanswered about the validity of studies of livestock grazing's effects on fisheries (Rinne 1999), the relationship between grazing, the watershed, and fish habitat is a rather logical one. If vegetation protects soil (prevents severe erosion) and buffers or slows runoff during stormflow events (floods) as well as increases groundwater (greater low flows), it logically follows that a landscape that has been reduced in vegetative cover by excessive livestock grazing will loose its capacity to retain the soil and moderate the action of water during stormflow events, and have less stored groundwater for low flows during dry periods. The result is a compromised watershed. Soil would be lost down hill and downstream (severe erosion) resulting in increases in turbidity and sedimentation in the stream (Johnson 1992, Weltz and Wood 1994); flood flow events would be more extreme, and the resulting scour would degrade the structure and function of fish habitat as well as physically remove fish (Brown *et al*. 1974, Gifford and Hawkins 1978, Platts 1981, Platts 1991, Johnson 1992, Li *et al.* 1994); the watershed would also have less water during dry periods, the stream potentially drying out all together (Chaney *et al*. 1990, Elmore 1992). The end result is mortality to fish due to the creation of an altered habitat in which they could no longer live. This scenario is exacerbated by the fact that degraded fisheries habitats are more suitable to non-native fishes that prey on and compete with native fishes such as the Gila topminnow (Moyle *et al.* 1983, Courtenay and Stauffer 1984, Arthington *et al.* 1990, Soule 1990, Aquatic Nuisance Species Task Force 1994, Moyle and Light 1996).

The indirect effects to watersheds have been discussed in several earlier sections, as well as generally summarized with respect to fish in the preceding paragraph. Based on this information, we concluded that impacts to vegetation and litter from livestock grazing can affect watershed condition and function, which can in turn indirectly affect Gila topminnow. Livestock grazing could indirectly affect the Mud Springs or Hidden Water Spring Gila topminnow populations if uplands or riparian areas are mismanaged. Hidden Water Spring occurs in a large watershed with steep topography in Cane Spring Canyon. Mud Springs is on the slope of a hill in the Rock Creek drainage, so is less susceptible to watershed effects, but could be affected by localized grazing. Both the Dos S and Cottonwood units that these watersheds occur in have been identified as having unsatisfactory soils and riparian condition, which is indicative of degraded watershed condition. Both habitats consist of a series of small pools. If upland or riparian areas are overgrazed, vegetative ground cover is lost, and negative watershed effects begin to occur, such as increased runoff from storm flow events and the concomitant increases in sedimentation, as well as decreases in minimum flows. The increases in sedimentation can suffocate fish and

fish eggs; increased flood flows could physically remove fish during flash floods; the lowering of the water table could eliminate fish habitat entirely, by drying up the habitat; all of these scenarios would equate to mortality of Gila topminnow, and could potentially result in the loss of these populations.

Roads can be an interrelated or interdependent action to the proposed action when maintained or built for the grazing program. Roads can cause excess sedimentation, changes in runoff patterns, and habitat fragmentation. Roads can also lead to the indirect effects of illegal stocking of non-native aquatic species. The easier the vehicular access, the greater the likelihood that non-native aquatic species will be illegally stocked. Non-native aquatic species are a major threat to Gila topminnow populations and their mere presence may preclude the use of a site for reestablishment (Meffe *et al.* 1983, Bestgen and Propst 1989, Marsh and Minckley 1990, Weedman 1998). Illegal stocking of non-native aquatic species could result in take of Gila topminnow through interspecific competition or predation.

Potential, Unoccupied Sites

The previous Dos S consultation briefly considered the effects to unoccupied potential habitat in Rock and Picadilla creeks, and other springs. Mesquite Wash was characterized by the Forest as potential Gila topminnow habitat, but not by AGFD (Weedman and Young 1997). AGFD used far more restrictive criteria. The unsatisfactory soil condition and unsatisfactory riparian condition in Sycamore, Picadilla, and Rock creeks indicate that livestock grazing may be inhibiting the development of potential habitat on the Dos S unit. Since there is no indication of the trend for soil or riparian condition of the Dos S unit, we cannot determine if conditions are improving. For Gila topminnow to be recovered to the point of downlisting, many reestablishment sites will be needed (Weedman 1998). Finding sites will be difficult, so potential sites on the Forest are crucial for Gila topminnow recovery.

Gila topminnow have been found at the confluence of Kayler Spring drainage and Tonto Creek three times in four surveys since 1992 (Weedman and Young 1997). The last survey did not find Gila topminnow (D. Duncan, Arizona Ecological Service Field Office, pers. obs., 2000), though topminnow have always been rare there. Indirect effects of livestock grazing may affect the Kayler/Tonto population. Livestock grazing on the other allotments in this consultation that are upstream of the Kayler/Tonto confluence could indirectly affect the Gila topminnow population. The upstream allotments are: H-4, Seventy Six, Star Valley, Christopher Mountain/Ellinwood, and Cross V. These vary in distance upstream from the Kayler/Tonto Creek confluence, from H-4 (approximately 2 miles) to Christopher Mountain/Ellinwood (approximately 40 miles). There are additional allotments upstream that are not included in this consultation.

Upstream indirect effects are those that affect watershed function and stream channels. Soil condition on the six allotments in the Tonto Creek watershed above Kayler Spring is satisfactory on three allotments and unsatisfactory on the other three. Combined data for the six allotments show 43 percent satisfactory soil condition. Riparian condition is unsatisfactory on four allotments and unknown on the other two. The ecological condition on the allotments is 2

percent high, 35 percent moderately high, 28 percent moderately low, 1 percent low, and 34 percent unknown. The trend is unknown. The current average stocking rate for the six allotments is 13.1 ac/AM. Projected stocking rate is 9.6 ac/AM.

These six Tonto Creek watershed allotments are similar in soil, riparian, and ecological condition with the other allotments in this consultation. We assume that the allotments in the Tonto Creek watershed not in this consultation are in similar condition. The poor and less than optimal condition of these grazing allotments contributes to the degraded status of the watershed and may be contributing to the absence of Gila topminnow in Tonto Creek. Gila topminnow could probably survive at minimal levels in Tonto Creek, which is historic habitat, even with the non-native species that are present, if aquatic habitat complexity and size in Tonto Creek improved to provide areas where topminnow could survive.

Sites recommended for reestablishment of Gila topminnow can be impacted by livestock grazing indirectly the same as occupied sites. Direct effects could occur if and when topminnow are reestablished into the sites. Improper livestock grazing at recommended reestablishment sites could render them unsuitable for topminnow or preclude them from becoming suitable habitat. This would seriously impact recovery of Gila topminnow.

Livestock grazing impacts to the unnamed potential Gila topminnow site in Devil's Canyon allotment are hard to determine. Livestock use of the site is unknown as is the condition of the watershed. The tank is in a small watershed.

Impacts of livestock grazing to Benson Spring on the Millsite allotment are unknown. The poor ecological and soil conditions of the allotment could be contributing to habitat degradation at Benson Spring. Effects of watershed degradation from livestock grazing would probably be small because the watershed is less than 600 acres.

Cottonwood Creek and Spring on the Roosevelt and Schoolhouse allotments, respectively, are recommended for reestablishment of Gila topminnow. The spring is excluded from livestock (USDA Forest Service 1999:III-86). If Gila topminnow are put into the spring only, they could move downstream in Cottonwood Creek on the Roosevelt allotment. Cottonwood Creek is in unsatisfactory riparian condition, but Gila topminnow surveys have noted little livestock use of the creek (Service files). The unsatisfactory riparian and soil conditions of the Roosevelt allotment may impact the suitability of Cottonwood Creek as Gila topminnow habitat.

Other Riparian Areas

The last group of sites that could be affected by the proposed action are those that have not been evaluated, but may provide suitable or potential Gila topminnow habitat. The impacts from livestock grazing identified previously in this section could also apply to the unidentified sites, but it is difficult to ascertain from available information. Sites with a watershed upstream of them (most sites), can be negatively affected by livestock grazing in the upstream watershed, especially when conditions in the watershed are less than optimal. Refer to the previous effects

discussion for an accounting of the effects of livestock grazing to these unidentified sites. Livestock grazing effects to potential habitat could preclude use of those sites by Gila topminnow, thus having a negative effect on the recovery of the species.

Other, more site-specific new range projects such as fences, cattleguards, and waters will require a site-specific analysis and section 7 consultation, when appropriate. These projects specifically were not included in the proposed action (USDA Forest Service 1999), although the effects of any of these types of future projects has been considered in the effects of the action.

Cumulative Effects

Cumulative effects are those 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 to the proposed action.

Non-Federal actions that have occurred and are likely to reoccur are road and highway maintenance and construction, legal and illegal stocking of non-native aquatic species, urbanization, water use, and many activities that could occur on private lands. These actions can create excess sediment in runoff, changes in flow and flood regimes, and introduce or augment non-native aquatic species that are detrimental to Gila topminnow.

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

Conclusion

After reviewing the current status of the Gila topminnow, the environmental baseline for the action area, the anticipated effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed ongoing livestock grazing on 20 allotments on the Forest is not likely to jeopardize the continued existence of Gila topminnow. We base this conclusion on the following: 1) the currently occupied sites are fenced from livestock, thus eliminating most adverse effects; 2) Gila topminnow are not present in the sites recommended for reestablishment or in the sites that have not been evaluated; and 3) efforts to manage livestock grazing at the reestablishment or unevaluated sites will not preclude their use for recovery of Gila topminnow.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as harass,

harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant, permittee, or contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Incidental take from the proposed livestock grazing on the Forest is expected to occur both as direct mortality of individual Gila topminnow and as harm resulting from habitat modification and destruction. Although Gila topminnow sites are exclosed from livestock, exclosures do not keep livestock out all of the time. Direct mortality is reasonably certain to occur through the trampling of stream channels by livestock when fences are periodically washed out, cut, or otherwise damaged. Likewise, harm and/or harassment is reasonably certain to occur, in both the Hidden Water Spring and Mud Springs populations, through: 1) habitat alteration and loss due to grazing when exclosures fail; and 2) illegal stocking of predatory and competitive non-native aquatic species facilitated by the presence of livestock waters. Additionally, harm and/or harassment is reasonably certain to occur in the Hidden Water Spring population from: 1) reductions in surface flows due to watershed degradation; 2) altered watershed conditions that result in flashier streamflow; and 3) watershed conditions that result in unstable stream channels.

The anticipated level of take cannot be quantified as numbers of individual fish. Gila topminnow are a short-lived, highly fecund species whose natural cycle includes large, rapid fluctuations that make population estimates difficult to obtain and that mask changes due to take from human actions. In addition, dead fish are seldom found due to their small size and rapid consumption by scavengers. Therefore, the level of anticipated take will be quantified differently depending on whether incidental take is mortality or harm.

1. For the ongoing livestock grazing and its management on Sunflower allotment, take will be considered to have been exceeded if any one of the following conditions occurs:

a) livestock grazing occurs within a Gila topminnow site exclosure at more than five percent utilization of any woody riparian species (measured as percentage of apical meristems grazed within 6 ft of the ground) and trampling, chiseling, or other physical impact by livestock on more than 10 percent of the alterable streambanks by length;

b) if the Forest's riparian utilization limits of less than 10 percent impact to alterable banks, less than 30 percent use of plant biomass, and less than 40 percent use of leaders on woody plants less than 6 ft tall, are exceeded by more than 10 percent at any one time within the watershed of Cane Spring Canyon (Hidden Water Spring); or

c) the proposed upland utilization levels of 35 percent are exceeded by more than 10 percent anytime within the watershed of Cane Spring Canyon (Hidden Water Spring).

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

EFFECT OF THE TAKE

In this biological opinion, the Service finds the anticipated level of incidental take is not likely to result in jeopardy to Gila topminnow.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental taking authorized by this biological opinion.

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

2. Conduct all proposed actions in a way that will minimize loss and alteration of Gila topminnow habitat.

3. Monitor the fish community and habitat to document levels of incidental take.

4. Maintain a complete and accurate record of actions which may result in take of Gila topminnow and their habitat.

TERMS AND CONDITIONS FOR IMPLEMENTATION

In order to be exempt from the prohibitions of section 9 of the Act, the Forest Service is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above. Implementation of terms and conditions is nondiscretionary.

1. The following terms and conditions will implement reasonable and prudent measures 1 and 2.

    a. Inspect all earthen stock tanks and ponds on National Forest lands in the Cane Spring Canyon watershed to determine presence or absence of non-native aquatic species. If such species are found, initiate removal of these species in cooperation with the Service and the AGFD. The inspections shall be completed within five years of the date of this opinion and removals implemented within seven years (Recovery Plan Task 1.5, Weedman 1998).

    b. Inspect and maintain all Gila topminnow site exclosures a minimum of three times a year. One of the inspections must be within one month of livestock being put in a pasture next to the exclosure. Inspection reports from the permittees may be used to accomplish this term and condition. The permittees will report their inspection and maintenance work to the District annually. Livestock will be removed from any exclosure immediately upon learning that they have intruded into the exclosure. Notification will be provided to the Service of any exclosure fence damage and any livestock intrusion into the exclosures in the annual report required by this biological opinion (Recovery Plan Task 1.4, Weedman 1998).

2. The following term and condition will implement reasonable and prudent measure 3.

    If livestock gain access to extant Gila topminnow sites, monitor for dead and dying Gila topminnow during visits to the area by Forest biologists, at least once annually. Report all findings in the annual report.

3. The following terms and conditions will implement reasonable and prudent measure 4.

    a. Records of exclosure and gap fence monitoring and maintenance shall be maintained. Exclosure maintenance, repair, livestock intrusion, and other relevant information will be furnished to the Service as part of the annual report for this BO (Recovery Plan Task 1.4, Weedman 1998).

    b. In the annual report described in the general terms and conditions in this biological opinion, the Forest Service shall briefly summarize for the previous calendar year; 1) implementation and effectiveness of the terms and conditions, 2) documentation of take, if any, and 3) actual livestock use (head, animal months, dates of pasture use, utilization measurements, etc.) with a description of any variations from the proposed action (for the

Sunflower allotment). If other monitoring or research is completed concerning Gila topminnow or conditions of rangeland, riparian areas or soil, a copy of the relevant reports shall be included (Recovery Plan Tasks 1.4, 1.5, 2.4, 3, Weedman 1998).

c. Ensure that the Service is sent all copies of all NEPA documents and section 7 reports completed for projects on the Sunflower allotment (Recovery Plan Tasks 1.4, 1.5, 2.4, 3, Weedman 1998).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for Gila topminnow. In furtherance of the purposes of the Act, we recommend implementing the following actions from the draft, revised recovery plan (Weedman 1998):

1. Reestablish Gila topminnow into suitable habitat on the Forest. Identify suitable and potential Gila topminnow habitat. One action plan covering all known suitable and potential sites and all Forest actions affecting them should be done. Augmentation stocking and management of existing sites should be included (Recovery Plan Tasks 1.4, 1.7, 2.1, 2.2, 2.3, 2.6).

2. Discourage the use of non-native aquatic species on the Forest, and where possible, remove them (Recovery Plan Tasks 1.5, 1.6, 2.4, 2.5).

3. Construct a barrier on Lime Creek to prevent the upstream spread of non-native fish, including green sunfish. Remove non-native fish in the watershed if necessary (Recovery Plan Task 1.4).

4. Consider implementing the allowable use guidelines for livestock grazing in the Forest Plan on all allotments on the Forest. This should allow quicker recovery of watersheds and riparian areas (Recovery Plan Task 1.4).

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 implementation of any conservation actions.

DISPOSITION OF DEAD OR INJURED LISTED ANIMALS

Upon finding a dead or injured threatened or endangered animal, initial notification must be made to the Service's Division of Law Enforcement, Federal Building, Room 8, 26 North McDonald, Mesa, Arizona (602/261-6443) within three working days of its finding. Written

notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. Care must be taken in handling injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible condition. If feasible, the remains of intact specimens of listed animal species shall be submitted to educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution before implementation of the action. A qualified biologist should transport injured animals to a qualified veterinarian. Should any treated listed animal survive, the Service should be contacted regarding the final disposition of the animal.

REPORTING REQUIREMENTS

To implement the reporting requirements identified in the preceding terms and conditions and to address all species covered by this consultation, the Forest shall submit an annual report to the Arizona Ecological Services Field Office. The report shall, at a minimum, briefly summarize for the previous calendar year:

1) implementation of terms and conditions and conservation recommendations;

2) estimates of and documentation of any incidental take;

3) any excess use, increased animal months, unauthorized use, or other variations from the proposed action; and

4) a discussion of the effectiveness of the terms and conditions and their effects on the Forest's grazing program.

The report will also include reporting requirements listed in the various terms and conditions in this BO.

The annual report is due December 1 of each year with the first report due December 1, 2002.

DESERT PUPFISH (*Cyprindon macularius macularius*)

Status of the Species

In Arizona, the genus Cyprinodon was historically comprised of two recognized subspecies, (*C. m. macularius)* and (*C. m. eremus)*, and an undescribed species, the Monkey Spring pupfish. The desert pupfish subspecies are now recognized as separate species, the desert pupfish (*Cyprinodon macularius*) and the Quitobaquito pupfish (*C. eremus*)(Echelle *et al.* 2000). The desert pupfish was listed as an endangered species with critical habitat on April 30, 1986, (US Fish and Wildlife

Service 1986c). The Mexican government has also listed the species as endangered [Secretaria de Desarrollo Urbano y Ecologia (SEDUE) 1991]. Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers, although collections are lacking for the latter three. The desert pupfish is also found in the lower Colorado River, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888; Garman 1895; Gilbert and Scofield 1898; Evermann 1916; Thompson 1920; Jordan 1924; Coleman 1929; Jaeger 1938; Miller 1943; Minckley 1973, 1980; Black 1980; Turner 1983; Miller and Fuiman 1987). Historic collections occurred in Baja California and Sonora, Mexico, and in the United States in California and Arizona.

The natural history of the desert pupfish is very similar to that described for the Gila topminnow. They occupied similar habitats, although the pupfish was not nearly as widespread. The desert pupfish also went through cycles of expansion and contraction because of natural climatological variation (US Fish and Wildlife Service 1986c, 1993b; Weedman and Young 1997). Such a scenario would have led to panmixia among populations over a very large geographic area (US Fish and Wildlife Service 1993a).

Twelve natural populations persist; eight of these are in Mexico. About 20 transplanted populations exist in the wild (US Fish and Wildlife Service 1993a). One or more threats imperil most natural and transplanted populations. Since the 19th century, desert pupfish habitat has been steadily destroyed by streambank erosion, the construction of water impoundments that dewatered downstream habitat, excessive groundwater pumping, the application of pesticides to nearby agricultural areas, and the introduction of non-native fish species. The non-native bullfrog may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet that includes fish (Frost 1935, Cohen and Howard 1958, Brooks 1964, McCoy 1967, Clarkson and deVos 1986). There is also a concern that introduced salt cedar (*Tamarisk* spp.) next to pupfish habitat may cause a lack of water at critical times (Bolster 1990; R. Bransfield, US Fish and Wildlife Service, pers. comm., 1999). Evapotranspiration by luxuriant growths of this plant may especially impact smaller habitats where water supply is limited. The remaining populations continue to face these threats, and the Salton Sea area populations, in particular, are severely threatened.

Naturally occurring populations of desert pupfish are now restricted in the United States to California in two streams tributary to, and a few shoreline pools and irrigation drains of, the Salton Sea. The species is found in Mexico at scattered localities along the Colorado River Delta and in the Laguna Salada basin. No natural populations occur in Arizona. Additional life history information can be found in the recovery plan (US Fish and Wildlife Service 1993a) and other references cited there.

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 current 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.

No natural populations of desert pupfish occur on the Forest. The nearest population is in Avery Lake at the Boyce Thompson Arboretum near the town of Superior, Arizona. Suitable habitat for desert pupfish is found at less than 2,500 ft elevation. Five allotments of the 20 analyzed are within this range (Bronco, Dead Mesa, Millsite, Roosevelt and Sunflower) although surveys have not been done for possible or suitable habitat sites.

The Sunflower allotment (Cottonwood unit) was stocked with desert pupfish at Hidden Water Spring in 1976, but the stocking failed. The Arizona Game and Fish Department has recommended it be restocked with desert pupfish (Weedman and Young 1997).
A number of other waters on the Forest represent potential habitat for the pupfish as well. Allotments addressed in this biological opinion with potential habitat are Bronco (Cave Creek), Deadman Mesa (Fossil Springs), Millsite (Benson Spring), Roosevelt (various springs and Tonto Creek), and Sunflower (various springs including Hidden Water Spring and Sycamore Creek). Livestock have been excluded from Fossil Springs on the Deadman Mesa allotment so grazing was determined to may affect, but not likely adversely affect, desert pupfish on this allotment (see Appendix B).

Desert pupfish reproduce year-around in the constant temperatures of springs, but have strong spring-summer reproductive cycles in habitats with seasonally variable temperatures. Although desert pupfish is thought of as a "desert fish" inhabiting isolated springs, it is not exclusively so. Desert pupfish can be found along margins of small to large streams in habitats well above the desert floor (Rinne and Minckley 1991). Several locations in the Forest near springs or headwaters of different streams were recommended for reestablishment of Gila topminnow (Weedman and Young 1997); these locations should also be investigated for establishing desert pupfish as well.

Effects of the Action

As previously stated, desert pupfish do not occur on the Forest, thus the effects of livestock grazing on desert pupfish are limited to potential habitat and recovery potential. Continued livestock grazing will have effects on potential habitat on the following four allotments: Bronco, Millsite, Roosevelt, and Sunflower.

Livestock grazing has both indirect and direct effects on fishery resources. Most potential habitats analyzed in the BA for the four allotments are fully accessible to livestock grazing. Effects to potential desert pupfish habitat from livestock grazing are removal of vegetation cover, disturbance of the soil mantle, reduced infiltration rates, increased sediment yields from a watershed, and reduced water quality. Livestock prefer riparian zones to upland range sites due to the availability of water and the quality of forage in these areas. The number and amount of

time cattle spend in riparian areas, as well as the success of grazing management in the uplands, will determine the overall effects on aquatic resources (see Effects of the Action for Gila topminnow).

Critical habitat does not fall within any of the affected allotments in this assessment; therefore, none will be affected.

Cumulative Effects

Cumulative effects are those 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 to the proposed action.

Non-Federal actions that have occurred and are likely to reoccur are road and highway maintenance and construction, legal and illegal stocking of non-native aquatic species, urbanization, water use, and many activities that could occur on private lands. These actions can create excess sediment in runoff, change flow and flood regimes, and introduce or augment non-native aquatic species that are detrimental to desert pupfish.

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

Conclusion

After reviewing the current status of the desert pupfish, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the ongoing and long-term grazing, as proposed, is not likely to jeopardize the continued existence of the desert pupfish. We reached this decision because desert pupfish are not present on the five allotments. Critical habitat for this species does not occur in the action area, so no destruction or adverse modification of critical habitat is anticipated.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significant

impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited taking under the Act if such taking meets the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

The Service does not anticipate any incidental take of desert pupfish resulting from this proposed action.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purpose of the Act 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.

As identified in the Desert Pupfish Recovery Plan (US Fish and Wildlife Service 1993a), we recommend the Forest implement the following:

1. Reestablish populations into historic range to meet each of the respective recovery plan requirements (Recovery Plan task 2).

2. Develop and implement plans to monitor populations and their habitats with periodic assessments of their biotic and genetic integrity (Recovery Plan tasks 5, 6).

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 implementation of any conservation actions.

ARIZONA AGAVE (*Agave arizonica*)

Status of the Species

Arizona agave (*Agave arizonica*) was listed as endangered May 18, 1984 (US Fish and Wildlife Service 1984b). Critical habitat has not been designated. Questions regarding *A. arizonica*'s taxonomic status generated a petition from the Forest Service for delisting dated May 7, 1985. Review of all available data by the Service concluded the petitioned action was not warranted (US Fish and Wildlife Service 1986d, 1987).

Agave arizonica is a perennial succulent that reproduces once in its life. Vegetative offsets (clones) are its primary reproductive means. Individuals occur as isolated plants or as a cluster of plants in proximity to *Agave chrysantha* and *Agave toumeyana* variety *bella* in central Arizona (Gila, Maricopa, and Yavapai counties) south of the Mogollon Rim. *Agave arizonica* occurs in habitat designated as interior chaparral and Great Basin conifer woodland (Brown 1994). Plants have been found at elevations ranging from 3,000-6,000 ft where the ranges of *A. chrysantha* and *A. toumeyana* var. *bella* (currently considered by experts to be the putative parent plants) overlap. *Agave arizonica* was originally found in 1959 by John H. Weber, Harold J. Hazlett, and John. H. Houzenga during a deer hunt in the New River Mountains. Weber was a Desert Botanical Garden horticulturist and collected several specimens. The species is described from these New River specimens (Gentry and Weber 1970). Fewer than 100 plants have been documented in the wild. Some plant locations are known to exist on private lands, but most known locations are in the New River Mountains of the Forest, with additional populations southeast of Payson and near Parker Creek on the Tonto Basin Ranger District (Fenner 1990).

Agave arizonica is a small plant with attractive rosettes showing bright green leaves outlined in dark, mahogany-colored margins. Pale yellow flower clusters sway atop tall, sub-umbellate inflorescences. During its sexual reproductive cycle, a single stalk grows out of the center of the rosettes during the bolting period (April through September), which coincides with the summer monsoon rains. After seed has set and shattered out, the plant dies. Known locations occur at relatively far distances from one another, possibly making natural reproduction from seed difficult because natural cross-pollination could be severely hampered by distance. Bumblebees (*Bombus sonorus*), mining bees (Family Halictidae), and wasps (*Polistes* spp.) have been observed foraging in *A. arizonica* flowers; bats are possible pollinators (US Fish and Wildlife Service 1994d).

The Forest has conducted annual surveys to monitor known populations of this species. Much of the Cave Creek Ranger District has been surveyed and the Star Valley and Soldier Camp allotments have been surveyed by Desert Botanical Garden and Forest personnel. Lack of funds, research, personnel, and priority needs limit the potential for discovering new populations of *A. arizonica*.

Primary threats to this species (and its putative parent plants) include grazing of seed stalks and plant trampling by livestock, soil compaction by recreational vehicles, loss and alteration of habitat by mining and home and road construction, natural factors (disease, climate), and wildfire. Potentially, these threats could affect 100 percent of *A. arizonica*'s range. Botanical experts still disagree on *A. arizonica'*s taxonomic status, and surveys for the plant are currently small in scope and concentrate on known locations; thus, current population trends for this species are unknown.

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 current 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.

Two allotments on the Forest (Bronco and New River) support known populations of Arizona agave. The Forest determined the proposed action is likely to adversely affect Arizona agave on these two allotments (USDA Forest Service 1999). The New River Allotment was later dropped from this consultation.

On the Bronco allotment, occupied and potential habitat for this species exists in at least two pastures (Bronco and Cottonwood), and several years have passed without habitat conditions being documented. This allotment consists of 3,070 ac, all of which is capable range. It is divided into five pastures which are grazed from November 15 to April15. These dates are within the agave bolting season (April to September). The west pasture containing Cave Creek will be grazed from November to mid-February or before if use limits are exceeded; livestock are moved to the eastern pastures until April 15 or before if use limits are exceeded. Maximum allowable use is 20 percent use on woody riparian vegetation, 20 percent of biomass on riparian herbaceous material, and 35 percent on perennial grasses in uplands.

Effects of the Action

Potential direct effects of livestock grazing on Arizona agave include crushing of plants (adults and pups) and eating stalks during agave bolting season which is April through September (Howell 1996, USDA Forest Service 1999). Indirect effects of grazing in occupied and potential agave habitat include soil compaction and disturbance, reduced water infiltration rates, loss of putative parent plants through crushing and stalk consumption, and habitat alteration and modification as a result of projects, structures, fences, or waters (USDA Forest Service 1999).

On the Bronco allotment, livestock grazing occurs in all five pastures from November 15 to April 15, meaning livestock are in the pastures containing Arizona agave during the early part of the bolting season (April to September) for this species. While utilization levels are limited to 35 percent of the current year's growth of perennial grasses, monitoring is not being conducted on agave or upland use levels near agave clones. Before April 15, bolts should still be shorter than the roseate of the plant, and therefore will be protected from grazing. Although livestock are not expected to eat bolts, they may crush some plants (P. Fenner, Tonto National Forest, pers. comm. 2001). Soils are in satisfactory condition, indicating compaction is not presently a concern.

Cumulative Effects

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

No future State, tribal, local, or private actions that would impact this species are known. These two allotments are on Federal lands and any new projects proposed on the Forest will be subject to section 7. No critical habitat is designated for Arizona agave; therefore, none will be affected.

Conclusion

After reviewing the status of the Arizona agave, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the ongoing and long-term grazing management plan, as proposed, is not likely to jeopardize the existence of the Arizona agave. We reached this decision because vegetation utilization is limited to 35 percent on Bronco allotment and livestock are removed from areas containing the species by April 15. No critical habitat is designated for Arizona agave; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of state law or regulation, in the course of any violation of a State criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of 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. Design allotment grazing management actions to comply with the "not likely to adversely affect" criteria as described in the guidance criteria (USDA Forest Service 1998). This includes eliminating livestock herbivory on Arizona agave bolts from April through September.

2. Conduct a comprehensive survey by the end of year 2003, in occupied and potential habitat of all allotments on the Forest, to establish a population baseline for Arizona agave. Establish agave locations with Global Positioning System units and map them on U.S. Geological Survey topographic maps (1:24,000 scale), with copies furnished to the Service and the Phoenix Desert Botanical Garden.

3. Conduct follow-up surveys every two years and determine population status, using the same mapping methods as in 2, above.

4. Designate a Forest Service range management employee to actively participate on the Arizona Agave Recovery Team.

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.

ARIZONA HEDGEHOG CACTUS (*Echinocereus triglochidiatus* var. *arizonicus*)

Status of The Species

The Arizona hedgehog cactus *(Echinocereus triglochidiatus* var. *arizonicus*), was listed as endangered without critical habitat in 1979 (US Fish and Wildlife Service 1979). This species occurs in the Upper Sonoran Life Zone within the interior chaparral community of Pinal and Gila counties, Arizona (Benson 1982). According to Crosswhite (1992a), the vast majority of specimens are found on relatively open, rocky slopes and steep, fissured cliffs. A few isolated individuals have been found in the moderately dense climax stands of interior chaparral. Parent rock materials of preferred habitat are Schultze granite and Apache Leap tuff (dacite), both igneous in origin. Pinal schist and the Pioneer formation in proximity to the dacite and Schultze granite also provide habitat for the Arizona hedgehog cactus, but only where these formations express themselves as exposed bedrock (Cedar Creek Associates, Inc. 1994).

Crosswhite found this cactus thrives best on slopes of 20 to 90 degrees in rocky, bouldery terrain, but it can often be encountered on flatter ground and more open slopes (Cedar Creek Associates, Inc. 1994). Its roots invade cracks in exposed rock or narrow soil pockets between boulders and within bedrock. These soil pockets and cracks provide the necessary periodic moisture and shelter from high temperatures and moist soils. Warm moist soils harbor pathogenic bacteria and fungi proven to be a leading cause of death in cacti (Crosswhite 1992a).

Because the taxon is an obligate outcrosser, pollination can variably occur with the aid of hummingbirds, carpenter bees, solitary bees, and introduced honeybees, as all are present within the habitats of *E. t.* var. *arizonicus* (Crosswhite 1992b). Pollinators are important to the species' reproduction. Mortality and deleterious factors influencing this species include: 1) illegal removal by humans [for horticultural practices, illegal export or sale, or the belief that *E. t.* var. *arizonicus* is a source of the illegal and controlled hallucinogen dimethyltryptamine (Crosswhite 1992b)], 2) decimation of individual plants by sucking and boring insects, 3) spread of the disease "soft-rot of cactus" *(Erwinia carnegieana),* 4) disturbance and trampling by grazing animals, 5) past land use changes from the undisturbed condition within occupied habitats (e.g., mineral exploration, road and facility development, highway construction, powerline construction, etc.), 6) consumption by javelina, and 7) freeze loss.

Preferred Arizona hedgehog cactus habitat is exposed and stable bedrock or boulders exhibiting sufficient fracturing or rock interstices for establishment. Although Arizona hedgehog cactus will occasionally establish on colluvial, active material, they tend not to persist in such a rooting

medium and obviously prefer stable rock. Arizona hedgehog cacti are not found in non-rocky or deep soil conditions, most likely due to the potential for increased competition from other plant species. The apparent, preferred condition of the overall landscape appearance is often described as "barren", "herbaceous" species, or "scattered shrub" (Cedar Creek Associates, Inc. 1994).

Distribution

The main population contains the type locality for this species. It is in a narrow corridor between Miami and Superior, Arizona, generally parallel to U.S. Highway 60 (Fletcher 1983). The upper West Fork Pinto Creek subpopulation of Arizona hedgehog cactus is known from at least three locations external to the main distribution area along the Miami-Superior highway corridor. To the northwest, within the Superstition Wilderness Area (under the jurisdiction of the Forest), at least two areas near the West Fork of Pinto Creek were identified as habitat occupied by Arizona hedgehog cactus. The number of cacti within these two areas is described as "scattered to numerous".

A second satellite (disjunct) population was identified by an unknown observer about 10 miles north-northeast of Globe, Arizona, on the Tonto National Forest. Although it appears that this Apache Peak subpopulation is a member of the species of Arizona hedgehog cactus, one slight difference was noted. On average, the Apache Peak subpopulation plants appear more "fuzzy" than the average type locality (main distribution) specimens owing to somewhat longer spines. However, it was noted that this slight difference was well within the realm of observed variability exhibited by the type locality population. Therefore, it is anticipated that this minor difference is most likely simple morphologic variation due to the geographic separation of gene pools.

A third satellite population of Arizona hedgehog cactus occurs on El Capitan Mountain (Bingham 1993). This subpopulation is on lands under the jurisdiction of the BLM.

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 current 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.

Occupied and potential habitat exists on four livestock grazing allotments on the Forest: Bohme/Sleeping Beauty/Bellevue, Devil's Canyon, Millsite, and Pinto Creek. Complete distribution, abundance, and taxonomic status is unknown at this time. The Forest Service determined that the proposed project is not likely to adversely affect Arizona hedgehog cactus on the Millsite allotment, and that it is likely to adversely affect the species on the Bohme/Sleeping Beauty/Bellevue, Devil's Canyon, and Pinto Creek allotments.

On the Bohme/Sleeping Beauty/Bellevue allotment, Arizona hedgehog cactus occurs in the southwestern part. Livestock use on the uplands has generally been high. Stocking levels were reduced in 1998, but were restored to previous levels under the current annual operation plan. Based on expected livestock use levels and lack of fences or regulatory structures to manage livestock, use may exceed 40 percent. It is unclear if monitoring is being conducted.

On the Devil's Canyon allotment, Arizona hedgehog cactus occurs in all three pastures. Two pastures support the species on very steep, rocky slopes inaccessible to livestock. The north pasture supports this species on slopes and large flats that are accessible to livestock. Historically, livestock use levels have been high in the north pasture and use levels exceed 40 percent. Monitoring requirements are not being met on this allotment. The BA includes protective measures that the Forest could take to improve the use and habitat of the allotment. These measures are not completed nor part of the proposed action.

On the Pinto Creek allotment, the exact distribution of Arizona hedgehog cactus is unknown but specimens were found on the southern end of the allotment. Livestock were removed in the summers of 2000 and 2001 due to drought conditions but have been returned after a period of rest. Some improvement may have occurred. Thresholds identified in the grazing guidance criteria are still exceeded for this species.

Effects of the Action

The major direct impact to the species is physical damage from livestock trampling (Crosswhite 1990, Parfitt and Christy 1991, Cedar Creek Associates, Inc. 1994). Cedar Creek personnel's observations of physical damage to individual cacti due to cattle occurred at an estimated rate of approximately one trampled cactus specimen in 400 to 500 observations. These observations occurred throughout the range of the species during seasons when cattle were present at allowable stocking rates. Observations occurred only in those topographic circumstances which allow grazing by cattle regardless of underlying substrate. These cacti tend to grow in circumstances unfavorable for passage or grazing activity by cattle, due to steepness of slope and the fact that specimens are usually within bedrock cracks and crevices. Only those few individuals that grow within a soil matrix (less than 3 percent of the population) on slopes less than 60 percent are at risk of physical damage from livestock. By comparison, damage caused by javelina is more frequent and problematic. Regarding trampling of seedlings, one Cedar Creek observation is noteworthy. A single, two-year-old specimen observed to have been crushed during early spring, showed very good signs of recovery following two later visits in the summer and fall of the same year, and was fully recovered the following year.

Cumulative Effects

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

No future State, tribal, local, or private actions that would impact this species in the action area are known. These allotments are on lands administered by the Forest Service and any new range, wildlife, or recreation projects proposed on the Forest will be subject to section 7.

Conclusion

After reviewing the status of the Arizona hedgehog cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the ongoing and long-term grazing management plan, as proposed, is not likely to jeopardize the existence of the Arizona hedgehog cactus. We reached this conclusion because only a small portion of the cacti on these allotments are accessible to livestock. Critical habitat is not designated for Arizona hedgehog cactus; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of state law or regulation, in the course of any violation of a State criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of 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. Design allotment grazing management actions so they comply with the "may affect, but is not likely to adversely affect" grazing guidance criteria as described in the Forest's BA (USDA Forest Service 1999).

2. Conduct a comprehensive survey by the end of calendar year 2003, in all occupied and potential habitat on the Forest, to establish a population baseline for Arizona hedgehog cactus. Species locations should be established with Global Positioning System units and mapped on U.S. Geological Survey topographic maps (1:24,000 scale), with copies furnished to the Service, the Boyce-Thompson Arboretum, and the Phoenix Desert Botanical Garden.

3. Conduct follow-up surveys every two years to determine population status, using the same mapping methods as in 2, above.

4. Complete installation of proposed fencing and gates on all allotments before allowing livestock grazing in the allotment.

5. Continue to monitor drought and weather conditions, and reduce livestock use on allotments as appropriate to compensate for changing conditions.

6. Limit utilization of uplands to 35 percent and monitor use to ensure compliance.

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.

LESSER LONG-NOSED BAT (*Leptonycteris curasoae yerbabuenae*)

Status of the Species

The lesser long-nosed bat is a medium sized leaf-nosed bat. It has a long muzzle, a long tongue, and is capable of hover flight. These features are adaptations that allow the bat to feed on nectar from the flowers of columnar cacti such as the saguaro (*Carnegiea giganteus*) and organ pipe cactus (*Stenocereus thurberi*), and from paniculate agaves such as Palmer's agave (*Agave palmeri*) and Parry's agave (*A. parryi*)(Hoffmeister 1986). Palmer's agave exhibits many characteristics indicating they are pollinated by bats, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (although not all) of these same morphological features (Gentry 1982). Slauson (1999, 2000) demonstrated that there was a mutualistic relationship between Palmer's agave and the lesser long-nosed bat, though this relationship was asymmetric. The bat is quite dependent on the agave for food during a certain period, but the agave has other pollinator options.

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (US Fish and Wildlife Service 1988a). No critical habitat has been designated for this species. A recovery plan was completed in 1994 (US Fish and Wildlife Service 1994d). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. The recovery plan states that the species will be considered for delisting when three major maternity roosts and two post-maternity roosts in the United States, and three maternity roosts in Mexico have remained stable or increased in size for at least five years.

The lesser long-nosed bat is migratory and found throughout its historic range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. In southern Arizona lesser long-nosed bat roosts have been found from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County) and south to the international boundary. Individuals

have also been observed from the vicinity of the Pinaleno Mountains (Graham County) and as far north as Phoenix and Glendale (Maricopa County)(AGFD Heritage Data Management System). This bat is also known from far southwestern New Mexico in the Animas and Peloncillo Mountains (Hidalgo County). Roosts in Arizona are occupied from April to as late as early November (Cockrum and Petryszyn 1991; Sidner 1999, 2000); although the species has been recorded in winter at hummingbird feeders in Tucson (Sidner and Houser 1990).

Suitable day roosts and concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (US Fish and Wildlife Service 1994d). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever determines roost suitability, the species seems sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

The lesser long-nosed bat recovery plan (US Fish and Wildlife Service 1994d) identifies the need to protect foraging areas and food plants. Columnar cacti and agaves provide critical food resources for this bat. Populations of these plants need continued protection to sustain nectar-feeding bat populations. A critical need in this area is information about the size of the foraging areas around roosts so that adequate areas can be protected. This information will show the minimum area needed to support a roost of nectar- and fruit-eating bats, provided the roost locations are known. Additional life history information can be found in the recovery plan (US Fish and Wildlife Service 1994d) and other references cited there.

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 current 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 Forest requested formal consultation on the effects of livestock management to the lesser long-nosed bat for the following 19 allotments: Seventy Six, Bohme/Sleeping Beauty/Bellevue, Bronco, Buzzard Roost, Christopher Mountain/Ellinwood, Deadman Mesa, Devil's Canyon, H-4, Jones, Millsite, Payson/Cross V, Pinto Creek, Roosevelt, Star Valley, and Sunflower. No records exist for lesser long-nosed bat on the Forest. The nearest confirmed records are from Glendale and Phoenix, about 20-30 miles west of the Forest. These records are of immature females late in the season, August 30 (Phoenix) and September 16 (Glendale), both in 1963, suggesting transients. What may have been a lesser long-nosed bat or bats were also observed recently in a mine in the McDowell Mountains, a few miles west of the western boundary of the Forest (Tim

Snow, AGFD, Phoenix, pers. comm., 1999). The nearest known roosts to the Forest are: 1) in the Picacho Mountains, approximately 40 miles south-southeast of the southern Forest boundary, and about 44 miles south-southeast of the Millsite allotment, and 2) an additional roost or roosts recently found in the Galiuro Mountains approximately 40 miles from the southern boundary of the Jones allotment.

A bat inventory was conducted on the Payson and Pleasant Valley Ranger Districts in June and August 1993. Thirteen possible roost sites, including 5 bridges, 1 mine, and 7 caves were searched for bats. Mist-netting was conducted at 59 sites. No lesser long-nosed bats were detected during the surveys (Agyagos and Harris 1993). Although lesser long-nosed bats have not been found on the Forest, no comprehensive roost surveys have been conducted, and the species is rarely taken in mistnets over water (a common collecting technique for bats). Many mines and caves on the Forest could potentially support roosting lesser long-nosed bats. Records from Phoenix and Glendale suggest the species occurs as at least a transient on the Forest. If lesser long-nosed bats day roost in the McDowell Mountains, they could easily forage and night roost on the Forest, which is only a few miles to the east.

Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 38 miles (one way)(Dalton et al. 1994; V. Dalton, Tucson, pers. comm., 1997; Y. Petryszyn, University of Arizona, pers. comm., 1997). Steidl (pers. comm. 2001) found that typical one-way foraging distance for bats in southeastern Arizona is roughly 12.5 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in Organ Pipe Cactus National Monument (USFWS 1997b). Horner et al. (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. The roosts in the Picacho and Galiuro Mountains are slightly farther from allotments under consideration (40-44 miles) than any documented one-way foraging flights. However, the maximum distance the species may fly during foraging bouts is unknown, and thus it is possible that bats from the Picacho roost may forage on the Millsite allotment, and bats from the Galiuros may forage on the Jones or other allotments. The Forest has proposed a bat roost survey for the southern portion of the Forest. The results of the survey should help clarify if the lesser long-nosed bat occurs on the Forest and the allotments under consultation.

Potential foraging habitats, in the form of saguaro or agave stands occur on all 19 allotments. Tables 1 and 2 of the BA characterize the vegetation communities of the allotments. Saguaros occur commonly in Sonoran Desert scrub communities below approximately 3,500 ft and rarely to as high as 4,500 ft (Benson 1982), whereas agaves may occur in many community types from low desert to high in the mountains. Desert agave occurs most frequently in Sonoran Desert scrub below 3,500 ft. Palmer's agave, which is the most important agave for lesser long-nosed bat in southeastern Arizona, is typically encountered in semidesert grasslands and lower woodland communities at 3,000-6,000 ft; while Parry's agave occurs in openings in woodlands and chaparral at 4,500-8,000 ft. Amole is distributed primarily south of the Salt River in semidesert grasslands and woodlands at 3,300-6,500 ft (Benson and Darrow 1982).

Vegetation community type maps and area by community type for each allotment are included in the BA. Allotments containing the greatest acreage of Sonoran Desert scrub, which could potentially provide foraging habitat for maternity roosts of lesser long-nosed bat, include the Sunflower 134,571 ac, Millsite 13,110 ha, Roosevelt 6,665 ha, and New River 16,616 ac allotments. The largest area of semidesert grasslands, chaparral, pinyon/juniper, or oak woodlands that likely support the greatest density of agaves for post-breeding lesser long-nosed bats is found on the Buzzard Roost 34,832 ac, Sunflower 34,439 ac, and Millsite 32,376 ac allotments.

Saguaros flower in May and fruits mature in June and July (Benson 1982). Lesser long-nosed bats feed on both the nectar and fruits of saguaros. When saguaro fruits are scarce or unavailable in late July or early August, agave nectar is the primary food resource for lesser long-nosed bats. Agaves typically bolt or flower and provide a nectar resource for foraging bats from about April 15 into October, depending on the agave. Palmer's agave, the most important agave for lesser long-nosed bats in southeastern Arizona, begins to bolt in May, and typically flowers from July through early October (Howell 1996, Slauson 1996). Because cattle are known to eat agave stalks, an important part of the baseline information needed to quantify effects is identification of those allotments in which cattle grazing would occur in agave habitat during bolting (April 15 to October). Also relevant are authorized upland utilization, range condition and trend, and soil condition. Proposed utilization is an indicator of future grazing intensity, while range condition and trend, and soil condition, are indicators of how grazing, other management, and natural processes have affected ecological condition. Available information on these topics is summarized in Table 21.

Current range condition and trend information is lacking for most allotments. Old range analysis data, often from the 1960s, were presented in the BA, but these data probably have little relevance today, except as a historical perspective. Many changes in livestock management have been implemented since the 1960s that have probably resulted in positive changes in range condition and trend. After realizing that the condition of many allotments were degraded, the Forest developed or revised allotment management plans for many of the allotments in Table 21 in the 1980s and 1990s. These AMPs implemented various forms of rest-rotation grazing systems, and sometimes reduced stocking rates or rested overutilized pastures. Additional changes were implemented in 1998 pursuant to the recommendations of the Forest's Endangered Species Act/National Forest Management Act Consistency Team. Unfortunately, virtually no data exist to document how range condition has responded to these management changes. These changes may have improved range condition in many areas.

Relevant to the lesser long-nosed bat, many changes in allotment management targeted distribution problems within the allotments. Often areas near water, particularly riparian areas, were overutilized, whereas sometimes upland areas were underutilized (see BA supporting information). Changes made to improve distribution may have, in some cases, increased numbers of cattle in uplands, which support saguaros and agaves used by the lesser long-nosed bat.

Soil condition varies greatly among the allotments, from mostly satisfactory (i.e., Bohme/Sleeping Beauty/Bellevue, Christopher Mountain/Ellinwood), to mostly unsatisfactory (H-4). Although grazing is probably a contributing factor in observed soil condition, other factors, including recent fires, are also important causes of deteriorated soil condition.

Grazing occurs during the agave bolting season in all but one allotment (Buzzard Roost); however, the number of cattle or pastures grazed while agaves are bolting varies greatly among allotments. No specific information is available about agave densities in areas grazed during the bolting season. Authorized maximum utilization rates vary from 30 to 60 percent of the current years' growth, although in some cases different utilization rates are assigned to different key species (Christopher Mountain/Ellinwood, Payson/Cross V, Star Valley). A 1995 Forest Plan amendment established an allowable use guide for specific areas that are not covered by an environmental assessment or allotment management plan. The guide establishes a maximum utilization of 50 percent, and lesser utilization in areas of less than excellent range condition that are not rested at least two years out of three. This guide would apply to the Bohme/Sleeping Beauty/Bellevue and Christopher Mountain/Ellinwood allotments, and the Cline pasture of the Sunflower allotment, for which neither environmental assessments nor allotment management plans have been developed. However, implementation of this part of the Forest Plan was stayed by a court decision.

Effects of the Action

The grazing program could affect the lesser long-nosed bat in two ways: 1) disturbance of roosts, and 2) reduced forage resources through adverse effects to saguaro and agave populations. Effects to roosts are speculative because no lesser long-nosed bat roosts are known to occur on the Forest. However, as discussed above, comprehensive surveys are needed to fully assess whether such roosts are present. Surveys for bats and potential roost sites were begun in 2000 (Debbie Lutch, Tonto NF, pers. comm., 2000). If roosts are present within the allotments, there is some potential for routes maintained (actively or through use) as part of the grazing program to facilitate public access to roosts. Lesser long-nosed bats are very sensitive to human disturbance.

Lesser long-nosed bats require suitable forage plants. Grazing can affect changes in saguaro and agave populations by directly affecting individuals through trampling or browsing, or indirectly through alteration of the vegetation community, degradation of soil and watershed conditions, and modification of the fire regime. The severity of adverse effects to lesser long-nosed bats resulting from potential reduction in forage resources caused by grazing is dependent on the importance of forage plants in a specific area to bat reproduction, survival, and growth. It seems likely that landscape-scale projects, such as a Forest-wide grazing program in areas with saguaros and agaves, could have some effects on bat foraging behavior, if bats are present. The Service considers loss of forage resources a great enough threat to include protection of foraging areas and food plants as a priority 1 task in the lesser long-nosed bat recovery plan.

As discussed in the "Effects of the Action" for the cactus ferruginous pygmy-owl, saguaro densities have been found to be reduced in grazed areas. Impacts due to livestock grazing activities may occur from trampling of young saguaros, grazing of nurse plants that results in

reduction or removal of protective cover, or grazing of the young saguaros themselves (Steenbergh and Lowe 1977, Abouhalder 1992). On the Forest, the density of saguaros was found to be reduced due to grazing, particularly in gentler, non-rocky terrain that cattle can easily access (Burgess 1964).

Often an objective of livestock management is to increase the abundance of grasses. Grasses are probably one of the strongest competitors with agave seedlings (Burgess, pers. comm., 1997). Increased abundance of grass could result in reduced agave abundance. When overgrazing results in declines of perennial grasses (Martin and Cable 1974, Eckert and Spencer 1987), there may be less competition between grasses and agaves.

Although data are few, there is some indication that ecological condition is degraded on many of the allotments. Soils are in unsatisfactory condition on many thousands of acres, and often on more than half of each allotment (Table 21). The Forest recognized that ecological condition was degraded on many allotments in the 1980s and made changes in livestock management in an attempt to reverse the damage. Data are lacking to evaluate whether those changes were successful in improving range condition; however, we suspect some improvement has occurred. Current grazing practices may not be the only, or even the primary cause of degraded conditions. Range vegetation and soil conditions may also be degraded by historic overgrazing; fire and subsequent erosion; changes in fire regimes; roads, off-road vehicles, urban, and other surface-disturbing activities; grazing by wildlife species; drought; floods; introduced non-native plants, such as Lehmann lovegrass; or combinations of factors (Humphrey 1958, Hastings and Turner 1965, Martin 1975, Brown and McDonald 1995, Wang *et al.* 1997). However, where ongoing and proposed utilization rates are relatively high (>40 percent), if authorized utilization represents what actually occurs on the ground, then, despite the cause of current degraded conditions, ranges in the allotments are unlikely to improve and degradation may continue. For instance, in semidesert grasslands, Holechek *et al.* (1998) recommended that utilization average about 35 percent (also see Holechek's May 27, 1999, letter to William N. Poorten, Tucson). For semidesert grass and shrub rangelands, Martin (1975) recommended that average utilization rates should be about 40 percent, but may range as high as 60 percent in dry years to as low as 20 percent in high production years. To affect an improvement in degraded range condition, lower utilization rates should be applied (Martin 1973, Holechek *et al.* 1998). The maximum utilization rates authorized by the Forest in key areas may not reflect average utilization over space and time within the allotments. However, because they are often higher than the averages recommended by Holechek and Martin, the potential exists for permitted grazing to utilize range plants to a degree that will continue to cause degradation, and prevent recovery of degraded conditions.

The Forest's grazing guidelines (1998) of 30 percent utilization in desert scrub communities below 1,219 m (4,000 ft) is probably adequate to maintain range condition, and some degraded areas are likely to improve if these standards are adhered to. This proposed use was developed to minimize adverse effects to the cactus ferruginous pygmy-owl. Unfortunately, the proposed use does not meet these standards in desert scrub in the following allotments: Seventy Six,

Bohme/Sleeping Beauty/Bellevue, Bronco, H-4, Millsite, Pinto Creek, Roosevelt, and Sunflower. Holechek (1988) and Holechek *et al.* (1998) found that, in desert scrub, average utilization rates of 25 to 35 percent are appropriate for maintaining range condition. The Forest's BA says that livestock numbers will be reduced, but it has not implemented the 30 percent utilization guidelines for desert scrub throughout much of the forest, including the above mentioned allotments consulted on herein. Utilization has been reduced for many of these allotments to 35 percent, however. This reduction will help to reduce trampling and browsing of forage plants and conditions for saguaro and agave establishment and growth is expected to improve.

In summary, the proposed action could potentially directly affect lesser long-nosed bat roosts and individual bats through enhanced public access, if any bat roosts occur on the allotments. If bats are present, they may also be affected indirectly through effects to their forage resources, saguaros and agaves. Indirect effects to agave and saguaro populations from grazing include direct browsing and trampling, deterioration of soil and watershed conditions, changes in plant communities, and altered fire regimes. Lesser long-nosed bats are opportunistic foragers and are capable of long distance flights. Temporary and minor shifts in the abundance of agaves and saguaros as a potential forage resource for these bats are expected to have limited adverse effects. However, as these impacts to lesser long-nosed bat food resources accumulate across large portions of the landscape, bat survivorship may be reduced through increased foraging flight distances and related energy expenditures, increased exposure to predators and likelihood of accidental death, changes in use patterns of limited large roost sites, and potential disruption of the "nectar corridor." These effects may be most evident in those years where weather patterns, fire, or other causes have also affected agaves and saguaros. The long-term effect of livestock use contributes to ecosystem based changes. The net result is that there are effects from livestock activities across the landscape to the ecosystem upon which the lesser long-nosed bat depends. Exactly how this alters the distribution and abundance of agaves and saguaros probably depends on site-specific conditions and grazing prescriptions.

Cumulative Effects

Cumulative effects are those adverse effects of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project. Effects of past Federal and private actions are considered in the Environmental Baseline. Most of the activities expected to occur on the allotments and adjacent areas would be authorized by the Forest, and thus the effects of such activities are not considered cumulative. However, the allotments contain numerous, small private inholdings. Activities such as residential development, farming, and other activities occur on many of these lands. These actions, the effects of which are considered cumulative, may result in small-scale loss or degradation of potential lesser long-nosed bat foraging habitat. Any grazing that occurs on these lands is likely interrelated or interdependent to the proposed action. Residential and commercial development and mining, and associated habitat loss, also occurs on private lands in the Payson, Globe-Miami, Superior, and other communities within the Forest.

Conclusion

After reviewing the status of the lesser long-nosed bat, the environmental baseline for the project area, the effects of the proposed action, and cumulative effects, it is the Service's biological opinion that proposed grazing activities are not likely to jeopardize the continued existence of the lesser long-nosed bat. No critical habitat has been designated for this species; therefore, none will be affected. Our conclusion that the proposed action is not likely to jeopardize the species is based on the following:

1. No lesser long-nosed bats or roosts have been found on the Tonto National Forest.

2. The allotments contain a large area of potential lesser long-nosed bat foraging habitat; however, no roosts are known to occur within the maximum recorded one-way light distance from the allotments.

INCIDENTAL TAKE STATEMENT

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

AMOUNT OR EXTENT OF TAKE

No lesser long-nosed bats have been found on the Forest. However, nearby records and the presence of roosts in the Picacho and Galiuro Mountains suggest the species likely occurs as a transient on the Forest, at a minimum. Because we have no evidence that the species occurs more frequently than as a transient, we anticipate no take of lesser long-nosed bats.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects

of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for the lesser long-nosed bat. In furtherance of the purposes of the Act, we recommend implementing the following actions:

1. Expand proposed surveys for lesser long-nosed bat roosts to the entire forest (Recovery Plan task 1).

2. Monitor livestock utilization within all pastures used during the agave bolting season of the allotments listed in Table 21 (Recovery Plan task 2).

3. Investigate and monitor the invasion of non-native plants that may alter fire frequencies and intensities on the Forest and assist other agencies in developing methods for controlling these species (Recovery Plan task 2).

4. Apply a maximum grazing utilization limit of 30 percent or less in all desert scrub, and 40 percent (or less) in other vegetation communities to emphasize management for lesser long-nosed bat forage resources and facilitate ecosystem health (Recovery Plan task 2).

5. Apply restrictions on the exposure of bolting agaves to livestock use Forest-wide, especially during drought years, so that no allotment has more than 50 percent of capable area accessible to livestock during the agave bolting period (April 15 through September 15) during any one year (Recovery Plan task 1).

6. Support investigations of the effects of livestock grazing on paniculate agaves and columnar cacti (Recovery Plan task 1).

7. Implement the lesser long-nosed bat recovery plan, as appropriate.

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

CACTUS FERRUGINOUS PYGMY-OWL (*Glaucidium brasilianum cactorum*)

Status of the Species

A detailed description of the life history and ecology of the pygmy-owl may be found in the *Birds of North America* (Proudfoot and Johnson 2000), *Ecology and conservation of the cactus ferruginous pygmy-owl in Arizona* (Cartron and Finch 2000), and other information available at the Arizona Ecological Services Field Office. Information specific to the pygmy-owl in Arizona is limited. Research in Texas has provided useful insights into the ecology of the subspecies, and

in some instances represents the best available information; however, habitat and environmental conditions are somewhat different in Arizona and conclusions based on Texas information are tentative.

The Service listed the Arizona population of the pygmy-owl as a distinct population segment (DPS) on March 10, 1997 (U.S. Fish and Wildlife Service 1997a). The past and present destruction, modification, or curtailment of habitat is the primary reason for the decrease in population levels of the pygmy-owl. On July 12, 1999 we designated approximately 731,712 acres of critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa counties in Arizona (U.S. Fish and Wildlife Service 1999d). However, on September 21, 2001, the U.S. District Court for the District of Arizona vacated this final rule designating critical habitat for the pygmy-owl, and remanded its designation back to the Service for further consideration.

Life history

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

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

Over the past several decades, pygmy-owls have been primarily found in the Arizona Upland Subdivision of the Sonoran Desert, particularly Sonoran Desert scrub (Brown 1994). This community in southern Arizona consists of paloverde, ironwood, mesquite, acacia, bursage (*Ambrosia* spp.), and columnar cacti (Phillips *et al.* 1964, Monson and Phillips 1981, Davis and Russell 1990, Johnson and Haight 1985, Johnsgard 1988). However, over the past several years, pygmy-owls have also been found in riparian and xeroriparian habitats and mesquite-invaded semidesert grasslands as classified by Brown (1994). Desert scrub communities are characterized by an abundance of saguaros or large trees, and a diversity of plant species and

vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. Semidesert grasslands have experienced the invasion of velvet mesquites (*Prosopis velutina*) in uplands and linear woodlands of various tree species along bottoms and washes.

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

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

Pygmy-owls are considered non-migratory throughout their range by most authors, and have been reported during the winter months in several locations, including Organ Pipe Cactus National Monument (OPCNM) (R. Johnson unpubl. data, T. Tibbitts, OPCNM unpubl. data). Pygmy-owls begin nesting activities in late winter to early spring. In Arizona differences between nest sites may vary by as much as two months (Abbate *et al.* 1996, S. Richardson, Arizona Game and Fish Department [AGFD] unpubl. data). As with other avian species, this may be the result of a second brood or a second nesting attempt following an initial failure (Abbate *et al.* 1996). In Texas, juveniles remained within approximately 165 feet of adults until dispersal. Dispersal distances (straight line) of 20 juveniles monitored from their natal sites to nest sites the following year averaged 5 miles (ranged from 0.75 to 19 miles, G. Proudfoot unpubl. data). Telemetry studies of dispersing juveniles in Arizona during 1999 and 2000 ranged from 1.4 to 12.9 miles (straight line distance) (n=6, mean 6.2 miles) in 1999, and 1.6 to 11.7 miles (n=6, mean 5.8 miles) in 2000 (S. Richardson and M. Ingraldi, AGFD unpubl. data). Pygmy-owl telemetry studies have documented movement of owls between southern Pinal County and northwestern Tucson (S. Richardson and M. Ingraldi, AGFD unpubl. data). Juveniles typically dispersed from natal areas in July but did not appear to defend a territory until September. They may move up to one mile in a night; however, they typically fly short distances from tree to tree instead of long

single flights (S. Richardson, AGFD unpubl. data). Subsequent surveys during the spring have found that locations of male pygmy-owls are in the same general location as last observed the preceding fall.

Apparently unpaired females may also remain in the same territory for some period of time. In the spring of 2001, an unpaired female (the male died in 2000) remained in its previous years' territory well into the spring, exhibiting territorial behavior (calling) for 2 months until ultimately switching territories and paring with an unpaired male and successfully nesting (S. Richardson, AGFD unpubl. data). Researchers suspect that if this unpaired female could have attracted an unpaired male during that time, she would have likely remained in her original territory. Apparently at some point the urge to pair is too strong to remain and they seek out new mates.

In Texas, Proudfoot (1996) noted that, pygmy-owls used between 3 and 57 acres during the incubation period, and they defend areas up to 279 acres in the winter. Therefore, a 280 acre home range is considered necessary for pygmy-owls. Proudfoot and Johnson (2000) indicate males defend areas with radii from 1,100 - 2,000 feet. Initial results from ongoing studies in Texas indicate that the home range of pygmy-owls may also expand substantially during dry years (G. Proudfoot unpubl. data).

Species status and distribution range wide

The pygmy-owl is one of four subspecies of ferruginous pygmy-owl. Pygmy-owls are known to occur from lowland central Arizona south through western Mexico to the States of Colima and Michoacan, and from southern Texas south through the Mexican States of Tamaulipas and Nuevo Leon. It is unclear at this time if the ranges of the eastern and western populations of the ferruginous pygmy-owl merge in southern Mexico. Recent genetic studies suggest that ferruginous pygmy-owl populations in southern Arizona and southern Texas are distinct subspecies, and that there is no genetic isolation between populations in the United States and those immediately south of the border in northwestern or northeastern Mexico (Proudfoot and Slack 2001). Results also indicate a comparatively low haplotypic diversity in the northwestern Tucson population, suggesting that it may be recently separated from those in the Altar Valley, Arizona, and in Sonora and Sinaloa, Mexico.

The Service is currently funding habitat studies and surveys in Sonora, Mexico to determine the distribution and relative abundance of the pygmy-owl there. Preliminary results indicate that pygmy-owls are present in northern and central Sonora (U.S. Fish and Wildlife Service unpubl. data) although, based on the lack of sightings, they may be rare or uncommon in northern Sonora (Hunter 1988, U.S. Fish and Wildlife Service 1997a). Further studies are needed to determine their distribution in Mexico.

The range of the Arizona DPS of the pygmy-owl extends from the International Border with Mexico north to central Arizona. The northernmost historic record for the pygmy-owl is from New River, Arizona, about 35 miles north of Phoenix, where Fisher (1893) reported the pygmy-owl to be "quite common" in thickets of intermixed mesquite and saguaro cactus. According to

early surveys referenced in the literature, the pygmy-owl, prior to the mid-1900s, was "not uncommon," "of common occurrence," and a "fairly numerous" resident of lowland central and southern Arizona in cottonwood forests, mesquite-cottonwood woodlands, and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz rivers and various tributaries (Breninger 1898, Gilman 1909, Swarth 1914). Additionally, pygmy-owls were detected at Dudleyville on the San Pedro River as recently as 1985 and 1986 (AGFD unpubl. data, Hunter 1988).

Records from the eastern portion of the pygmy-owl's range include a 1876 record from Camp Goodwin (nearby current day Geronimo) on the Gila River, and a 1978 record from Gillard Hot Springs, also on the Gila River. Pygmy-owls have been found as far west as the Cabeza Prieta Tanks, Yuma County, in 1955 (Monson 1998).

Hunter (1988) found fewer than 20 verified records of pygmy-owls in Arizona for the period of 1971 to 1988. Formal surveys for the pygmy-owl on OPCNM began in 1990, with one located that year. Beginning in 1992, survey efforts conducted in cooperation with the AGFD, located three single pygmy-owls on OPCNM (U.S. Fish and Wildlife Service and OPCNM unpubl. data). In 1993, surveys were conducted at locations where pygmy-owls had been sighted since 1970. Only one pygmy-owl was detected during these survey periods, and it was located in northwestern Tucson (Felley and Corman 1993). In 1994, a pair and single owl of unknown breeding status were located in northwestern Tucson during informal survey work by AGFD (Abbate *et al.* 1996). In 1995, AGFD confirmed 5 adult pygmy-owl and one juvenile, one of which was the first nest in many years. In 1996, AGFD focused their survey efforts in the Tucson Basin. A total of 12 pygmy-owls were detected, including one known nesting pair and their 2 successful fledglings. Three additional pygmy-owls and three other unconfirmed reports were also recorded at OPCNM in 1996.

While the majority of Arizona pygmy-owl detections in the last seven years have been from the northwestern Tucson area in Pima County, pygmy-owls have also been detected in southern Pinal County, at OPCNM, Cabeza Prieta National Wildlife Refuge (CPNWR), Buenos Aires National Wildlife Refuge (BANWR), and on the Coronado National Forest. The following is a brief summary of recent owl numbers and distribution[4]:

In 1997, survey efforts of AGFD located a total of five pygmy-owls in the Tucson Basin study area (the area bounded to the north by the Picacho Mountains, the east by the Santa Catalina and Rincon mountains, the south by the Santa Rita and Sierrita mountains, and the Tucson Mountains to the west). Of these owls, one pair successfully fledged two young which were banded. Two adult males were also located at OPCNM, with one reported from a previously unoccupied area (T. Tibbitts, OPCNM pers. comm. 1997).

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[4] To a large degree, survey effort plays an important factor in where owls have been documented. Survey effort has not been consistent over the past several years in all areas of the state, affecting the known distribution and numbers of owls in any particular area.

In 1998, survey efforts in Arizona increased substantially and, as a result, more pygmy-owls were documented, which may at least in part account for a larger number of known owls. In 1998, a total of 35 pygmy-owls were confirmed (S. Richardson, AGFD unpubl. data, U.S. Fish and Wildlife Service unpubl. data, T. Tibbitts, OPCNM unpubl. data, D. Bieber, Coronado National Forest unpubl. data).

In 1999, a total of 41 adult pygmy-owls were found in Arizona at 28 sites. Of these sites, 11 had nesting confirmed by AGFD and the Service. Pygmy-owls were found in three distinct regions of the state: Tucson Basin, Altar Valley, and OPCNM. Almost half of the known owl sites were in the Altar Valley. Overall, mortality was documented for a number of fledglings due to natural (e.g., predation) or unknown causes. Of the 33 young found, only 16 were documented as surviving until dispersal (juveniles known to have successfully dispersed from their natal area). It is unclear what the survival rate for pygmy-owls is; however, as with other owls and raptors, a high mortality (50 percent or more) of young is typical during the first year of life.

Surveys conducted in 2000 resulted in 24 confirmed pygmy-owl sites (i.e. nests and resident pygmy-owl sites) and several other unconfirmed sites (S. Richardson, AGFD unpubl. data, T. Tibbitts, OPCNM unpubl. data, U.S. Fish and Wildlife Service unpubl. data). A total of 34 adult pygmy-owls were confirmed. Nesting was documented at 7 sites and 23 fledglings were confirmed; however, as in 1999, over a 50 percent fledgling mortality was documented (S. Richardson, AGFD unpubl. data). A total of 9 juveniles were known to have successfully dispersed from their natal areas in 2000. Successful dispersal was not confirmed at two nests with four fledglings. The status of the remaining fledglings was unknown; however, they were presumed dead.

Surveys conducted during the recently completed 2001 season resulted in a total of 46 adult pygmy-owls confirmed at 29 sites[5] in Arizona (S. Richardson, AGFD unpubl. data, T. Tibbitts, OPCNM unpubl. data, U.S. Fish and Wildlife Service unpubl. data). There were also several other unconfirmed sites that are not included in these totals. Nesting was documented at 17 sites; it is unknown at this time how many young have successfully fledged. The following regions of the state are currently known to support pygmy-owls:

- **Tucson Basin** (northwestern Tucson and southern Pinal County) - A total of 8 adults (3 pairs and 2 single males) were confirmed at 5 sites, all of which were in Pima County. For the first time in 3 years, no pygmy-owls were documented in southern Pinal County. Three nests in northwestern Tucson were confirmed, all with young.

- **Altar Valley** - A total of 19 adult pygmy-owls were documented at 12 sites. As a result of increased access to portions of the valley, the number of known owls increased to 7 pairs and 5 resident single owls. A total of 7 nests were confirmed.

[5] Pygmy-owl sites are nests and resident male pygmy-owl sites that have been confirmed by AGFD or the Service.

- **OPCNM and CPNWR** - Ten adults, consisting of 3 pairs and 4 single pygmy-owls were confirmed at 7 sites. Three nests were active. Two new sites were documented on the CPNWR.

- **Other** - A total of 9 adults, consisting of 4 pairs and 1 single pygmy-owl at 5 sites documented elsewhere in southern Arizona. Nesting was confirmed at 4 of these sites. It is unknown how many of these young successfully dispersed. There were several other possible pygmy-owl detections reported elsewhere in the state, but they were not confirmed.

One factor affecting the known distribution of pygmy-owls in Arizona is where early naturalists spent most of their time and where recent surveys have taken place. For example, a majority of surveys in the recent past (since 1993) have taken place in OPCNM and in the Tucson Basin, and these areas are where most owl locations have been recorded. However, over the past three years, large, previously unsurveyed areas have been inventoried for owls, resulting in a much wider distribution than previously thought. As a result, our knowledge is changing as to pygmy-owl distribution and habitat needs as new information is collected. For example, before 1998, very few surveys had been completed in the Altar Valley in southern Pima County. Prior to 1999, the highest known concentration of pygmy-owls in the state was in northwestern Tucson. However, in 1999, after extensive surveys in Altar Valley, more owls were found there (18 adults) than in northwestern Tucson (11 adults), although until 2001, there have been fewer nest sites found in Altar Valley than in the Tucson Basin (S. Richardson, AGFD unpubl. data).

Range wide trend

The Service determined that the CFPO in Arizona was endangered because of the following three factors (US Fish and Wildlife Service 1997a):

1. present or threatened destruction, modification, or curtailment of its habitat or range;

2. inadequacy of existing regulatory mechanisms; and

3. other natural or manmade factors, which included low genetic variability.

The Service believes that the past and present destruction, modification, or curtailment of habitat is the primary reason for the decrease in population levels of the pygmy-owl. The most urgent threat to pygmy-owls in Arizona is thought to be the loss and fragmentation of habitat (U.S. Fish and Wildlife Service 1997a, Abbate *et al.* 1999). The complete removal of vegetation and natural features required for many large scale and high-density developments directly and indirectly effects pygmy-owl survival and recovery (Abbate *et al.* 1999).

Habitat loss, degradation, and fragmentation are widely accepted causes contributing to raptor population declines worldwide (Snyder and Snyder 1975, Newton 1979, LeFranc and Millsap 1984). Habitat fragmentation is the process by which a large and continuous block of natural

habitat is transformed into much smaller and isolated patches by human activity (Noss and Csuti 1994). Fragmentation has two components (1) reduction of the total amount of habitat type and (2) apportionment of remaining habitat into smaller, more isolated patches (Harris 1984, Wilcove *et al.* 1986, Saunders *et al.* 1991).

Nesting in small natural patches may have additional risks. For example, Haug (1985) found burrowing owl home range size increases with the percentage of vegetation disturbance. In fragmented landscapes, burrowing owls may forage greater distances and spend more time away from the nest, making them more vulnerable to predators, and therefore, less efficient at reproduction (Warnock and James 1997). As fragmentation increases, competition for fewer productive pygmy-owl territories may occur (Abbate *et al.* 1999). Unlike other larger birds that can fly long distances over unsuitable or dangerous areas to establish new territories, pygmy-owls, because of their small size and their short style of flight, are exposed to greater risks from predation and other threats (Abbate *et al.* 1999).

Site tenacity in birds is one of many factors that may create time lags in response to fragmentation and other disturbances. Individuals may remain in sites where they bred successfully in the past, long after the habitat has been altered (Wiens 1985). Because of lack of data, it is unclear whether site tenacity for pygmy-owls is a factor in the increasingly fragmented landscapes that exists in the action area. For example, researchers have been closely monitoring an established pygmy-owl site (documented each year since 1996) in which the male died in 1999, apparently from a collision with a fence (S. Richardson, AGFD unpubl. data.). This site was not known to be occupied since 1999. This site has the highest amount of development (33 percent) within its estimated home range of any other known nest site (S. Richardson, AGFD unpubl. data.). The site will continued to be monitored to determine if new owls reestablish a nest site.

In northwestern Tucson, all currently known pygmy-owl locations, particularly nest sites, are in low-density housing areas where abundant native vegetation separates structures. Additionally, they are adjacent to or near large tracts of undeveloped land. Pygmy-owls appear to use non-native vegetation to a certain extent, and have been observed perching in non-native trees in close proximity to individual residences. However, the persistence of pygmy-owls in areas with an abundance of native vegetation indicates that a complete modification of natural conditions likely results in unsuitable habitat conditions for pygmy-owls. While development activities are occurring in close proximity to owl sites, particularly nest sites, overall noise levels are low. Housing density is low, and as a result, human presence is also generally low. Roads in the areas are typically dirt or two-lane paved roads with low speed limits that minimize traffic noise. Low density housing areas generally have lower levels of traffic noise because of the limited number of vehicles traveling through the area.

Other factors contributing to the decline of pygmy-owl habitat include the destruction of riparian bottomland forests and bosques. It is estimated that 85 to 90 percent of low-elevation riparian habitats in the southwestern U.S. have been modified or lost; these alterations and losses are attributed to woodcutting, non-native plant invasion, urban and agricultural encroachment, water

diversion and impoundment, channelization, groundwater pumping, livestock overgrazing, and hydrologic changes resulting from various land-use practices (e.g., Phillips *et al.* 1964, Carothers 1977, Kusler 1985, Jahrsdoerfer and Leslie 1988, U.S. General Accounting Office 1988, Szaro 1989, Dahl 1990, State of Arizona 1990, Bahre 1991). Cutting of trees for domestic and industrial fuel wood was so extensive throughout southern Arizona that, by the late 19th century, riparian forests within tens of miles of towns and mines had been decimated (Bahre 1991). Mesquite was a favored species because of its excellent fuel qualities. The famous vast forests of "giant mesquites" along the Santa Cruz River in the Tucson area described by Swarth (1905) and Willard (1912) fell to this threat, as did the "heavy mesquite thickets" where Bendire (1888) collected pygmy-owl specimens along Rillito Creek, a Santa Cruz River tributary, in present-day Tucson. Only remnant fragments of these bosques remain.

Regardless of past distribution in riparian areas, it is clear that the pygmy-owl has declined throughout Arizona to the degree that it is now extremely limited in distribution in the state (Johnson *et al.* 1979, Monson and Phillips 1981, Davis and Russell 1990, Johnson-Duncan *et al.* 1988, Millsap and Johnson 1988, Monson 1998). A very low number of pygmy-owls in riparian areas in recent years may reflect the loss of habitat connectivity rather than the lack of suitability (Cartron *et al.* 2000b).

In recent decades, the pygmy-owl's riparian habitat has continued to be modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips *et al.* 1964, Brown *et al.* 1977, State of Arizona 1990, Bahre 1991, Stromberg *et al.* 1992, Stromberg 1993a and 1993b). Sonoran desert scrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced pygmy-owl habitat. Diversion and pumping result in diminished surface flows, and consequent reductions in riparian vegetation are likely (Brown *et al.* 1977, Stromberg *et al.* 1992, Stromberg 1993a and 1993b). Channelization often alters stream banks and fluvial dynamics necessary to maintain native riparian vegetation. The series of dams along most major southwestern rivers (e.g., Colorado, Gila, Salt, and Verde rivers) have altered riparian habitat downstream of dams through hydrological and vegetational changes, and have inundated former habitat upstream.

In the United States, pygmy-owls are rare and highly sought by bird watchers, who concentrate at a few of the remaining known locations. Limited, conservative bird watching is probably not harmful; however, excessive attention and playing of tape-recorded calls may at times constitute harassment and affect the occurrence and behavior of the pygmy-owl (Oberholser 1974, Tewes 1993). For example, in 1996, a resident in Tucson reported a pygmy-owl sighting which subsequently was added to a local birding hotline and the location was added to their website on the internet. Several car loads of birders were later observed in the area of the reported location (S. Richardson, AGFD pers. comm. 1999).

One of the few areas in Texas known to support pygmy-owls continues to be widely publicized as having organized field trips and birding festivals (American Birding Association 1993, Tropical Birds of the Border 1999). Resident pygmy-owls are found at this highly visited area

only early in the breeding season, while later in the season they could not be detected. O'Neil (1990) also indicated that five birds initially detected in southern Texas failed to respond after repeated visits by birding tours. It is unknown if the birds habituate to the playing of taped calls and stopped responding, or if they abandoned the area. Oberholser (1974) and Hunter (1988) additionally indicated that in southern Texas recreational birdwatching may disturb owls at highly visited areas.

Human activities near nests at critical periods of the nesting cycle may cause pygmy-owls to abandon their nest sites. In Texas, 3 of 102 pygmy-owl nests monitored from 1994-1999 were abandoned during the early stage of egg laying. Although unknown factors may have contributed to this abandonment, researchers in Texas associated nest abandonment with nest monitoring (G. Proudfoot pers. comm.). Some outdoor recreational activities (e.g., off road vehicle [ORV] and motor bike use/racing, firearm target practicing, jeep tours, etc.) may disturb pygmy-owls during their breeding season (particularly from February through July, G. Proudfoot pers. comm. 1999 and S. Richardson, AGFD pers. comm. 1999). Noise disturbance during the breeding season may affect productivity; disturbance outside of this period may affect the energy balance and, therefore survival. Wildlife may respond to noise disturbances during the breeding season by abandoning their nests or young (Knight and Cole 1995). It has also become apparent that disturbance outside of a species' breeding season may have equally severe effects (Skagen *et al.* 1991).

Individual pygmy-owls may react differently to noise disturbances, some individuals exhibiting less tolerance than others. Noise can affect animals by disturbing them to the point that detectable change in behavior may occur. Such behavioral changes can affect their activity and energy consumption (Bowles 1995). Dangerous or unfamiliar noises are more likely to arouse wildlife than harmless and familiar noises. Habituation is the crucial determinant of success in the presence of noisy disturbances. Exposures of some experienced birds may produce no or minimal losses (Black *et al.* 1984). The habituation process can occur slowly, so it may not be detected in the short-term. In the long-term, some nesting birds become more tenacious and less responsive in the presence of human disturbance if they are not deliberately harassed (Burger and Gochfeld 1981). It is unknown if noise habituation occurs in some pygmy-owls as it does with other bird species. Robert and Ralph (1975), Schreiber *et al.* (1979), Cooke (1980), Parsons and Burger (1982), Ainley *et al.* (1983), and McNicholl (1983) found that adult birds, and chicks to some extent, habituated to the presence of humans, and their responses to people seemed to be less than those of undisturbed birds. Burger and Gochfeld (1981) and Knight *et al.* (1987) found responses to noise disturbances and habituation in nesting birds become more tenacious and less responsive in the presence of human disturbance if they were not deliberately harassed.

Raptors in frequent contact with human activities tend to be less sensitive to additional noise disturbances than raptors nesting in remote areas. However, exposure to direct human harassment may make raptors more sensitive to noise disturbances (Newton 1979). Where prey is abundant, raptors may even occupy areas of high human activity, such as cities and airports (Newton 1979, Ratcliffe 1980, White *et al.* 1988). The timing, frequency, and predictability of the noise disturbance may also be factors. Raptors become less sensitive to human disturbance

as their nesting cycle progresses (Newton 1979). Studies have suggested that human activities within breeding and nesting territories could affect raptors by changing home range movements (Anderson *et al.* 1990) and causing nest abandonment (Postovit and Postovit 1987, Porter *et al.* 1973).

Application of pesticides and herbicides in Arizona occurs year-round, and these chemicals pose a potential threat to the pygmy-owl. The presence of pygmy-owls in proximity to residences, golf courses, agricultural fields, and nurseries may cause direct exposure to pesticides and herbicides. Furthermore, ingestion of affected prey items may cause death or reproductive failure (Abbate *et al.* 1999). Illegal dumping of waste also occurs in areas occupied by pygmy-owls and may be a threat to pygmy-owls and their prey; in one case, drums of toxic solvents were found within one mile of a pygmy-owl detection (Abbate *et al.* 1999).

Little is known about the rate or causes of mortality in pygmy-owls; however, they are susceptible to predation from a wide variety of species. In Texas, eggs and nestlings were depredated by racoons (*Procyon lotor*) and bullsnakes (*Pituophis melanoleucus*). Both adult and juvenile pygmy-owls are likely killed by great horned owls (*Bubo virginianus*), Harris' hawks *(Parabuteo unicinctus*), Cooper's hawks, and eastern screech-owls (*Otus asio*) (Proudfoot and Johnson 2000, G. Proudfoot unpubl. data). Pygmy-owls are particularly vulnerable to predation and other threats during and shortly after fledging (Abbate *et al.* 1999). Therefore, cover near nest sites may be important for young to fledge successfully (Wilcox *et al.* 1999, Wilcox *et al.* 2000). Although nest depredation has not been recorded in Arizona, only a few nests have been monitored (n = 21 from 1996-1999). Additional research is needed to determine the effects of predation, including nest depredation, on pygmy-owls in Arizona and elsewhere.

Another factor that may affect pygmy-owls is interspecific competition/predation. In Texas, depredation of two adult female pygmy-owls nesting close to screech-owls was recorded. These incidences were recorded as "depredation by screech-owl" after examination of the pygmy-owl corpses and assessment of circumstances (i.e., one pygmy-owl attempted to nest in a box that was previously used as screech-owl roost site, the other established a nest in a box within 16 feet of screech-owl nest site). In 2001, an unpaired female pygmy-owl was found dead in a tree cavity, apparently killed by a screech-owl (S. Richardson, AGFD unpubl. data). Conversely, pygmy-owls and screech-owls have also been recorded successfully nesting within 7 feet of each other in the same tree without interspecific conflict (G. Proudfoot, unpubl. data). The relationship between pygmy-owl and other similar small owl species needs further study.

Direct and indirect human-caused mortalities (e.g., collisions with cars, glass windows, fences, power lines, domestic cats [*Felis domesticus*], etc.), while likely uncommon, are often underestimated, and probably increase as human interactions with owls increase (Banks 1979, Klem 1979, Churcher and Lawton 1987). This may be particularly important in the Tucson area where many pygmy-owls are located. Pygmy-owls flying into windows and fences, resulting in serious injuries or death to the birds, have been documented twice. A pygmy-owl collided into a closed window of a parked vehicle; it eventually flew off, but had a dilated pupil in one eye indicating serious neurological injury as the result of this encounter (Abbate *et al.* 1999). In

another incident, an adult owl was found dead on a fence wire; apparently it flew into a fence and died (S. Richardson, AGFD, unpubl. data). AGFD also has documented an incident of individuals shooting BB guns at birds perched on a saguaro which contained an active pygmy-owl nest. In Texas, two adult pygmy-owls and one fledging were killed by a domestic cat. These owls used a nest box about 246 feet from a human residence. Free roaming cats can also affect the number of lizards, birds, and other prey species available to pygmy-owls; however, very little research has been done in the Southwest on this potential problem.

Because pygmy-owls have been observed moving around the perimeter of golf courses, avoiding non-vegetated areas, roads and other openings may act as barriers to their movements (Abbate *et al.* 1999, S. Richardson, AGFD unpubl. data). On one occasion, a radio-tagged dispersing juvenile stopped within 0.7 mile of Interstate 10 where there were large openings and few trees or shrubs, and reversed its direction (Abbate *et al.* 1999). However, radio-tagged, juvenile pygmy-owls have been observed on several occasions crossing two-lane roads with light to moderately heavy vehicular traffic, where trees and large shrubs were present on either side (Abbate *et al.* 1999).

Fires can affect pygmy-owls by altering their habitat (Abbate *et al.* 1999). A recent fire altered habitat near an active pygmy-owl nest site (Flesch 1999) and although four mature saguaros in the area survived (at least in the short-term), post-fire mortality of saguaros has been recorded (Steenbergh and Lowe 1977 and 1983, McLaughlin and Bowers 1982, Esque *et al.* 2000). Flesch (1999) also noted that approximately 20 to 30 percent of the mesquite woodland within 164 feet of the nest was fire- or top-killed, and ground cover was also eliminated until the summer monsoons. Careful use of prescribed fires in areas potentially suitable for pygmy-owls is necessary so that habitat is not lost or degraded (Flesch 1999).

Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. Caughley and Gunn (1996) further note that small populations can become extinct entirely by chance even when their members are healthy and the environment favorable. The pairing of siblings or parents with their offspring, particularly in raptors, is rare, and has been documented in only 18 cases, representing 7 species (Carlson *et al.* 1998). Four of these species were owls: barn owls, burrowing owls (*Athene cunicularia*), screech-owls, and spotted owls (*Strix occidentalis*). In 1998 and 1999, two cases of sibling pygmy-owls pairing and breeding were documented (Abbate *et al.* 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within their dispersal range, and/or from barriers (including fragmentation of habitat) that has influenced dispersal and limited the movement of young owls (Abbate *et al.* 1999). Further, because the pygmy-owl is nonmigratory, there may be an additional limitation on the flow of genetic material between populations which may reduce the chance of demographic and genetic rescue from immigration from adjacent populations.

Environmental, demographic, and genetic stochasticity, and catastrophes have been identified as interacting factors that may contribute to a population's extinction (Hunter 1996). Environmental stochasticity refers to random variation in habitat quality parameters such as climate, nutrients,

water, cover, pollutants, and relationships with other species such as prey, predators, competitors, or pathogens. Demographic stochasticity is uncertainty due to random variation in reproductive success and survivorship of individuals. Genetic stochasticity is the random variation in gene frequencies of a population due to genetic drift, bottlenecks, inbreeding, and similar factors. Catastrophes are events such as droughts or hurricanes that occur randomly. When these factors interact with one another, there are likely to be a combination of effects, such that a random environmental change like habitat fragmentation can result in population and genetic changes by preventing dispersal. These factors are much more likely to cause extinction when a species' numbers are already extremely low. The small, fragmented population of pygmy-owls in Arizona may not have the ability to resist change or dramatic fluctuations over time caused by one or more of the factors mentioned above.

Trichomoniasis is a disease which may affect pygmy-owls. Because owls prey on finches, sparrows, and other seed-eating birds known to carry trichomoniasis, they have a higher risk of contracting the disease. According to Boal and Mannan (1996), raptors in urban areas experience greater exposure to trichomoniasis, resulting in high mortality of raptor nestlings. No studies have been completed to date on the pygmy-owl in urban or other areas to determine if, in fact, they have been affected by this disease; however studies have recently been initiated (S. Richardson, pers. comm., 1999).

An additional potential threat to the pygmy-owl is low recruitment. Recruitment is the number of young who survive long enough to leave the nest per nesting attempt. Proudfoot (1996) found through a study of four active nest cavities that only one was successful in fledging young. The recruitment rate for this study was 1.0 (four nesting attempts with four young fledging from one nest, while the other three nests failed). We do not know what recruitment rate would be necessary for pygmy-owls because of the lack of information on reproduction, longevity, natality, and mortality for this subspecies. However, Proudfoot estimated that, based on information for the eastern screech owl (*Otus asio*), a recruitment rate of 2.25 was necessary for a stable pygmy-owl population. AGFD is currently investigating what the recruitment rate for pygmy-owls is in the Tucson area (S. Richardson, pers. comm., 1999).

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including demographic stochasticity, where chance variations in birth and death rates can result in extinction. A series of environmental changes such as habitat reduction reduce populations to a state in which demographic stochasticity takes hold. In small populations such as with the pygmy-owl, each individual is important for its contributions to genetic variability of that population. As discussed above, low genetic variability can lead to a lowering in reproductive success and environmental adaptability, affecting recovery of this species.

In December 1998, the first Habitat Conservation Plan and section 10(a)(1)(B) permit for the pygmy-owl was approved for a guest ranch which may be converted to low density residential housing in northwest Tucson. Pima County is currently working with the Service on developing a county-wide Sonoran Desert Conservation Plan (SDCP) which, if approved, would give the county a section 10 permit for not only pygmy-owls but also potentially several other listed

species. No habitat restoration projects specific to the pygmy-owl exist for lands managed by the U.S. Government, Indian Nations, State agencies, or private parties. The Forest Service, BLM, and Bureau of Reclamation have focused attention in some areas on modifying livestock grazing practices in recent years, particularly as they affect riparian ecosystems. Several of these projects are within the currently known range of pygmy-owls, including historical locations.

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 current 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.

Pygmy-owls were historically widespread in, and immediately next to, the project area. Hunter (1988), Russell *in litt.* 1998, and the AGFD Heritage Data Management System list 36 records of pygmy-owls from New River (about 35 miles north of Phoenix) to the lower San Pedro River in eastern and southern Pinal County. Table 22 lists each pygmy-owl occurrence near Tonto National Forest in Maricopa and Pinal counties by general area, the date collected, reference, and the number of records collected.

Of those historical occurrences on record in the vicinity of the action area, several are near allotments addressed in this consultation. The Blue Point Cottonwood records are the most numerous and the most recent. This site is on the Salt River near the present day Blue Point recreation site and is within several miles of the southern boundary of the Sunflower allotment. There is also a record from the late 1800's from Cave Creek and one from New River, which are within several miles of the Bronco allotment. Records from the Gila River from the early 1900's may have been near the Millsite allotment. All of these allotments have potential or suitable habitat.

During 1997-99, the Forest conducted very limited pygmy-owl surveys in desert scrub and riparian communities along the Salt River from the Stewart Dam at Saguaro Lake, and along the Verde River north of Fort McDowell Indian Reservation (USDA Forest Service, unpubl. data; Johnson and Haight, unpubl. data, 1998). No pygmy-owls were detected during any of these surveys.

It is unclear how much suitable or potential pygmy-owl habitat occurs on the Forest. The Forest's BAE identified ten allotments that contain suitable or potential pygmy-owl habitat and on which on-going grazing is likely to adversely affect the pygmy owl: Bellvue, Bohme, Bronco, H-4, Millsite, Pinto Creek, Roosevelt, Seventy-Six, Sleeping Beauty, and Sunflower. Of these allotments, only Bohme and Bronco have satisfactory soil condition, and none have satisfactory riparian condition (of those that have riparian areas). Range condition and trend information was provided for only two of the ten allotments: the Millsite allotment, and the Desert and

Cottonwood units of the Sunflower allotment. The Millsite allotment (1992 data) indicated poor condition with four clusters in static trend and two clusters in upward trend. On the Sunflower allotment, the Desert unit is in poor condition with static trend based on 1992 data, and the Cottonwood unit is in fair condition with static trend based on 1983 data (USDA Forest Service 1999).

A comprehensive pygmy-owl habitat assessment analysis has not been completed within the Forest; however, based on the limited historical information currently available, potential suitable habitat is likely to be within riparian habitats. However, based on the distribution of recent records in Arizona, rich desert scrub communities may be the most likely place to find pygmy-owls. The historical perspective of the bird being primarily a riparian species may be due to disproportionate collecting along rivers where humans were concentrated, while the upland deserts were less intensively surveyed.

Over the past decade, most of the pygmy-owls have been found within the palo verde-mixed cacti series of the Arizona Upland Subdivision of Sonoran Desert scrub, and riparian and xeroriparian habitats within semidesert grasslands classified as following Brown (1982). Occupied sites in Sonoran Desert scrub are characterized by an abundance of saguaros or large trees, and a diversity of plant species and vegetation strata. Xeroriparian habitats contain a rich diversity of plants that support a wide array of prey species and provide cover. The density of annuals and grasses, as well as shrubs, is important to the pygmy-owl's prey base. Shrubs and large trees provide protection against aerial predation for juvenile and adult pygmy-owls. Saguaros and large trees provide substrate for nesting cavities in Sonoran Desert scrub, while trees with cavities provide nesting strata in deciduous forest riparian habitats.

While the only recent reports of pygmy-owls on the Forest (25 years old) are at Blue Point on the Salt River, numerous records indicate that pygmy-owls were at one time found at least in small numbers in portions of the geographic area encompassed by the proposed action. It is presently unclear how much suitable habitat may be present on the Forest since habitat assessments have not been completed.

Effects of the Action

No pygmy-owls are currently known to occur on the Forest. However, suitable habitat occurs on the forest and surveys have not been sufficient to conclude that this species is not present. Of the 20 allotments addressed in this consultation, the Forest Service has concluded that ten allotments have potentially suitable pygmy-owl habitat and that grazing and its associated activities may affect, and are likely to adversely affect, the pygmy-owl because they failed to meet one or more of the following guidance criteria of August 25, 1998 (USDA Forest Service 1998) and modified by the Service's memo dated September 18, 1998:

1. Livestock grazing is limited to utilization levels that avoid degradation of composition and vigor of understory vegetation or that preclude regeneration of any strata of vegetation and is limited to 30 percent utilization in desert scrub and xeroriparian areas and no more than 30 percent of the apical stems of seedling/sapling (0-6 ft) woody riparian species such as willows and cottonwoods in riparian areas in a given year;

2. Below 4,000 ft elevation, mature vegetation outside riparian (saguaro, mesquites, ironwood, etc.) is maintained with good ground cover for prey base; or

3. Livestock gathering activities do not occur within a 0.25 mile radius of an occupied site, or unsurveyed suitable habitat, between January 1 and June 30.

Table 31 of the BA summarizes the effects determination for allotments with an effect for each of the activities being analyzed under the grazing program (permitted use, grazing system, and utilization). The Forest Service (1999) assessed effects to species in each allotment addressed under this consultation.

The Forest Service has determined that each of the ten allotments contain areas of potentially suitable pygmy-owl habitat; however, the Forest Service has not developed a habitat assessment program to evaluate all areas below 4,000 ft that may be suitable habitat on the Forest. The BLM and the Coronado National Forest have both developed a habitat assessment procedure to evaluate potential habitat on their lands, resulting in a factored score which is used to prioritize surveys in areas with the highest quality habitat. These assessments have been developed in cooperation with the AGFD and the Service and consider specific vegetation conditions present within specific geographic regions of the state.

The loss of riparian habitat to a variety of uses, including livestock overgrazing, is considered one of the causes contributing to the decline of the pygmy-owl. Ohmart and Anderson (1986) note that structural complexity and mean canopy height of riparian forests are generally reduced where riparian systems are under heavy water management, livestock grazing, pollution, or recreational activities. Arizona Department of Environmental Quality (1993) notes that changes to plant community structure and age class structure occur by direct consumption of plants and by disturbances to soils. Because the most palatable plants are eaten first, remaining plants have a competitive advantage and become more widespread. Young, palatable plants of all species are consumed before they can mature and set seed. Furthermore, disturbance of soils may prevent establishment of seedlings, and can affect the roots of riparian plants with shallow root systems. Chaney *et al.* (1990) note that depleted upland vegetation can cause livestock to concentrate in riparian areas, causing further riparian losses. Damage to riparian areas from grazing without proper control of intensity, season, and duration can be long-lasting and potentially irreversible.

Direct results of livestock grazing include removal of vegetation cover and trampling of grass and brush. Indirect or delayed effects of grazing include altered forage composition, reduced vigor of plants, and accelerated soil erosion resulting in a reduction of land productivity. Long-term effects of heavy grazing often result in vegetation changes toward more xeric conditions (Wiens and Dyer 1975). Deterioration of western riparian systems began with severe overgrazing in the late nineteenth century (Chaney *et al.* 1990). Assessing the true impacts of livestock grazing in riparian systems is difficult since often there is no baseline information from which to draw significant conclusions (Krueper 1995). However, the observations of Croxen (1926) of dramatic livestock-related changes in riparian areas on the Tonto National Forest in the

first quarter of the 20th century (related herein in the "Environmental Baseline - Overview") suggest grazing at least contributed to historic and current degraded conditions of riparian pygmy-owl habitats.

Livestock overgrazing in riparian habitats is one of the most common causes of riparian degradation (Ames 1977, Carothers 1977, Behnke and Raleigh 1978, USDA Forest Service 1979, U.S. GAO 1988). Effects of overgrazing include changes in plant community structure, species composition, relative species abundance, and plant density (Bock *et al.* 1990). These changes are often linked to more widespread changes in watershed hydrology (Brown *et al.* 1977, Rea 1983, U.S. GAO 1988), and are likely to affect the habitat characteristics essential to the pygmy-owl. Blydenstein *et al.* (1957) found that heavy livestock use reduced biomass and diversity of annual forbs and grasses, and changed the composition of shrub species. Grazed riparian areas typically have less ground cover, a poorly developed understory and midstory, and decreased vegetation biomass when compared with similar ungrazed riparian areas (Krueper 1995).

Jones (1981) found that grazing reduced lizard abundance and variety in a number of habitats in western Arizona. Pianka (1966) discussed the importance of vegetation structure, and found communities with increased plant structures supported more lizard species than those with less structure. Overall, complex vegetation communities with a high degree of species diversity and structural heterogeneity provide habitat for many prey species including birds, insects, and mammals. Riparian communities, particularly where willows are found, support one of the richest and diverse insect fauna among plant communities which are also important to fish, amphibians, reptiles, birds, and small mammals (Southwood 1961). In addition, birds have been shown to respond to alterations in vegetation structure and species richness within riparian habitats (Bull and Slovin 1982, Szaro and Jakle 1985). Higher densities and diversity of birds have been found in ungrazed riparian habitats compared with adjacent grazed areas (Crouch 1981, Mosconi and Hutto 1981, Taylor 1986).

Grazing pressure on vegetation has also been shown to alter growth form, plant vigor, and plant species composition, resulting in increases or decreases in populations of bird species (Glinski 1977, Townsend and Smith 1977, Ryder 1980). Excessive livestock grazing can also affect types and abundance of food items for birds (Ryder 1980) and effects on small mammals may be similar (Krueper 1995). Raptors which use small mammals as prey may not choose to frequent submarginal riparian habitats for feeding due to lack of preferred prey items. Additionally, insect biomass may be decreased in riparian habitats which are heavily grazed due to the lack of understory vegetation (Krueper 1995). This can be particularly important to the pygmy-owl since reptiles, birds, and small mammals are important prey species.

Livestock will spend 5 to 30 times longer in riparian habitats than adjacent uplands, and typically congregate in floodplains in hotter, dryer summer months imposing heavy use during the heart of the growing season, and in many instances throughout the growing season (Skovlin 1984). In many areas of the West, the concentration of livestock in riparian habitats is exacerbated due to steep canyons, narrow riparian corridors, and limited accessability (Dahlem 1979). These

conditions are typical in areas that are likely to contain suitable pygmy-owl habitat on the Forest. Therefore, there is a potential for negative impacts from grazing on these habitats which may be important to pygmy-owls for food, cover, and nesting.

Steenbergh and Lowe (1977) examined saguaro density and recruitment at Saguaro National Park which, until recently, was grazed by livestock. In addition, Burgess (1964) examined saguaro populations on the Forest. They found that in Sonoran Desert scrub habitats, direct destruction of young saguaros has resulted from trampling by cattle seeking shade and forage beneath the crowns of desert trees, particularly palo verde and mesquite. They also found that livestock grazing has had the greatest impact in non-rocky habitats where germination, establishment, and survival of young saguaros are most directly dependent upon the physical protection of other vegetation. Grazing in rocky habitats has had far less impact upon young saguaro recruitment. They summarized that grazing has reduced the density of saguaro populations by decreasing the number of sites suitable for germination and establishment of young plants by increasing exposure to natural mortality-causing factors. Therefore, since most recent nest cavities used by pygmy-owls have been in saguaros in non-rocky habitat, activities which affect saguaro recruitment could be significant.

Stromberg (1993a, 1993b) notes that unregulated livestock grazing has been implicated as one of the primary causes of decadent age structures of trees, where stands have large, old trees, but few saplings or small trees. Additionally, Stromberg (1993a, 1993b) notes that reduced seedling establishment can result from browsing, trampling of seedlings, and reduction of a stabilizing herbaceous cover. Soil compaction associated with grazing can reduce the growth rate of existing trees by decreasing water percolation and the abundance of mycorrhizae and other critical soil components. Additional information on the effects of livestock grazing in riparian communities is found in the Effects of the Proposed Action for the Gila topminnow, southwestern willow flycatcher, and the Environmental Baseline - Overview.

Grazing in the watersheds of riparian communities may also affect riparian vegetation communities, stream hydrology, and channel morphology. In particular, degraded watersheds can result in higher peak flows, lower base flows, erosion and sedimentation of stream channels, and other effects, which are described in detail in the Effects of the Proposed Action for the southwester willow flycatcher and Gila topminnow.

In riparian areas and Sonoran Desert scrub communities, the Forest Service indicates that grazing levels have been set for minimal effects to the range and are not expected to result in take of the pygmy-owl. The Forest Service notes that ten allotments contain riparian habitat or Sonoran Desert scrub communities with potential habitat for the pygmy-owl. All of these are currently in some rotation type grazing systems, including holistic resource management (HRM), rest rotation, year-round, seasonal, deferred rotation, and modified Santa Rita.

Plant species found within Sonoran Desert scrub occupied by pygmy-owls include saguaro, blue palo verde *(Parkinsonia floridum*), ironwood, acacia, prickly pear (*Opuntia* spp.), and cholla (*Cylindropuntia* spp.), with dense patches of triangle-leaf bursage, and other shrub species in the

understory. A study conducted on the Sierra Ancha allotment of the Forest near Roosevelt Reservoir indicated that cattle diets were mainly annual grasses and forbs in March, April, and early May, and that shrubs made up only three to 10 percent of the diet in these months. However, in May, as annuals begin to dry out and jojoba and mesquite starts to grow, livestock begin browsing more heavily on these species. Jojoba made up 53 percent of their diet in late May, declining to 13 percent in October. Mesquite ranged from 15 to 40 percent of their diet from June through October (Smith *et al.* 1993b).

Smith *et al.* (1993a) conducted an additional study on the Santa Rita Experimental Range south of Tucson. Their study determined that grasses comprised approximately 55 percent of the year-round diet, reaching a peak of 78 percent in the summer and a low of 35 percent in early spring. Forbs were found to comprise minor percentages of the diet except in early spring when borages made up approximately 33 percent of the diet. Shrubs made up approximately 33 percent of the diet year-long, peaking at 55 percent in winter and 45 percent in spring. Smith *et al.* (1993a) note that *Opuntia* and mesquite were the major shrub components. The study also noted that utilization levels were 40 to 50 percent, so that selected forage was not influenced by a shortage of specific species due to overgrazing.

The Forest has concluded that in each of the ten allotments with potential pygmy-owl habitat, unsatisfactory conditions exist in one or more of the ratings of soil, riparian, or watershed. This suggests that these allotments have been adversely affected to some degree by past or current livestock grazing, fire suppression, prescribed fires, wildfires, timber harvest, road construction, settlement, water diversion, mining, and/or recreational activities. The Service is concerned about the potential adverse effects to any pygmy-owls that may occur in these allotments, which are all in various degrees of degraded condition, particularly since they contain unsurveyed potential habitat.

The Sunflower allotment is relatively close to historical pygmy-owl sites; the Cottonwood unit is within 7-9 miles of pygmy-owl sightings. The Forest Service (1999) has determined that the unit has unsatisfactory riparian and watershed conditions. In addition, the Millsite allotment, while not near owl sightings, also has unsatisfactory riparian and watershed conditions. The Service is particularly concerned that grazing activities and other ongoing management will continue to maintain or worsen these degraded conditions within unsurveyed potential suitable pygmy-owl habitat, especially within these two areas that are close to past pygmy-owl sightings or may impact nearby critical habitat.

In Sonoran Desert scrub, pygmy-owls are typically found in very well-developed thickets of desert vegetation and, within xeroriparian habitats, they appear to select relatively dense drainages lined with trees and shrubs. Grazing that reduces the structure and composition of desert scrub and xeroriparian communities below the site's potential likely adversely affect the suitability of the site as pygmy-owl habitat. Although grazing in semidesert grassland and Chihuahuan Desert scrub can cause a decrease in grasses and an increase in shrubby species (Holechek *et al.* 1994, Bahre 1995), this effect has not been documented in Sonoran Desert scrub. Grazing can result in reduced shrub cover (Webb and Stielstra 1979) and reduced

desirable shrubs (Orodho *et al.* 1990) in Mojave Desert scrub and Great Basin Desert scrub, respectively. Browsing of shrubs and young trees, trampling or browsing of saguaros and their nurse plants (Abouhalder 1992), and adverse effects to soils and cryptobiotic crusts are mechanisms by which the structure and composition of Sonoran Desert scrub could be affected by grazing. Reduction in shrub, tree, and columnar cactus cover and regeneration would degrade pygmy-owl habitat.

Changes to the structure and composition of xeroriparian and Sonoran Desert scrub communities and riparian habitats can result in a decreased prey base for the pygmy-owl, increased susceptibility of the pygmy-owl to its aerial predators, reduction in suitable nesting structures, and habitat fragmentation. The Service is particularly concerned with year-long grazing in riparian and Sonoran Desert scrub habitat. Although this grazing system (or lack of one) is not specifically proposed on any of the allotments in this consultation, errant cattle are common on the Forest, and year-round grazing probably occurs as often as not on many of these allotments. The Service believes that this type of grazing can, in the long-term, decrease potential nesting habitat for the pygmy-owl by suppressing regeneration of trees in riparian areas and by inhibiting recruitment of saguaros.

Livestock gathering activities which concentrate cattle or human activities such as at corrals, loading and unloading facilities, etc., may impact pygmy-owls if they are nesting near these areas during January 1 to June 30. Such activities may disturb nesting owls, causing them to not nest in a particular area, or abandon active nests, particularly during the period the female is incubating eggs. The Service is concerned that adverse impacts from such activities may occur to nesting pygmy-owls if they take place within 0.25 mile of unsurveyed habitat or a future known owl site. More research needs to be completed as to the effect disturbance has on pygmy-owls.

The proposed project area encompasses the northern portion of the historic range of this species, and includes areas that were likely historically occupied, or perhaps are still occupied, by pygmy-owls. The Forest Service has indicated that allotments in the project area encompass potential habitat for this species; however, surveys completed to date have been limited to a few small areas. Therefore, the occupancy status of this species on the Forest is tentative. The Service believes that there is a potential for pygmy-owls to occur in some of the Forest Service's allotments during the period covered under this biological opinion, and adverse effects could occur from the proposed action when grazing and associated activities exceed levels stated within the guidance criteria (USDA Forest Service 1999). Loss of vegetation essential for foraging and cover from aerial predators, as well as the potential decrease in nesting cavities from the loss of saguaros and browsing on mesquite, and suppression of riparian tree regeneration, as documented by the Forest Service (1999), could adversely affect this species in those allotments exceeding guidance criteria levels.

Cumulative Effects

Cumulative effects are those adverse effects of future non-Federal (State, local government, and private) actions that are reasonably certain to occur in the project area. Future Federal actions would be subject to the consultation requirements established in section 7 of the Act and,

therefore, are not considered cumulative to the proposed project. Effects of past Federal and private actions are considered in the Environmental Baseline. Due to the extent of the lands in the project area administered by Federal agencies, particularly the Forest Service and the BLM, many of the actions that are reasonably expected to occur in the general area would be subject to section 7 consultation. However, many activities are expected to occur on private and State lands that are not subject to the section 7 process.

Other activities expected to occur on non-Federal lands in potential pygmy-owl habitat include agriculture, grazing on private and State lands, and woodcutting. Grazing on private lands may, in some cases, be interrelated or interdependent to grazing on the Forest's allotments. Large-scale habitat fragmentation and loss of pygmy-owl habitat near the Forest may continue into the future and may further impact the owl. Areas lower than 4,000 ft in elevation within the Forest may be increasingly important habitat and may provide linkages and connectivity as adjacent areas are developed. State lands and other areas that are currently suitable habitat may be sold or developed, further impacting this species. In addition, recreational activities will undoubtably increase as more people move into the area.

Conclusion

After reviewing the status of the pygmy-owl, the environmental baseline for the action area, and the anticipated effects of the proposed action, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the pygmy-owl. Critical habitat is not currently designated for this species, thus none will be adversely modified. We present this conclusion for the following reasons:

1. No pygmy-owls have been found recently on the Forest, including any of the 20 allotments.

2. Forest utilization levels do not exceed 30 percent and are consistently monitored.

INCIDENTAL TAKE STATEMENT

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

AMOUNT OR EXTENT OF TAKE

Recent, comprehensive survey data documenting presence or absence of the pygmy-owl are lacking for the allotments addressed in this consultation. Therefore we anticipate no take of cactus ferruginous pygmy-owl.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act direct Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibilities for the cactus ferruginous pygmy-owl. In furtherance of the purposes of the Act, we recommend implementing the following discretionary actions:

1. The Forest has identified potential protection and mitigation measures for the pygmy-owl. One is to reduce livestock numbers to achieve a 30 percent utilization limit in riparian areas, desert washes, and desert scrub habitats which are potentially suitable habitat for the pygmy-owl. The Service believes this, in combination with the other protection measures stated in its BA (USDA Forest Service 1999), will substantially reduce the adverse impacts of livestock grazing within the project area to this species. However, to ensure this measure is fully met and management of these units are effective in reaching this objective, annual monitoring of utilization levels in each unit with potential pygmy-owl habitat should be completed and submitted to the Service in the report required for this opinion. If these utilization levels are not achieved in any unit, then we recommend the Forest state what measures will be undertaken to meet these criteria and when.

2. Develop a habitat assessment procedure and conduct assessments in cooperation with AGFD, the Service, and others to identify potential suitable pygmy-owl habitat areas. These agencies would meet annually to revise as appropriate the Forest's pygmy-owl habitat assessment methodology as new information is gathered and analyzed. The focus would be on vegetation communities found on the Forest in all potentially suitable pygmy-owl habitat where grazing and its associated activities might take place. Range site guides from the Natural Resource Conservation Service may be useful in this assessment.

3. Initiate surveys in accordance with current Service protocols for pygmy-owls in areas having potentially suitable habitat to determine the status of this species on the Forest. This information would assist the Service and others in developing and implementing a recovery strategy for this species. If a pygmy-owl is found on or near the Forest, the Forest Service may need to consult with the Service to address potential adverse effects.

4. Limit livestock gathering activities that concentrate livestock or humans within unsurveyed suitable habitat during the breeding season (between January 1 and June 30).

5. The Forest has identified the potential removal of all livestock handling, gathering, and shipping facilities from riparian areas and desert washes at a rate of one per year based on their level of impacts to pygmy-owl habitat in one of the potential protection and mitigation measures (USDA Forest Service 1999). The Service is concerned that many of these activities could continue to operate, further degrading already unsatisfactory habitat conditions. If there are numerous facilities present within the allotment, it may take several years for removal at a rate of one facility per year. The Forest should coordinate with the Service to identify and prioritize which facilities will be removed annually.

6. Encourage private landowners with riparian communities on their property to seek assistance in removing livestock from riparian areas or taking other riparian restoration measures. Funding may be available through the Service's Partners for Fish and Wildlife Program or other sources.

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

MEXICAN SPOTTED OWL (*Strix occidentalis lucida*)

Status of the Species

The Mexican spotted owl was listed as threatened on March 16, 1993 (US Fish and Wildlife Service 1993b). Critical habitat was designated for the species on June 6, 1995 (US Fish and Wildlife Service 1995b), but was later withdrawn (US Fish and Wildlife Service 1998b). It was redesignated in 2001; however no U.S. Forest Service lands were designated as critical habitat. The Mexican spotted owl was originally described from a specimen collected at Mount Tancitaro, Michoacan, Mexico, and named *Syrnium occidentale lucidum*. The genus was later changed to *Strix* and specific and subspecific names were changed to conform to taxonomic standards; the subspecies became *S. o. lucida*. The American Ornithologists' Union currently recognizes three spotted owl subspecies; the California, *S. o. occidentalis*; Mexican, *S. o. lucida*; and Northern, *S. o. caurina* (AOU 1957, 1983).

The Mexican spotted owl is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. Mexican spotted owls breed sporadically and do not nest every year. Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Nesting habitat is typically in areas with complex forest structure or rocky canyons, and contains mature or old-growth stands which are uneven-aged, multistoried, and have high canopy closure (Ganey and Balda 1989, US Fish and Wildlife Service 1991b).

Besides forested areas, Mexican spotted owls inhabit a variety of canyons. These canyons vary from those with a high degree of forested structure (coniferous or hardwood riparian woodlands) to those with little or no tree cover present. The common characteristic among these canyons is

steep to vertical rock walls in all or part of the canyon. These canyons are often used extensively when available. Rock-walled canyons generally are found at elevations below 7,500 ft above sea level and are occupied by owls as low as 3,700 ft (Ganey and Balda 1989).

Seasonal movement patterns of Mexican spotted owls are variable. Some individuals are year-round residents within an area, some remain in the same general area but show shifts in habitat-use patterns, and some migrate considerable distances, 12-31 miles, during the winter, generally migrating to more open habitats at lower elevations (Ganey and Balda 1989, Willey 1993, Ganey *et al.* 1998).

The Mexican Spotted Owl Recovery Plan (US Fish and Wildlife Service 1995c) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. "Protected habitat" includes all known owl sites, and all areas in mixed conifer or pine-oak forests with slopes greater than 40 percent where timber harvest has not occurred in the past 20 years, and all reserved lands (lands that have been administratively withdrawn from commercial activities, such as wilderness areas or research natural areas). "Protected Activity Centers" (PACs) are delineated around known Mexican spotted owl sites. A Mexican spotted owl PAC includes a minimum of 600 acres designed to include the best nesting and roosting habitat in the area. The recommended size for a PAC is anticipated to include about 75 percent of the foraging area of a Mexican spotted owl. "Restricted habitat" includes mixed conifer forest, pine-oak forest, and riparian areas; the recovery plan provides less specific management guidelines for these areas. The recovery plan does not provide owl-specific management guidelines for "other" habitat (US Fish and Wildlife Service 1995c). The Tonto National Forest Plan (USDA Forest Service 1985) describes Standards and Guidelines intended to define and protect riparian areas. Additional life history information can be found in the recovery plan (US Fish and Wildlife Service 1995c), and the references cited there.

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 current 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 Forest encompasses the lower watersheds of the Salt and Verde rivers and is split between two Mexican spotted owl Recovery Units; the Upper Gila Mountain Recovery Unit (39 Mexican spotted owl PACs) and the Basin and Range-West Recovery Unit (31 Mexican spotted owl PACs). The BA notes the Forest supports 70 known Mexican spotted owl PACs, with most associated with the Mogollon Rim and the Mazatzal, Sierra Ancha, and Pinal mountain ranges. This grazing management consultation includes impacts analyzed and determinations made that could affect 20 Mexican spotted owl PACs in or near these 20 allotments (USDA Forest Service 1999). Originally, the Forest made "may affect, likely to adversely affect" determinations for ten

allotments. Four of these allotments were later removed from the consultation. Five others were reduced to not likely to adversely affect determinations based on changes in management, with which we concurred (see Appendix B). The remaining allotment, Pinto Creek, is discussed here. It should also be noted that other subject allotments of this consultation with PACs or Mexican spotted owl habitat were found by the Forest to not affect the Mexican spotted owl, because livestock do not have access to PACs within these allotments; and, within Mexican spotted owl habitat outside of PACs, cattle graze at levels that allow for woody and herbaceous vegetation cover for rodent prey species to remain at the site's potential and support fire management to reduce the risk of catastrophic wildfire (see USDA Forest Service letter dated July 9, 1999).

The Pinto Creek allotment is found near the Bohme/Sleeping Beauty/Bellevue allotments and the Log Trough Mexican spotted owl PAC (see maps in biological assessment). Haunted Canyon forms a boundary between the Pinto Creek allotment and the Bohme allotment. Much of the Pinto Creek allotment is affected by current (and proposed) copper mining operations. Pinto Creek experiences direct mining impacts and has been subjected to at least two breaches of the Pinto Creek Mine tailings pond, both requiring extensive clean-up operations of environmental contaminants. Within the boundaries of the Pinto Creek allotment, the stream experiences "a high degree of manipulation" (USDA Forest Service 1999:III-21). Pinto Creek is the main riparian corridor, with Horrell Creek considered the primary tributary. Riparian conditions are rated as unsatisfactory in Pinto Creek.

The Haunted Canyon corridor could provide a link to the Log Trough PAC, as well as a link for Mexican spotted owl to reach lower-elevation, wintering habitat and other Mexican spotted owl PACs in the Pinal Mountains. Haunted Canyon contains steep-sided canyons that could provide suitable Mexican spotted owl nesting habitats. Mexican spotted owl surveys were conducted in the reach of Pinto Creek in Haunted Canyon in conjunction with the (then proposed) Carlota Copper Mine project, with negative results. In 1994, the presence of a single owl, sex unknown, was documented in the Log Trough PAC; no further Mexican spotted owl information is available since then for this PAC.

Livestock were removed from this allotment due to drought conditions. They were later returned to the allotment in the autumn of 2001. Some improvement in the allotment may have occurred. Use restrictions and a monitoring plan will be followed, and continued improvement in the riparian and upland areas is expected. Any use greater than authorized will result in a two-year closure of the pasture. Livestock grazing occurs outside of the winter "rest" period in some riparian pastures on Pinto Creek, and this could result in rapidly-occurring damage to riparian vegetation, reversing any earlier improvements. The ability to monitor levels and note rapid changes has not been tested. High levels of use went undetected in the Pinto Creek winter pastures during the 2000 grazing season.

Effects of the Action

Livestock grazing regimes can be managed in different ways; one is rest/rotation. Rest/rotation among pastures in the Pinto Creek allotment is the typical method of moving livestock to balance impacts and grazing throughout an allotment. The allotment is fenced into eight pastures, and

livestock are grazed in each pasture during several months of each year, if not an entire year, before being moved to another pasture. The theory is that each pasture gets a growing season's worth of rest before being grazed again. The proposed action has the potential to affect Mexican spotted owl habitat and Mexican spotted owl prey on the Pinto Creek allotment.

On the Forest, known or confirmed Mexican spotted owl nest or summer roost sites have not been found in the mid-to low-elevation riparian areas of the forest such as Haunted Canyon. Mid- to low-elevation riparian habitats could be important to Mexican spotted owl for winter movement and dispersal corridors between existing Mexican spotted owl PACs for adults or juveniles. The importance of a given mid- to low-elevation riparian area for Mexican spotted owl movement or wintering is related to its level of connectivity to occupied owl areas and its capability to produce dense, structurally diverse broadleaf vegetation (USDA Forest Service 1999).

Grazing in Mexican spotted owl habitats can impact habitat structure and composition, as well as Mexican spotted owl prey species diversity, distribution, and availability. The 1995 Mexican spotted owl recovery plan details effects of grazing to Mexican spotted owl in four categories: 1) altered prey availability, 2) altered habitat susceptibility to fire, 3) degeneration of riparian plant communities, and 4) impeded and impaired ability of plant communities to become Mexican spotted owl habitat. Livestock and associated grazing can affect small mammals directly (small mammal burrow and soil compaction or competition for vegetation) or indirectly (alteration of plant species composition or structure to influence small mammal habitat). Vegetation cover is often greatly reduced on grazed compared with ungrazed areas, and vegetation typically appears more dense in ungrazed areas (Hayward *et al.* 1997). The abundance of small mammals in grazed versus ungrazed areas has been documented. Bock and Bock (1994) reported that in southern Arizona, small mammal species that prefer habitats with substantial ground cover were more abundant on an ungrazed site, whereas species that prefer open habitats were more abundant on a grazed site (USDA Forest Service 1999).

Some knowledge exists regarding the effects that livestock grazing can have on small mammals frequently consumed by spotted owls, and regarding mesic or montane plant communities inhabited by the owl's prey. Based on studies conducted in other areas of the United States, Ward and Block (1995) show that under heavy grazing, decreases in populations of voles would be expected, and this would improve conditions for deer mice in meadow habitat. Deer mice are associated with areas containing little herbaceous cover and extensive exposed soil. Long-tailed and Mexican voles use sites with less exposed ground and greater herbaceous cover. Increases in deer mouse abundance in meadows would not offset decreases in vole numbers because voles provide greater biomass per individual and per unit area (Ward and Block 1995, US Fish and Wildlife Service 1995c).

The abundance of small mammals in the diet of spotted owls has been related to owl reproduction. Ward and Block (1995) suggested that the owl's reproductive success was not influenced by a single prey species, but by many species in combination. None of the specific prey groups significantly influenced owl reproductive success, but rather, they concluded it was

more likely that the owl's reproductive success was influenced by total prey biomass consumed in a given year, rather than by a single prey species. More young were produced when moderate to high amounts of the three most common prey groups (woodrats, peromyscid mice, and voles) were consumed (US Fish and Wildlife Service 1995c). Grazing does appear to affect the owl's prey base (rodents) in a negative way, and is an ongoing land use in Haunted Canyon on the Pinto Creek allotment. Because Haunted Canyon provides a potential corridor for owls dispersing from the Log Trough PAC, and may provide nesting habitat (no surveys have been conducted), grazing in Haunted Canyon could adversely affect the owl.

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions are subject to the consultation requirements established under section 7, and, therefore, are not considered cumulative in the proposed action. Future actions within or next to the action area that are reasonably certain to occur include mining, urban development, road building and widening, land clearing, trail construction, and other associated actions. These activities have the potential to reduce the quality of Mexican spotted owl nesting, roosting, and foraging habitat, and cause disturbance to breeding Mexican spotted owl, and would contribute as cumulative effects to the proposed action. As discussed in the Environmental Baseline, Pinto Creek is affected by a variety of mining activities.

Conclusion

After reviewing the status of the Mexican spotted owl, the environmental baseline for the action area, the effects of the proposed actions, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Mexican spotted owl and not likely to result in adverse modification or destruction of critical habitat. Our conclusion that the proposed action is not likely to jeopardize the species is based on the following:

1. No critical habitat occurs in or near the action area.

2. No PACs on the Tonto will be affected by the proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in

the same regulation by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

AMOUNT OR EXTENT OF TAKE

Recent, comprehensive survey data documenting presence or absence of the Mexican spotted owl is lacking for the allotments addressed in this consultation. Therefore, we anticipate no take of Mexican spotted owl.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of Act directs Federal agencies to utilize their authorities to further the purposes of the Act 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 the recovery plan (US Fish and Wildlife Service 1995c), or to develop information.

1. Implement management strategies that will restore satisfactory conditions to all riparian communities as soon as possible. This includes reducing grazing levels, increasing the number of exclosures to protect riparian habitat, resting of riparian areas, establishing riparian pastures, limiting winter use, and/or removing allotments from use (Recovery Plan task 22211).

2. Develop utilization standards for local geographic areas and habitat types, particularly in key habitat types such as riparian areas, meadows, and pine/oak and mixed conifer forests. Pick those places that will allow livestock grazing levels to move rangeland conditions toward good to excellent in the most expedient manner possible (Recovery Plan task 2).

3. The issues of high utilization levels in allotments and the lack of site-specific data and monitoring of livestock grazing use in PACs should be addressed in detail and corrected in future AMPs and AOPs (Recovery Plan task 2111).

4. Develop and initiate studies to gain a comprehensive understanding of how grazing affects the habitat of the Mexican spotted owl and its prey species (Recovery Plan task 4142).

5. Convert all unconverted Management Territories and Cores into Mexican spotted owl PACs. Update Mexican spotted owl PAC monitoring for all Forest PACs and report this information to the Service. Create and provide to the Service updated Mexican spotted owl PAC maps (1:24,000 scale) for the Forest. These maps should show any major landscape changes such as fires. This will help the Service in future analyses, consultations, and recovery.

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

SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*)

Status of the Species

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

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

The southwestern willow flycatcher was listed as endangered, without critical habitat on February 27, 1995 (US Fish and Wildlife Service 1995d). Critical habitat was later designated on July 22, 1997 (US Fish and Wildlife Service 1997b). A correction notice was published in the Federal Register on August 20, 1997 to clarify the lateral extent of the designation (US Fish and Wildlife Service 1997c).

On May 11, 2001, the 10th circuit court of appeals set aside designated critical habitat in those states under the 10th circuit's jurisdiction. The Service decided to set aside critical habitat designated for the southwestern willow flycatcher in all states (California, Arizona, and New Mexico) until it can re-assess the economic analysis.

Declining southwestern willow flycatcher numbers have been attributed to loss, modification, and fragmentation of riparian breeding habitat, loss of wintering habitat, and brood parasitism by the brown-headed cowbird (Sogge *et al.* 1997, McCarthey *et al.* 1998). Habitat loss and degradation are caused by a variety of factors, including urban, recreational, and agricultural development, water diversion and groundwater pumping, channelization, dams, and livestock grazing. Fire is an increasing threat to willow flycatcher habitat (Paxton *et al.* 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions and/or groundwater pumping desiccates riparian vegetation (Sogge *et al.* 1997). Willow flycatcher nests

are parasitized by brown-headed cowbirds (*Molothrus ater*) which lay their eggs in the host's nest. Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. When these feeding areas are in close proximity to flycatcher breeding habitat, especially coupled with habitat fragmentation, cowbird parasitism of flycatcher nests may increase (Hanna 1928, Mayfield 1977a,b, Tibbitts *et al.* 1994).

Habitat

The southwestern willow flycatcher breeds in dense riparian habitats from sea level in California to approximately 8000 ft in Arizona and southwestern Colorado. Historic egg/nest collections and species' descriptions throughout its range, describe the southwestern willow flycatcher's widespread use of willow (*Salix* spp.) for nesting (Phillips 1948, Phillips *et al.* 1964, Hubbard 1987, Unitt 1987, Huels, T., 1993 unpublished data, University of Arizona, Vertebrate Museum, Tucson, San Diego Natural History Museum 1995). Currently, southwestern willow flycatchers primarily use Geyer willow, Goodding's willow, boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolio*) and live oak (*Quercus agrifolia*) for nesting. Tamarisk is an important component of the flycatchers's nesting and foraging habitat in Arizona. In 2000, 270 of the 303 known nests built were placed in tamarisk tree (Paradzick *et al.* 2001). Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), and stinging nettle (*Urtica* spp.). Based on the diversity of plant species composition and complexity of habitat structure, four basic habitat types can be described for the southwestern willow flycatcher: monotypic willow, monotypic non-native, native broadleaf dominated, and mixed native/non-native (Sogge *et al.*1997).

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

Breeding Biology

Throughout its range the southwestern willow flycatcher arrives on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Maynard 1995, Sferra *et al.* 1995, 1997). Nesting begins in late May and early June and young fledge from late June through mid-August (Willard 1912, Ligon 1961, Brown 1988a,b, Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995). Southwestern willow flycatchers typically lay three to four eggs per clutch (range = 2 to 5). Eggs are laid at one-day intervals and are incubated by the female for

approximately 12 days (Bent 1960, Walkinshaw 1966, McCabe 1991). Young fledge approximately 12 to 13 days after hatching (King 1955, Harrison 1979). Typically one brood is raised per year, but birds have been documented raising two broods during one season and renesting after a failure (Whitfield 1990, Sogge and Tibbitts 1992, Sogge *et al.* 1993, Sogge and Tibbitts 1994, Muiznieks *et al.* 1994, Whitfield 1994, Whitfield and Strong 1995). The entire breeding cycle, from egg laying to fledging, is approximately 28 days.

Southwestern willow flycatcher nests are fairly small (3.2 inches tall and 3.2 inches wide) and its placement in a shrub or tree is highly variable (2.0 to 59.1 feet off the ground). Nests are open cup structures, and are typically placed in the fork of a branch. Nests have been found against the trunk of a shrub or tree (in monotypic saltcedar and mixed native broadleaf/saltcedar habitats) and on limbs as far away from the trunk as 10.8 feet (Spencer *et al.* 1996). Flycatchers using predominantly native cottonwood/willow riparian habitats nest low to the ground (5.9 to 6.9 feet on average), whereas birds using mixed native/non-native and monotypic non-native riparian habitats nest higher (14.1 to 24.3 feet on average). Birds nesting in habitat dominated by box elder nest the highest (to almost 60 feet).

The southwestern willow flycatcher is an insectivore, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. The bird typically perches on a branch and makes short direct flights, or sallies to capture flying insects. Drost *et al.* (1998) found that the major prey items of the southwestern willow flycatcher (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera); and true bugs (Hemiptera). Other insect prey taxa included leafhoppers (Homoptera: Cicadellidae); dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey included spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

Brown-headed cowbird parasitism of southwestern willow flycatcher broods has been documented throughout its range (Brown 1988a,b, Whitfield 1990, Muiznieks *et al.* 1994, Whitfield 1994, Hull and Parker 1995, Maynard 1995, Sferra *et al.* 1995, Sogge 1995a). Where studied, high rates of cowbird parasitism have coincided with southwestern willow flycatcher population declines (Whitfield 1994, Sogge 1995b,c, Whitfield and Strong 1995) or, at a minimum, resulted in reduced or complete nesting failure at a site for a particular year (Muiznieks *et al.* 1994, Whitfield 1994, Maynard 1995, Sferra *et al.* 1995, Sogge 1995b,c, Whitfield and Strong 1995). Cowbird eggs hatch earlier than those of many passerine hosts, thus giving cowbird nestlings a competitive advantage (Bent 1960, McGeen 1972, Mayfield 1977a,b, Brittingham and Temple 1983). Flycatchers can attempt to renest, but it often results in reduced clutch sizes, delayed fledging, and reduced nest success (Whitfield 1994). Whitfield and Strong (1995) found that flycatcher nestlings fledged after July 20th had a significantly lower return rate and cowbird parasitism was often the cause of delayed fledging.

Territory size

Southwestern willow flycatcher territory size likely fluctuates with population density, habitat quality, and nesting stage. Estimated territory sizes are 0.59 to 3.21 acres for monogamous males and 2.72 to 5.68 acres for polygynous males at the Kern River (Whitfield and Enos 1996), 0.15 to

0.49 acres for birds in a 1.48 to 2.22 acre patch on the Colorado River (Sogge 1995c), and 0.49 to 1.24 acres in a 3.71 acre patch on the Verde River (Sogge 1995b). Territories are established within a larger patch of appropriate habitat sufficient to contain several nesting pairs of flycatchers. These birds appear to be semi-colonial nesters.

Rangewide Distribution and Abundance

Unitt (1987) documented the loss of more than 70 southwestern willow flycatcher breeding locations rangewide (peripheral and core drainages within its range), and estimated the rangewide population at 500 to 1000 pairs. There are currently 182 known southwestern willow flycatcher breeding sites in California, Nevada, Arizona, Utah, New Mexico, and Colorado (all sites from 1993 to 1999 where a resident flycatcher has been detected) holding approximately 915 territories (Table 23). Sampling errors may bias population estimates positively or negatively (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology, natural population fluctuation, and random events) and it is likely that the total breeding population of southwestern willow flycatchers fluctuates. Numbers have increased over the last few years, and some habitat remains unsurveyed; however, they are consistent with the 1987 estimate that 500 to 1000 pairs probably exist. About 50 percent of the 915 territories are found at three locations (U-Bar Ranch - NM, Roosevelt Lake - AZ, San Pedro/Gila confluence - AZ).

Descriptions of flycatcher distribution can be difficult to understand due to the use of different terms. The territory is the most universal and least confusing term, due to it representing a singing male during the breeding season (Sogge *et al.* 1997). However, the words breeding "site," "location," or "group" are not necessarily defined the same throughout the bird's range. In Arizona, sites tend to represent a discreet patch of vegetation that contain flycatcher territories. Therefore, a "location" like the Gila/San Pedro confluence near Winkelman, AZ is comprised of many "sites." "Breeding groups" tend to describe a general geographic location where flycatcher territories exist, similar to a "location." In other state's like New Mexico, "sites" are defined a little differently, and a larger "location" may be more synonymous with a "site."

Rangewide, the population is comprised of extremely small, widely-separated breeding groups including unmated individuals. For example, in Arizona, fifty-seven percent (27/47) of the sites where flycatchers were found in 2000 (Paradzick *et al.* 2001) were comprised of five or fewer territories. In Arizona during the 2000 season, all but the "Salt River Inflow Site" at Roosevelt Lake had less than 20 pairs (Paradzick *et al.* 2001). Rangewide, 81 percent of all sites from 1993 to 1999 had 5 or less flycatcher territories present at the site (Sogge *et al.* 2000).

The distribution of breeding groups is highly fragmented, often separated by considerable distance. In Arizona, about a 55 mile straight-line distance exists between breeding flycatchers at Roosevelt Lake, Gila Co., and the next closest pairs on the San Pedro River, Pinal Co. or Verde River, Yavapai Co.

The large distances between breeding groups and small size of those populations reduces meta-population stability and increases the risks of local extirpation due to stochastic events, predation, cowbird parasitism, and other factors. Willow flycatchers no longer occur at 40 of the

182 sites located and/or tracked rangewide since 1993 (US Fish and Wildlife Service 2001). All but two of these sites had less than 5 flycatcher territories present. The two exceptions (PZ Ranch on San Pedro River and Colorado River Delta at Lake Mead) were destroyed by fire and lake inundation, respectively; however, many more than 5 territories are expected to be lost at Roosevelt Lake in the near future due to inundation.

Because of the dynamic nature of the flycatcher's habitat, the survival and recovery of the flycatcher is not dependent on a few locations with large numbers, but properly distributed populations placed close together. The southwestern willow flycatcher is believed to function as a group of meta-populations (US Fish and Wildlife Service 2001). Esler (2000) describes Levins' meta-population theory as that which addresses the demography of distinct populations (specifically extinction probabilities), interactions among sub-populations (dispersal and recolonization), and ultimately persistence of the aggregate of sub-populations, or the meta-population. Meta-population theory has been applied increasingly to conservation problems, in particular those cases where species' ranges have been fragmented by habitat alteration by humans. An incidence function analysis completed for the southwestern willow flycatcher incorporated a spatial component to estimate probabilities of habitat patch extinction and colonization (Lamberson *et al.* 2000). Modeling indicated that persistence of flycatcher populations is reduced when populations are small and widely distributed. Conversely, meta-populations are more stable when sub-populations are large and close together. However, where populations exceed 25 pairs, it is best to colonize a new site, rather than risk the effects of catastrophic events (fire, disease, flood, etc.).

Unlike many other endangered bird species, the flycatcher's habitat is dynamic and can change rapidly: nesting willow habitat can grow out of suitability; saltcedar habitat can develop from seeds to suitability in five years; heavy runoff can remove all habitat in a day; or river channels, floodplain width, location, and vegetation density may change over time. Because of those changes, flycatcher "habitat" is often defined in three categories: potential, suitable, or occupied. This demonstrates that areas other than existing occupied locations can be considered flycatcher "habitat." The development of flycatcher habitat is a dynamic process involving, maintenance, recycling, and regeneration of habitat. Flycatcher habitat can quickly change and vary in suitability, location, and occupancy over time (Finch and Stoleson 2000).

Arizona Distribution and Abundance

As reported by Paradzick *et al.* (2001), the largest concentrations or general locations of willow flycatchers in Arizona in 2000 were near the confluence of the Gila and San Pedro rivers (219 flycatchers, 119 territories); at the inflows of Roosevelt Lake (207 flycatchers, 115 territories); Gila River, Safford area (30 flycatchers, 15 territories); Topock Marsh on the Lower Colorado River (25 flycatchers, 15 territories); Verde River at Camp Verde (9 flycatchers, 5 territories); Alpine/Greer on the San Francisco River/Little Colorado River (7 flycatchers, 5 territories); Alamo Lake on the Bill Williams River (includes lower Santa Maria and Big Sandy river sites) (44 flycatchers, 24 territories); Big Sandy River, Wikieup (23 flycatchers, 16 territories) and Lower Grand Canyon on the Colorado River (14 flycatchers, 8 territories). The greatest number of flycatchers are found at two general locations. Roosevelt Lake and the San Pedro/Gila confluence make up 234 (71 percent) of the 328 territories known in the state.

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

In 2000, 328 territories were known from 47 sites along 11 drainages in Arizona (Paradzick *et al.* 2001). The lowest elevation where territorial pairs were detected was 197 feet at Adobe Lake on the Lower Colorado River; the highest elevation was at the Greer Town site (8300 feet). The majority of breeding groups in Arizona were extremely small.

Only 68 (21 percent) of all known Arizona flycatcher territories in 2000 (52 Gila River, 15 on Lower Colorado River, 1 on Bill Williams River) were found below dams. Territories are primarily found on free-flowing streams or surrounding impoundments. At Roosevelt (n=115) and Alamo (n=24) reservoirs, 139 territories (42 percent of statewide total) described by Paradzick *et al.* (2001) are found within the lake area of influence.

Just after listing in 1996, 145 territories were known to exist in Arizona. In 2000, 328 territories were detected. However, the increase of 153 territories at Roosevelt and at San Pedro/Gila River confluence since 1995 represent almost 85 percent of statewide growth. Discovery as a result of survey effort was a large factor in detecting more birds at San Pedro/Gila confluence, but the Roosevelt population grew as a result of increased habitat development in the conservation pool of the reservoir.

While numbers have increased in Arizona and significantly at a few specific areas, distribution throughout the state has not changed much. Recovery and survival of the flycatcher depends not only on numbers of birds, but territories that are well distributed (US Fish and Wildlife Service 2001). As a result, the population stability in Arizona has been largely dependent on the presence of two large populations (Roosevelt Lake and San Pedro/Gila River confluence). Therefore, the result of catastrophic events or losses of significant populations either in size or location would greatly change the status and survival of the bird. Conversely, expansion into to new habitats with increases in number of birds would also improve the stability and status of the flycatcher.

Some areas of Arizona have recently declined in known flycatcher abundance, specifically northern Arizona and the White Mountains in central/eastern Arizona. Populations in northern Arizona and the White Mountains have existed along the Colorado River in the Grand Canyon and upper Lake Mead, Little Colorado River, San Francisco River, and Verde River. The known populations at these sites declined from a high of 35 territories in 1996 to 19 territories in 2000 (Paradzick *et al.* 2001).

Severe reductions in the large population at Roosevelt Lake, as a result of inundation of habitat, is expected. The Bureau of Reclamation formally consulted with the Service on raising Roosevelt Dam (US Fish and Wildlife Service 1996b), and as a result of the project, all

flycatcher habitat was expected to be lost. The consultation involved habitat that would be inundated around the perimeter of the lake due to raising the height of the dam. Since completion of that consultation, Roosevelt Lake has never filled, rather it dropped in water level due to drought conditions. As a result, more flycatcher habitat has developed in the conservation pool of the lake. The population at Roosevelt in 2001 grew to just over 140 pairs of flycatchers, about 40 percent of all known pairs in Arizona and about 15 percent of the rangewide total (T. McCarthey, AGFD pers com.). Evaluation of the status of the species is partially based upon the expected loss of these pairs as a result of habitat inundation.

Therefore, the status of the southwestern willow flycatcher in Arizona and throughout its range will significantly change in the near future. The drop in number of territories subsequent to inundation at Roosevelt will alter the movement, recruitment, and recovery of the bird and reduce numbers in Arizona nearer to where they were when the bird was listed in 1995. The result of these changes places a critical need for improved habitat development, security, management, and expansion in habitats elsewhere in Arizona and throughout the bird's range.

Fire

The evidence suggests that fire was not a primary disturbance factor in southwestern riparian areas near larger streams (US Fish and Wildlife Service 2001). Yet, in recent time, fire size and frequency has increased on the lower Colorado, Gila, Bill Williams, and Rio Grande rivers. The increase has been attributed to increasing dry, fine fuels and ignition sources. The spread of the highly flammable plant, tamarisk, and drying of river areas due to river flow regulation, water diversion, lowering of groundwater tables, and other land practices is largely responsible for these fuels. A catastrophic fire in June of 1996, destroyed approximately a half mile of occupied tamarisk flycatcher habitat on the San Pedro River in Pinal County. Over 95 percent of fires on the lower Colorado River are caused by recreation users (US Fish and Wildlife Service 2001). Brothers (1984) attributed increased fire along the Owens River in California to increased use of the riparian zones by campers and fishermen in the past 30 years. That fire resulted in the forced dispersal or loss of up to eight pairs of flycatchers (Paxton *et al.* 1996).

Mortality

There are not extensive records of adult southwestern willow flycatcher mortality. Incidents associated with nest failures, human disturbance, and nestlings are typically the most often recorded due to the static location of nestlings, eggs, and nests. As a result, nestling predation and brood parasitism are the most common causes of southwestern willow flycatcher mortality. Also, human destruction of nesting habitat through bulldozing, groundwater pumping, and aerial defoliants have been recorded in Arizona (T. McCarthey, AGFD, pers. com). Human collision with nests and spilling the eggs or young onto the ground have been documented near high use recreational areas (US Fish and Wildlife Service 2001). A southwestern willow flycatcher from the Greer Town site along the Little Colorado River in eastern Arizona, was found dead after being hit by a vehicle along SR 373. This route is adjacent to the breeding site (T. McCarthey, AGFD, pers. com.).

Reproductive Success

In 2000, a total of 351 nesting attempts were documented in Arizona at 38 sites (Paradzick *et al.* 2001). The outcome from 227 nesting attempts from 12 sites was determined (not every nesting

attempt was monitored). Of the 227 nests, 45 percent (n=103) of the nests were successful. Causes of nest failure (n=124) included predation (n=62), nest abandonment (n=40), brood parasitism (n=8), infertile clutches (n=7), weather (n=2), and unknown causes (n=8). Cowbirds may have contributed to other abandoned nests, but no direct evidence was detected. No parasitized nests fledged any willow flycatchers along with cowbird young. Eight of 12 monitoring sites had cowbird trapping in 2000. Two additional breeding sites (Bill Williams National Wildlife Refuge and Alamo Lake) had traps, but no nest monitoring occurred. The upper San Pedro River in BLM's conservation area had cowbird trapping, but no breeding flycatchers were known to be present.

Intensive nest monitoring efforts in California, Arizona, and New Mexico have shown that cowbird parasitism and/or predation can result in failure of the nest; reduced fecundity in subsequent nesting attempts; delayed fledging; and reduced survivorship of late-fledged young. Cowbirds have been documented at more than 90 percent of sites surveyed (Sogge and Tibbitts 1992, Sogge *et al.* 1993, Camp Pendleton 1994, Muiznieks *et al.* 1994, Sogge and Tibbitts 1994, Whitfield 1994, C. Tomlinson 1997, Griffith and Griffith 1995, Holmgren and Collins 1995, Kus 1995, Maynard 1995, McDonald *et al.* 1995, Sferra *et al.* 1995, Sogge 1995a, b, San Diego Natural History Museum 1995, Stransky 1995, Whitfield and Strong 1995, Griffith and Griffith 1996, Skaggs 1996, Spencer *et al.* 1996, Whitfield and Enos 1996, Sferra *et al.* 1997, McCarthey *et al.*1998). The probability of a southwestern willow flycatchers successfully fledging its own young from a cowbird parasitized nest is low (i.e. <5 percent). Also, nest loss due to predation appears consistent from year to year and across sites, generally in the range of 30 to 50 percent. Documented predators of southwestern willow flycatcher nests identified to date include common king snake (*Lampropeltis getulus*), gopher snake (*Pituophis melanoleucos affinis*), and Cooper's hawk (*Accipiter cooperii*) (Paxton *et al.* 1997, McCarthey *et al.* 1998, Paradzick *et al.* 2000). These willow flycatcher predators were documented by video nest surveillance, in addition to documenting yellow-breasted chat (*Icteria virens*) and Clark's spiny lizard (*Scelopterus clarkii*) depredating other passerine nests nearby. These limited, but thorough observations of nests, demonstrate a wide variety of willow flycatchers nest predators. It is expected that other common predators of passerines, such as grackles, also eat flycatcher eggs and nestlings.

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

In April 2001, the Service released a draft recovery plan for the flycatcher (US Fish and Wildlife Service 2001). The recovery objectives of the plan are first, to reclassify the species from endangered to threatened status and second, to delist, removing the species from the endangered

species list. The criteria for determining when reclassification is appropriate are based on population levels. Specifically, reclassification can occur when the total known population of flycatchers achieves a minimum of 1,950 territories (equating to approximately 3,900 individuals), and are geographically distributed to allow proper functioning as metapopulations in each of six Recovery Units (see recovery plan). The criteria for determining when the southwestern willow flycatcher may be removed from the list of threatened and endangered species are that flycatcher populations and their habitat present at the time of reclassification must be protected into the foreseeable future, and that the major threats to the flycatcher must be proven eliminated to the extent needed to maintain flycatcher habitat for a period of 10 years after reclassification criteria are met. Additionally for delisting, the amount of suitable breeding habitat protected within each Management Unit (see recovery plan) would be double that required to support the target number of flycatchers under criterion for reclassification.

Because the primary threat to the species is habitat destruction, more specifically riparian nesting habitat reduction, degradation, and elimination as a result of agricultural and urban development, it logically follows that additional riparian habitat will have to be created or recovered in order to achieve the objectives of the recovery plan. Because livestock grazing is such an obvious cause of habitat destruction (livestock literally "eat" flycatcher habitat, destroying it or curtailing its development), this land use would seem to be in direct conflict with the recovery of the flycatcher. And in fact, the recovery plan does conclude excessive grazing is harmful to riparian habitat needed by the flycatcher. The recovery plan further concludes that evidence and field examples indicate that, with respect to livestock grazing, southwestern willow flycatcher recovery would be most assured, and in the shortest time, with total exclusion of livestock grazing from those riparian areas deemed necessary to recover the flycatcher and where grazing has been identified as a principal stressor. The plan also provides recommendations to Federal land managers on conservation planning for the flycatcher. The focus of these recommendations is on identifying riparian areas that pose the best opportunities for recovering flycatcher habitat (within the context of economic and other constraints) and excluding them from grazing (see Appendix G of the recovery plan).

The recovery plan does note that certain types of livestock grazing in specific situations may be compatible with flycatcher recovery. An example, one that is often cited by the livestock industry, is the Cliff/Gila Valley flycatcher population in New Mexico. While this does represent a good example of an instance where livestock grazing as a land use and management for flycatchers appear to be compatible, Cliff/Gila is extremely unique, for a number of reasons. Flycatchers at this location nest almost exclusively in box elders (*Acer negundo*) in a broad flood plain at an elevation of about 4500 feet (Stoleson and Finch 2000). The site is best characterized as a large expanse of predominantly box elder-dominated riparian woodland (the site is approximately four miles long and one mile wide), in a large broad flood plain. This type of habitat has not been documented anywhere else in the species range. Additionally, the type of irrigated grazing management that is in practice at the U-Bar Ranch at Cliff/Gila is also extremely unique and is undocumented elsewhere in the species range. This land use practice is not representative of the vast majority of livestock grazing programs practiced in the American southwest.

Summary
Historically, the southwestern willow flycatcher declined in extent of range occupied and population size as a result of habitat loss, modification, and fragmentation. Known number of flycatcher pairs has increased throughout its range since the bird was listed in 1995, but still remains within the 500 to 1000 pairs estimated by Unitt (1987). Approximately half of all the known breeding pairs are found at three locations throughout the subspecies range (Cliff/Gila Valley, New Mexico, Roosevelt Lake and Gila/San Pedro river confluence, Arizona). Water diversions and return flows, flood control projects, livestock grazing, and changes in annual flows due to off stream uses of water have affected the ability of the aquatic habitats to support native fish, plants, and wildlife. Riparian habitats by nature are dynamic, with their distribution in time and space governed mostly by flood events and flow patterns. Current conditions along southwestern rivers and streams are such that normal flow patterns have been greatly modified. Dams now control flow eliminating natural hydrologic patterns. In the few un-dammed watersheds, catastrophic flood events occur with greater frequency as a result of degraded watershed conditions. Stream channels are highly degraded, floodplains and riparian communities are reduced in extent, wildfire is more common and severe, and the species composition of riparian communities are modified with non-native plant species. Habitat loss, fragmentation, and changes in species type leads to increased brood parasitism and nest predation. These conditions have significantly diminished the potential for southwestern rivers and streams to develop suitable habitat for the southwestern willow flycatcher and for those habitats to remain intact and productive for nesting flycatchers.

To date, survey results reveal a consistent pattern range wide; the southwestern willow flycatcher population, as a whole, consists of extremely small, widely-separated breeding groups including unmated individuals (Table 23). Seventy percent (33/47) of the Arizona sites where flycatchers have been found contain five or fewer territories. The current distribution of breeding groups is highly fragmented, with groups often separated by considerable distances. This reduces metapopulation stability and increases the risks of local extirpation due to stochastic events, predation, cowbird parasitism, and other factors.

Because of the bird's low numbers, the effects of management and research activities are a concern. Survey and nest monitoring activities, and handling and banding procedures are regulated by Federal and State permitting processes to remove and reduce effects to the bird. Trapping, handling, banding, and determining the nest's status, removing cowbird eggs, even by the most careful biologist, may result in injury or death to a bird. Specific training in standardized survey and monitoring procedures (Sogge *et al.* 1997) are required throughout the species range.

Since listing in 1995, at least 46 Federal agency actions have undergone (or are currently under) formal section 7 consultation throughout the bird's range (Table 24). Six actions have resulted in jeopardy decisions. Many activities continue to adversely affect the distribution and extent of occupied and potential breeding habitat throughout its range (development, grazing, recreation, dam operations, etc.). Stochastic events also continue to adversely affect the distribution and

extent of occupied and potential breeding habitat. A catastrophic fire in June of 1996, destroyed approximately 0.6 mile of occupied habitat on the San Pedro River in Pinal County. That fire resulted in the forced dispersal or loss of up to eight pairs of flycatchers (Paxton *et al.* 1996).

Loss of flycatcher habitat due to federal projects (modification of Roosevelt Dam, operation of Hoover Dam) has resulted in biological opinions that led to acquisition of otherwise unprotected property specifically for the southwestern willow flycatcher. Portions of the lower San Pedro River were acquired by the Bureau of Reclamation and are under the management of The Nature Conservancy. In the future, unprotected habitat will be purchased or rehabilitated to compensate for loss of flycatcher habitat along the lower Colorado River, Tonto Creek, and Salt River in Arizona, and Lake Isabella, California.

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 current 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 fundamental approach to recovering an endangered species is to remove the threats to its existence. In the case of the flycatcher, the evidence and field examples in the literature indicate that with respect to livestock grazing, recovery would be most assured, and in the shortest time, with total exclusion of livestock from those areas that are described as providing potential habitat and where grazing is a significant stressor (US Fish and Wildlife Service 2001). The proposed grazing strategy on the allotments in consultations will delay improvement of the environmental baseline, where establishment of suitable habitat is not assured. As a result, the proposed strategy of continuing to graze in potential habitat and degraded uplands will continue to adversely affect the recovery of the southwestern willow flycatcher.

For the recovery of the southwestern willow flycatcher, dense riparian habitat (preferably native plants) must be restored, riparian ecosystems rehabilitated, and watersheds improved. Therefore it is not only important to describe effects that might occur directly on the lands that are being grazed, but how grazing would affect the entire watershed. Grazing is presently one of the most significant stressors on rehabilitation and maintenance of flycatcher habitat in the action area.

The proposed reauthorization of livestock grazing permits on National Forest System Lands includes major areas of the Forest, including the lower Verde River (below Bartlett Dam), lower Tonto Creek (below Gisela), Salt River (above Roosevelt Lake), and tributaries and upland watersheds. The historic and current condition of these areas establishes the baseline for evaluating effects to the southwestern willow flycatcher from the proposed livestock management on a landscape as well as individual allotment basis. Of the 20 allotments included in the proposed action, seven are specifically considered here. The Forest had determined that

the proposed management of six allotments may affect, and is likely to adversely affect, the southwestern willow flycatcher on the following allotments: the Bohme/Sleeping Beauty/Bellevue, Bronco, Pinto Creek, and Sunflower. The Forest determined that proposed management of two allotments, the Seventy Six and Millsite allotments may affect, but was not likely to adversely affect, the southwestern willow flycatcher (see Table 25; see Appendix B). Many of the remaining allotments, especially those in the Tonto Creek and Salt River watersheds, have contributed to the current habitat degradation and depressed status of the southwestern willow flycatcher in these areas, and provide data to establish the baseline conditions.

Livestock grazing has damaged about 80 percent of stream and riparian ecosystems in the western United States. Although these areas are only 0.5 to 1.0 percent of the overall landscape, a disproportionately large percentage (~70 to 80 percent) of all southwestern plants and animals depend on them. The introduction of livestock on the Forest after the Civil War caused a disturbance with many ripple effects. Livestock seek out water, succulent forage, and shade in riparian areas leading to trampling of streambanks, overgrazing of riparian vegetation, soil erosion, loss of streambank stability, declining water quality, and drier, hotter conditions. These changes have reduced habitat for riparian plant species, fish, and wildlife, thereby causing many native species to decline in number or become locally extirpated. Such modifications can lead to large-scale changes in adjacent and downstream ecosystems (Belsky *et al.* 1999).

One of the most significant adverse impacts within western riparian systems has been the perpetuation of improper grazing practices (Hastings and Turner 1965, Ames 1977, Glinski 1977, Marlow and Pogacnik 1985). Chaney *et al.* (1990) noted that initial deterioration of western riparian systems began with severe overgrazing in the late nineteenth century. For the last 75 years, the Forest has acknowledged the continued damage cattle have done to riparian areas, upland tributaries, and ranges (Croxen 1926, Alford 1993). Croxen (1926) noted dramatic grazing-related deterioration of riparian woodlands, stream hydrology, and watersheds, described in part in the Environmental Baseline - Overview. Alford (1993) noted the situation had improved, but resource problems still existed.

The effects of both past and ongoing grazing activities on the forest have had a profound effect on Tonto Creek, the Salt and Verde rivers, and associated riparian habitat, and there has been little improvement to the overall Salt, Tonto, and Verde watersheds under modern range management. For instance, Tonto Creek today more closely resembles the heavily impacted stream reach described by Croxen (1926) as compared to the heavily wooded stream course punctuated by sloughs and seep areas, described from before 1890. Recreation, development, and dams have also affected the riparian habitat of the flycatcher. These effects are evident by the poor soil and riparian conditions reported: over-utilization of riparian areas, increase in frequency and size of flood events, and ultimately, the absence of southwestern willow flycatchers throughout miles of streams on the Forest. The habitat that does develop is hindered in its density and growth by cattle grazing and trampling. Riparian habitat that persists, in spite of grazing, or that is excluded from grazing, is in danger of being toppled or washed out due to unnatural flooding from historically overgrazed uplands. By not allowing riparian habitat to persist, there is no rehabilitation of stream banks or prevention of erosion. As a result, the conditions of these streams are in a perpetual state of decay.

Status of the Species in the Action Area

Suitable habitat for the southwestern willow flycatcher in the action area has been described for locations along Pinto Creek (Pinto Creek allotment) and Queen Creek near Whitlow Dam (Millsite allotment). Surveys for WIFLs have occurred in suitable habitat on the Millsite allotment (none found), but not on the Pinto Creek allotment. No surveys have been conducted in potential habitat along streams located in other allotments (Bohme, Bronco, Seventy Six, and Sunflower). No suitable or potential habitat exists on other allotments addressed in this opinion.

The AGFD and the Forest Service have conducted surveys for flycatchers in much of the currently described suitable habitat on the Forest (T. McCarthey, AGFD, pers. comm.). AGFD is responsible for surveys surrounding Roosevelt Lake and upriver on Tonto Creek and the Salt River, however the Tonto Basin Ranger District has taken the lead for surveys along the Salt River upstream of Highway 288. Annually since 1996, AGFD has conducted extensive surveys around Roosevelt Lake and has performed habitat assessment overflights with Bureau of Reclamation along Tonto Creek to prioritize survey efforts. No locations upstream of the Tonto Creek breeding site at Roosevelt Lake were considered suitable to survey. Surveys were conducted by the Forest in 1997 and 1998 upstream of Highway 288 on the Salt River, at Whitlow Dam, and since 1996 on Canyon Creek (OW allotment). No surveys have been conducted along Pinto Creek, Sycamore Creek, Cave Creek, and Tonto Creek (between Gisela and Gun Creek), because the habitat is largely considered to be currently unsuitable for nesting flycatchers.

Tonto Creek, and the Verde and Salt rivers, are the largest drainages on the Forest. These drainages and some of their larger tributaries (i.e., Pinto Creek, Cave Creek, Sycamore Creek), provide the best opportunity to develop suitable flycatcher nesting habitat. Large portions of each stream, their tributaries, and watersheds are under the management of the Forest. The only flycatchers nesting on the Forest are at the Salt River and Tonto Creek inflows to Roosevelt Lake (Paradzick *et al.* 2001). Some native willow and cottonwood trees exist within this habitat, but the overwhelming majority is tamarisk. This nesting habitat developed around the edge of Roosevelt Lake due to the operation of Roosevelt Dam and will eventually be inundated. AGFD has conducted extensive surveys and nest monitoring near Roosevelt Lake. About 140 territories were found on the Tonto Creek and Salt River inflows to Roosevelt Lake in the 2001 breeding season (T. McCarthey, pers. comm.). It is imperative to develop habitat as quickly as possible and to maintain this habitat through management of rivers, creeks, tributaries, and uplands to ensure the continued existence for this critically endangered species. A single flycatcher, likely a migrant, was detected along upper Canyon Creek in 1996 on the OW allotment.

Current Conditions of 8 allotments

Based upon the Forest's March 1999 BA and June 2000 project amendment, roughly 37 miles of potential and suitable southwestern willow flycatcher nesting habitat (where grazing may affect the landscape) is described in the proposed action (Table 31 of Forest BA). These 37 miles are distributed throughout eight allotments: Seventy Six allotment - 8 miles; Bohme - 2 miles;

Bellvue - 5 miles; Sunflower - 13 miles; Bronco - 1 mile; Millsite - 1 mile; and Pinto Creek - 7 miles. Grazing is proposed to continue along riparian areas of Pinto Creek (Bohme/Sleeping Beauty/Bellevue, Bellevue, and Pinto Creek allotments), and on Cave Creek (Bronco allotment). Grazing is excluded on Tonto Creek (Seventy Six allotment), portions of New River (Millsite allotment), and on Sycamore Creek (Dos Unit of the Sunflower allotment).

The Forest concluded in their BA that the riparian and soil conditions for most of these allotments were unsatisfactory. Riparian and soil conditions were both declared unsatisfactory for two of the eight allotments (Pinto Creek, Sunflower). Soil condition was unsatisfactory for a total of four allotments (Pinto Creek, Sunflower, Sleeping Beauty, Millsite), and riparian condition was unsatisfactory for five allotments (Pinto Creek, Sunflower, Seventy Six, Bohme, Bronco). There was no determination of condition for riparian habitat (Millsite) or no riparian habitat present (Sleeping Beauty) on two allotments (Table 26).

Site-specific range conditions (stubble height, percent use of woody vegetation, etc.) for all six allotments were not described because monitoring and data collection have not occurred (Tonto National Forest *in litt.*). The BA describes proposed utilization levels for each allotment and cursory evaluations of riparian conditions and each allotment's capacity for flycatchers. We summarize the current drainage and range condition of each allotment from the BA and their surrounding watershed (see Appendix B for Millsite and Seventy Six; see Table 27).

Major Drainages

Tonto Creek

The allotments consulted on in this opinion that occur in the Tonto Creek drainage are Buzzard Roost, H-4, Seventy-Six and Star Valley. Tonto Creek and its uplands (tributaries, range condition, upstream habitat) are a severely stressed system, with a long history of overgrazing, human activity, and development. A combination of poor upland watershed management, overgrazing, trespass cattle, recreation, and development (Croxen 1926, Alford 1993, Ganda 1999) have prevented suitable habitat for the flycatcher from developing and persisting above the inflow area at Roosevelt Lake.

Tonto Creek provides potential habitat for flycatchers from the town of Gisela down to Roosevelt Lake. Presently, the only suitable habitat exists in tamarisk dominated communities within the influence of the lake. The Tonto Creek Riparian Unit (TCRU) was developed to facilitate riparian growth along Tonto Creek as mitigation for habitat lost from the raising of Roosevelt Dam. Development of the TCRU was a requirement of the U.S. Army Corps of Engineers 404 permit (Clean Water Act) to the Bureau of Reclamation. The permit requires full mitigation for the adverse impacts to 32 ha (80 ac) of riparian and wetland communities at the Tonto Creek inflow to the lake. Winter grazing (January 1 to March 15) since 1996 and high intensity monitoring allowed the Bureau of Reclamation (with assistance and cooperation of the Forest Service) to reach their objective.

Past consultations with the Service (at least 80 informal and formal since 1988) on Tonto Creek focused on a variety of activities including review of allotment management plans, development and repair of roads and trails, mining activities, recreation developments, prescribed burns, water developments, and Bureau of Reclamation activities related to raising of lake levels at Roosevelt Lake and the development of the TCRU. In addition, private actions conducted in this area include maintenance of diversion structures, channelization of the river, sand and gravel mining, and residential development.

Groundwater pumping, urbanization, recreation, and sand and gravel operations impede Tonto Creek's riparian rehabilitation. Groundwater pumping and surface water diversion occurs along Tonto Creek predominantly at the towns of Gisela and Punkin Center. OHVs, four-wheel drive vehicles, and woodcutting in the floodplain inhibits riparian growth. A large sand and gravel operation contributes to an overall unhealthy system. Additional hiking, OHVs, roads, and other recreational activities occur in the uplands surrounding Tonto Creek which may contribute to the poor quality of Tonto Creek. Ganda (1997) believed the effects of these activities were relatively insignificant when compared to damage done by cattle along the creek, tributaries, and uplands. As conditions continue to degrade, the effects of these activities become more significant.

Flooding is a major component to the continued degradation of Tonto Creek and an obstacle to its rehabilitation. Watershed deterioration causes more intense, but shorter duration flooding and longer times of lower flows. Upstream habitat, riparian health of tributaries, and range condition of uplands are all crucial components to reducing the energy of the flow to Tonto Creek, the main artery for drainage of the western slope of the Sierra Ancha range and eastern slope of the Mazatzal Mountains. Schuman and Thomsen (1972) calculated that about 80,000 acre feet of water from Tonto Creek flows into Roosevelt Lake annually. About one-quarter of that 2,000 acre feet is believed to be infiltration from tributary inflow.

Flows in Tonto Creek have increased in frequency and intensity since monitoring by USGS gauging stations began in 1941. Between 1941 and 1971, flows recorded at Gun Creek exceeded 5000 cfs at least 17 times. Since 1971, flows have exceeded this on at least 29 occasions. From 1941 to 1977, the highest flow recorded was about 21,000 cfs (1952). From 1977 to present, flows exceeded this six times (1978, 1979-twice, 1980, 1991, and 1993); three of these floods exceeded 30,000 cfs (USGS historical stream flows). There has been a fairly steady upward progression in the magnitude of peak flows culminating in 1986 when the 10-year average peak flow reached a maximum of over 30,000 cfs. This is over three times the 10-year average peak flow in 1950 of less than 10,000 cfs (Ganda 1997).

A Biological Assessment completed by Ecoplan (1999)(contractors of the Arizona Department of Transportation along with the Forest) estimated that currently the mean annual water volume passing the Gun Creek gauge (entering Roosevelt Lake) is roughly 119,700 acre feet. This is almost 30,000 acre feet more than what was estimated by Schuman and Thomsen (1972).

Ganda (1997) explored the possibility of whether the historical increase in peak flows could be attributed to higher precipitation. They believed that it could not be attributed to higher precipitation; the trend in rainfall between 1950 and 1977 decreased. From 1977 to 1987, there

was higher precipitation than what was recorded for the previous three decades, but subsequent higher flow in streams could not be attributed to this increase. Precipitation during this "wet" period in the 1980s was no greater than what occurred in the 1950s; peak flows in the 1950s ranged from 9,000-14,000 cfs as compared to the 23,000-32,000 cfs in the 1980s. This presents a compelling argument that at least through the late 1980s, watershed conditions were not significantly improving, and were still in poor condition. The result is what is seen today, continued erosion, degradation of riparian vegetation, and prevention of riparian rehabilitation.

Cottonwood and cottonwood/willow communities along Tonto Creek are mostly comprised of overmature vegetation with little regeneration, indicating that the area continues to undergo disturbance. A braided, sparsely vegetated creek has replaced well-developed banks and a defined channel. Much of the native communities are heavily fragmented and patchily distributed throughout the width of the floodplain. In addition, the most extensive community type consists of tamarisk, burro bush (*Hymenoclea* spp.), seepwillow (*Baccharis glutinosa*), and desert broom (*B. sarothroides*), largely unpalatable to livestock. Overall, Tonto Creek is characterized as being in poor condition mainly resulting from poor management of the watershed in the last century as well as poor conditions in the watershed (Ganda 1997).

Verde River

Allotments consulted on here which are within the Verde River drainage include Cross V, Deadman Mesa, Payson, and Sunflower. The lowest reach of the Verde River is a regulated section of stream that travels through the Forest and Fort McDowell and Salt River Pima Maricopa Indian communities. The uplands are primarily managed by the Forest, with Sycamore Creek draining the west slope of the Mazatzal Mountains (Four Peaks) into the Verde River at Fort McDowell. This entire stretch of the Verde River (20 miles) and the lower portion of Sycamore Creek have the potential for developing suitable flycatcher breeding habitat.

The lower Verde River suffers from a variety of pressures that inhibit riparian maintenance, growth and rehabilitation. Water releases from Bartlett Dam (built in the late 1930s) are regulated for water delivery and are not keyed toward riparian habitat maintenance. Large flood releases occur, but smaller floods are restrained by Bartlett Dam and further upstream, at Horseshoe Dam. As a result of sediments being trapped by these dams and poorly timed releases, the river is scoured and little riparian regeneration occurs. River banks along the lower Verde River meander and braid due to the lack of streamside riparian vegetation. Existing riparian habitat contains primarily overmature, decadent, and dying cottonwood trees with little understory located primarily along the edges of the floodplain or now, on high terraces distant from groundwater.

Grazing, agriculture, development, sand and gravel mining, woodcutting, and recreation along the lower Verde River add to the negative effects of dams, and retard development of riparian habitat. Free range grazing on the Fort McDowell and Salt River Pima Maricopa Indian communities help reduce riparian regeneration. Mesquite woodcutting on tribal land and agricultural development has removed the largest mesquite bosque on the lower Verde River.

This development helps increase run-off and decrease bank stability, as well as divert surface water. OHVs drive in the floodplain from Fort McDowell to Bartlett Dam trampling habitat. At Fort McDowell the river is dredged and mined for sand and gravel (Hunt *et al.* 1992).

The Salt River, Pima, Maricopa, and Fort McDowell Indian communities restricted river use of non-tribal members beginning the summer of 1997. This reduced some of the effects of recreation on these portions of the stream, however OHV driving, woodcutting, and grazing are still observed. Salt River Pima Maricopa Indian Community has submitted proposals to the Arizona Water Protection Fund to help restore riparian vegetation on their portion of the lower Verde River, but have been unsuccessful. They have received funds and are planning to begin fencing the Verde River (in order to remove cattle) in 2000. In the mid-1990s, Salt River Project helped Salt River Pima Maricopa Indian Community revegetate a large open sandy area with cottonwood and willow poles. Most of these trees died of flooding or lack of water (S. Parker, Salt River Pima Indian Community, pers. comm.). Fort McDowell has designated a portion of the river just below Highway 87 as an Environmental Protection Area. This area presently contains the best riparian habitat along the lower Verde River. This borderline suitable habitat was briefly surveyed in August 1999 by AGFD and US Fish and Wildlife Service; no flycatchers were found.

Salt River

Only the Roosevelt allotment occurs in the Salt River drainage. The Salt River from Redmond Flat to Roosevelt Lake is a relatively open piece of river that is sparsely vegetated along its banks above Highway 288 bridge. Near Roosevelt Lake (down-stream of Highway 288 bridge), the Salt River arm and lake's shoreline is vegetated with dense tamarisk and some sporadic cottonwood and willow. Flycatchers nest in these dense tamarisk forests. Potential habitat for flycatchers exists along the length of the Salt River (Redmond Flat/Horseshoe Bend to Roosevelt Lake) and the mouth of its tributaries (Coon Creek, Chalk Creek, Pinto Creek). Above the Highway 288 bridge, the Salt River is designated as Wilderness by the Forest and primarily receives recreation from boaters and anglers. The relatively remote section of river above the 288 bridge is likely prevented from developing riparian vegetation due to excessive flooding and overgrazing in the immediate area and possibly upstream on Tribal lands.

Redmond Flat is very similar in appearance to Gleason Flat (located farther upstream on the Salt River). Both are open river areas that are preceded by long stretches of canyon. At Gleason Flat large over-mature cottonwood trees persisted until many of them were toppled in the 1993 floods. This likely occurred at Redmond Flat decades ago. A small patch of riparian habitat exists between Chalk Creek and Coon Creek along the Salt River. Continued grazing and scouring due to unnatural flooding are likely preventing regeneration of riparian habitat to maturity. Degraded upstream and upland conditions promote unnatural flooding which impedes development and degrades riparian vegetation.

Allotments

Sunflower Allotment

The Sunflower allotment encompasses a large area of the western slope of the Mazatzal Mountains and Four Peaks Wilderness Area. Many small creeks (Boulder, Pine, Camp, Rock, Picadilla) drain these mountains into Sycamore Creek. Sycamore Creek flows into the Verde River on the Fort McDowell Indian Community.

No flycatchers are known to be present on this allotment and no suitable habitat exists. Potential habitat exists on low gradient stretches of lower Sycamore Creek and possibly Alder and Cottonwood Creeks. The Forest reports total use of these riparian areas by cattle. Soil conditions are rated as unsatisfactory and range conditions as fair to poor. The Forest reports that the poor conditions have largely been due to mismanagement of livestock through year-long and warm season grazing. Additionally, OHVs are known to drive in and along Sycamore Creek. Poor conditions on the uplands likely contribute to higher volume (flood) flows in Sycamore Creek, which may contribute to degradation of riparian habitat on the lower Verde River. The Forest is in the process of building a fence that would exclude cattle from Sycamore Creek at its confluence with Pine Creek down to the Fort McDowell Indian Community. As of August 2000, the fence has not been completed (L. Bizios, Tonto National Forest, pers. comm.). The allotment's size is 153,300 acres, riparian and soil conditions were rated as unsatisfactory.

Bohme/Sleeping Beauty/Bellevue Allotments

The Bohme/Sleeping Beauty/Bellevue allotments contain tributaries (Pinto Creek) of the upper Salt River near Roosevelt Lake where flycatchers breed. No flycatchers are known to exist along this tributary and no suitable habitat exists on these allotments. Further downstream on the Pinto Creek allotment, suitable, but currently unoccupied habitat exists. Grazing of Pinto Creek and the uplands on portions of the Bohme allotment has been high because no pasture fences exist. Also, an increase in cattle may also be resulting in excessive use. The Forest believes that overuse of uplands in these allotments has a high potential to affect downstream habitat. The Bohme allotment's size is 15,000 acres, riparian conditions were rated as unsatisfactory (soils were satisfactory). No riparian habitat exists on the Sleeping Beauty allotment and soils were rated as unsatisfactory. These three allotments are now managed as one unit with three pastures, which may improve riparian condition in the future by providing at least seasonal rest.

Pinto Creek Allotment

The Pinto Creek allotment lies just north (downstream) of the Bohme allotment and encompasses Pinto Creek. No flycatchers nest on this allotment, but there is both suitable and potential habitat along Pinto Creek. Management has resulted in improved conditions in some areas (restricted grazing), but poor conditions on other areas (unrestricted grazing). Upland use was considered high, but was not monitored. The Forest believes grazing on other portions of Pinto Creek is preventing habitat from reaching suitability. The presence of cattle during the winter of

1999/2000 resulted in heavy use of herbaceous forage (80-100 percent) and subsequent trampling of smaller riparian plants that were being established. This allotment is 34,170 acres in size, and both riparian and soils were rated as unsatisfactory.

Other allotments

Bronco Allotment

The Bronco allotment contains portions of Cave and Cottonwood Creeks just north of the town of Carefree. No flycatchers are known to nest on the allotment and no suitable habitat currently exists. Evaluations in 1998 indicated that use by cattle exceeded standards, and riparian areas were in unsatisfactory condition. Cave Creek was identified as potential flycatcher habitat. The Forest cited cattle as preventing suitable habitat from developing. This allotment is 3,070 acres in size, riparian conditions were rated as unsatisfactory, and soils were considered satisfactory.

Effects of the Action

Effects from the proposed continued livestock grazing and its management on the eight allotments included in this consultation would occur through three mechanisms: 1) watershed alteration; 2) physical damage and changes to streambanks, stream channels, and water column; and 3) alteration of the riparian vegetation community. Some protection and enhancement measures are described in the BA, but no implementation schedule is given. Because these measures are only recommendations, they will not be considered in the analysis of effects of the proposed action. No direct effects to flycatchers will occur because no occupied habitat occurs on any of the 20 allotments.

Indirect Effects

Physical Damage and Riparian Alteration

Cattle destabilize streambanks through chiseling, sloughing, compaction, and collapse which results in wider and shallower stream channels (Armour 1977, Platts and Nelson 1985c, Platts 1990, Meehan 1991). This alters the configuration of pools, runs, riffles, and backwaters; elevates levels of fine sediments and substrate embeddedness; reduces availability of instream cover; and alters other habitat factors. It also changes the way flood flows interact with the stream channel and may exacerbate flood damage to banks, channels, and riparian vegetation.

These impacts occur at all levels of cattle presence, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Damage begins to occur almost immediately upon entry of cattle onto the streambanks and use of riparian zones may be highest immediately following entry of cattle into a pasture (Platts and Nelson 1985b, Goodman *et al.* 1989). Vegetation and streambank recovery from long rest periods may be lost within a short period following grazing reentry (Duff 1979). Bank configuration, soil type, and soil moisture content influence the amount of damage with moist soil being more vulnerable to damage (Marlow and Pogacnik 1985, Platts 1990). Cattle presence on streambanks retards rehabilitation of previous damage as well as causing additional alteration (Platts and Nelson 1985b).

Cattle grazing in and on riparian vegetation may cause changes in the structure, function, and composition of the riparian community (Warren and Anderson 1987; Platts 1990; Schulz and Leininger 1990, 1991; Stromberg 1993b). Species diversity and structural diversity may be substantially reduced. Non-native plant species may be introduced via cattle feces. Reduction in health and density of riparian vegetation and shifts from deep rooted to shallow rooted vegetation contribute to bank destabilization and collapse and production of fine sediment (Meehan 1991). Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Platts and Nelson 1989). Litter is reduced by trampling and churning into the soil thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). The capacity of the riparian vegetation to filter sediment and pollutants to prevent their entry into the river and to build streambanks is reduced (Lowrance *et al.* 1984, Elmore 1992). Also, channel erosion in the form of downcutting or lateral expansion may result.

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

Belsky *et al.* (1999) summarized that, "cattle cause more damage to riparian zones than their often small numbers would suggest. Cattle tend to avoid hot, dry environments and congregate in wet areas for water and forage, which is more succulent and abundant than in uplands. They are also attracted to the shade and lower temperatures near streams, most likely because their species evolved in cool, wet meadows of northern Europe and Asia. In fact, cattle spend 5 to 30 times as much time in these cool, productive zones than would be predicted from surface area alone (Skovlin 1984). One study found that a riparian zone in eastern Oregon comprised only 1.9 percent of the grazing allotment by area, but produced 21 percent of the available forage and 81 percent of the forage consumed by cattle (Roath and Krueger 1982)." It can be argued that in the arid southwest these impacts are greater than a typically wetter Oregon.

Belsky *et al.* (1999) also discussed that grazing negatively affects water quality and seasonal quality, stream channel morphology, hydrology, riparian zone soils, instream and streambank vegetation, and aquatic and riparian wildlife. No positive environmental impacts were found (after examining the literature). Livestock were also found to cause negative impacts at the landscape and regional levels. Although Belsky *et al.* (1999) believed it was sometimes difficult to draw generalizations from the many studies on cattle grazing, due in part to differences in methodology and environmental variability among study sites, most recent scientific studies document that livestock grazing continues to be detrimental to stream and riparian ecosystems. To offset these effects, the Forest proposes to prevent grazing along Tonto Creek in the Seventy Six allotment and build a fence and remove cattle from lower Sycamore Creek (both projects are largely completed). Also, the Forest has fenced cattle from the Salt River and Tonto Creek arms of Roosevelt Lake where flycatchers currently breed and initiated cowbird trapping.

Utilization Rates

As described by the Forest in their June 2, 2000, BA amendment, grazing in potential habitat will inhibit the progress of riparian areas toward suitability. Grazing at 20 percent use in potential habitat is lower than the previous standard applied in riparian areas on the Forest (40-60 percent). If these new levels are strictly followed, it will reduce, but not eliminate the continued impact on riparian areas (see indirect effect sections).

Reducing percent use of riparian woody and herbaceous plants and on upstream ranges is not the most expeditious recovery action to establish or rehabilitate flycatcher nesting habitat. The elimination of grazing in potential habitat represents the quickest and most certain way to recover riparian habitat suitable for nesting flycatchers. Grazing of much Federal land for the last 75 years has degraded and prevented recovery of flycatcher habitat. As a result, grazing was a significant cause for listing the bird as endangered (US Fish and Wildlife Service 1995d). Probably because of poor habitat quality, free flowing streamside riparian areas under grazing management of the Forest have no known nesting flycatchers (over a 100 miles of potential habitat exists) (Paradzick *et al.* 2001).

While utilization levels on uplands and riparian areas have decreased from levels that have traditionally occurred on the Forest, permitted numbers remain unchanged. As a result, the same amount of cattle that exceeded previous limits of 40 percent use on woody riparian plants and 50 to 60 percent use of herbaceous upland grasses, will now be expected to consume less forage (generally 20 percent woody riparian plants and 35 percent upland grasses). If permitted numbers remain the same as in the past, we and the Forest (June 2, 2000 BA amendment) expect that cattle will be moved off the Forest more regularly because use limits will be reached rapidly. Without intensive monitoring, herding of cattle, or a reduction in stocking levels, use will be exceeded. Monitoring and implementing management based upon the results, will be the key activities to prevent cattle from exceeding use limits.

Seasons of Use

Winter use of riparian areas in Pinto Creek (Bohme: 10/15-3/30; Pinto Creek: 12/1-1/30) and Cave Creek (Bronco: 11/15 to mid-February) is proposed. Winter time use of riparian areas can reduce, but not eliminate the impacts of grazing. The strategy is for cattle to graze plentiful herbaceous perennial grasses when cottonwood and willow trees are dormant. Additionally, cold air circulating throughout river drainages can prevent cattle from congregating in the riparian areas. Grazing during the winter can still cause severe damage to riparian areas if precautions are not taken (Elmore and Kauffman 1994).

On the Tonto National Forest during the winter of 1999/2000, cattle caused significant damage. Along the upper Verde River, foraging and trampling of cottonwood and willow caused severe damage to riparian areas of the Skeleton Ridge and Cedar Bench allotments because of reduced herbaceous winter time forage and mild temperatures (M. Ross, Tonto National Forest, pers. comm., 2000). Excessive use of herbaceous plants, alteration of streambanks, and trampling of riparian plants occurred in Pinto Creek. In both areas, cattle stayed in the riparian areas because the temperatures were mild throughout the winter and perennial grasses were not as abundant due

to drought. In the Forest's June 21, 2000 project amendment, they estimated that use of herbaceous grasses in the riparian areas was 80 to 100 percent. With continued drought expected and infrequent rain and flooding occurring in the arid Southwest, this event may have set back riparian development toward flycatcher nesting habitat for a number of years.

Another key to winter grazing is establishing the accurate dormant season for the plants at a particular elevation. Typically, higher elevations will have a longer dormant season. Monitoring of lower Tonto Creek (2500 ft in elevation) confirmed that the dormant season typically occurred from January to mid-March (Ganda 1999). These times can fluctuate from year to year by a couple weeks depending on seasonal temperature shifts.

Winter use of riparian areas in Pinto Creek at elevations from 3500-3800 ft (Bohme: 10/15-3/30; Pinto Creek: 12/1-1/30) and Cave Creek at an elevation of 2400 ft (Bronco: 11/15 to mid-February) varies, and likely does not coincide with the actual dormant season. Grazing on the Pinto Creek allotment does occur within the dormant season, however the Bohme allotment, which is adjacent, allows grazing for five months. It is likely that on the Bohme allotment, the dormant season is three months long at the most. In lower elevation Cave Creek, grazing is permitted for three months (beginning in November), where at the same elevation on Tonto Creek, 2.5 months was the dormant season (beginning in January). Due to the low elevation and mild temperatures along Cave Creek, it is likely grazing will occur in part during the riparian growing season. These estimates are based upon monitoring and dormant seasons established for lower Tonto Creek (Ganda 1999) and comparisons to the proximity, elevation, and temperatures of Cave Creek and Pinto Creek.

Again, similar to use limits, monitoring these pastures is important when determining if it is appropriate to graze these riparian areas during the winter time. Without establishing the herbaceous forage component before allowing cattle entering the pasture, it will not be known whether there is enough herbaceous forage available for cattle. If cattle are found staying in the riparian areas as a result of mild winters and not being regularly herded, then cattle can physically harm riparian trees by trampling, trailing, and bedding. If cattle are present when cottonwood and willow trees are not dormant, then they can be significantly effected by herbivory.

Trespass Cattle

Ensuring that only the permitted cattle are present on an allotment and during the appropriate time are important to not exceeding use limits. Following the Forest's request for permittees to remove cattle from allotments by March 31, 2000 due to drought, cattle continued to be found during the summer of 2000 on Tonto Creek (Tonto Basin allotment), Salt River (Poison Spring/Sierra Ancha allotments)(J. Rourke, AGFD, pers. comm., 2000) and Sycamore Creek (Sunflower allotment)(C. Klug, AGFD, pers. comm., 2000). Ganda (1999) recorded trespass cattle in the Tonto Creek Riparian Unit that had nearly exceeded use limits before the time cattle were supposed to be in the pasture. Maintaining fences and monitoring conditions and use of allotments before, during, and after cattle are present is needed to ensure that trespass cattle are not contributing to or causing use limits to be surpassed.

Watershed Alteration

The history of upland grazing on the Forest and its continued effects on riparian habitat has been presented in the environmental baseline. The Service stresses that to generate and maintain riparian habitat, a healthy watershed (uplands, tributaries, ranges, etc.) is a key component (Elmore and Kauffman 1994, Briggs 1996). Elmore and Kauffman (1994) reported that "simply excluding the riparian area (from grazing) does not address the needs of the upland vegetation or the overall condition of the watershed. Unless a landscape-level approach is taken, important ecological linkages between the uplands and aquatic systems cannot be restored and riparian recovery will likely be limited." As the Forest described in their June 2, 2000, project amendment, "this level of use (35 $\pm$ 5 percent for uplands) is generally considered too high for soils and rangelands in these conditions. Overall, use on allotments with these conditions should receive lighter use."

Continuing to graze in uplands where the soil conditions and riparian habitat in upland tributaries are unsatisfactory will continue to delay recovery and generate the most significant effect of unhealthy ranges, which is unnatural flooding. Unnatural flooding subsequently will topple existing trees and shallow rooted saplings and poles, and continue to erode rivers like the current conditions observed on the Salt and Verde rivers, Tonto Creek, and their tributaries.

Livestock grazing may cause long-term changes to the watershed and its functions. The extent of these changes varies with watershed characteristics, grazing history, and cumulative effects from other human uses and natural watershed processes. Watershed changes due to grazing are more difficult to document than direct livestock impacts to the riparian and aquatic communities due to their long-term, incremental nature, the time lag and geographic distance between cause and effect, and numerous confounding variables. Despite this, the relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Chaney *et al.* 1990, Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994).

Livestock grazing may alter the vegetation composition of the watershed (Martin 1975, Savory 1988, Vallentine 1990, Popolizio *et al.* 1994). It may cause soil compaction and erosion, alter soil chemistry, and cause loss of cryptobiotic soil crusts (Harper and Marble 1988, Marrs *et al.* 1989, Orodho *et al.* 1990, Schlesinger *et al.* 1990, Bahre 1991). Cumulatively, these alterations contribute to increased erosion and sediment input into the streams (Johnson 1992, Weltz and Wood 1994). They also contribute to changes in infiltration and runoff patterns, thus increasing the volume of flood flows while decreasing their duration (Brown *et al.* 1974, Gifford and Hawkins 1978, Johnson 1992). Groundwater levels may decline and surface flows may decrease or cease (Chaney *et al.* 1990, Elmore 1992). Development of livestock waters may alter surface flows by impoundment, spring capture, or runoff capture.

Invasion of Tamarisk

Tamarisk is generally unpalatable to cows. As a result, in areas where native plants and tamarisk exist, tamarisk may have the competitive edge when cattle consume native plants. Decadent stands of tamarisk carry a much higher fuel load in a fire. The subsequent transition of native plants to tamarisk has increased the fire risk in the nesting habitat of the flycatcher because a fire

in a stand of tamarisk is more likely to be catastrophic. As a result, we can reasonably expect that continuing the proposed grazing scheme will promote the existence of tamarisk (while decreasing the establishment of native riparian plants). As a result, the habitat that is developed will become much more flammable and threaten nesting flycatchers and other nearby habitats.

Grazing and Cowbirds

Willow flycatcher nests are parasitized by brown-headed cowbirds (*Molothrus ater*) which lay their eggs in the host's nest. Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements such as waters and corrals; agriculture; urban areas; golf courses; bird feeders; and trash areas. When these feeding areas are in close proximity to flycatcher breeding habitat, especially coupled with habitat fragmentation, cowbird parasitism of flycatcher nests may increase (Hanna 1928, Mayfield 1977a,b, Tibbitts *et al.* 1994).

Monitoring

It has been clearly described by Alford (1993) and others (Elmore and Kaufmann 1994, Briggs 1996) that monitoring the effect of grazing on rangelands and riparian areas is important for good management of the land. Establishing utilization levels, range conditions, available forage, herbaceous and woody use, and other parameters are crucial to determine range condition, if use is approaching or exceeding limits, and how to alter grazing to reach the desired condition. Yet, the GAO report on riparian habitat (1988) described that there are typically no personnel available to conduct these monitoring activities adequately. The Forest (*in litt*. 1999) confirmed this by reporting that "many allotments are not monitored; ...information on upland condition is not collected; and riparian areas are somewhat different in that use usually exceeds standards."

Therefore, improving habitat conditions is reliant on the Forest's monitoring and appropriate reaction to the results. As mentioned earlier, timely and frequent monitoring will be needed. The result will likely be that cattle will have to be herded and moved more regularly, or moved off the pasture or allotment. Without this, the consequences will likely be continued degradation of the land. Monitoring will also be a key instrument in documenting and minimizing the effects of trespass cattle and extended winter grazing.

The Forest's proposal stated that some riparian sites are sampled at the middle and end of the season, but that this does not occur at all sites. As a result of this statement, we are assuming that two visits are the preferred methodology, but are uncertain. The consequence of only visiting sites two times could result in continued degradation of the land by exceeding limits and overgrazing already degraded lands. By only visiting sites briefly throughout the middle and end of the season, trespass cattle may not be detected. As a result, utilization may be accelerated and condition of the land may change between rotations. Therefore, regular monitoring will be important in documenting trespass and the appropriate action to remedy the situation (repairing fences, removing cattle, etc.).

Summary

The Forest's Guidance Criteria for effects determination for the southwestern willow flycatcher (1997) establishes parameters and presents an opportunity to adjust the proposed action to achieve

a determination that the action is not likely to adversely affect the species. Specific concerns discussed in the flycatcher portion of the Guidance Criteria focused on the direct effects of livestock grazing and the role it plays in cowbird parasitism, invasion of non-native plants, and soil and watershed conditions. Included in this proposed grazing action were eight allotments where the Forest's conclusion was that grazing activities were likely to adversely affect the southwestern willow flycatcher. The following excerpts of the criteria primarily address the effects of grazing on the flycatcher, and development or maintenance of its habitat:

1) Livestock are permitted on the allotment;
2) livestock grazing reduces habitat suitability;
3) grazing in potential habitat slows the progression of habitat to suitability;
    a) regeneration or maintenance of woody vegetation is impaired by trampling, bedding, and feeding;
    b) livestock grazing occurs in times other than the dormant season;
    c) monitoring is not in place to determine that suitability is being maintained, enhanced, or that potential habitat is progressing toward suitability;
4) soil conditions in upland areas with livestock are classified as unsatisfactory in watersheds that contain occupied, unoccupied suitable or potential habitat; and
5) livestock use occurs in riparian areas upstream from occupied, potential, or suitable unoccupied habitat where it results in the reduction of the quality of the riparian habitat.

On the eight allotments (Bohme/Sleeping Beauty/Bellevue, Bronco, Pinto Creek, Sunflower, Seventy Six and Millsite) where the Forest concluded that grazing "may affect" southwestern willow flycatchers, riparian and upland conditions were mostly considered unsatisfactory. However, preventing grazing along Tonto Creek in the Seventy Six allotment and building a fence and removing cattle from lower Sycamore Creek are the proper methods to recover flycatcher habitat. Also, the Forest has fenced cattle from the Salt River and Tonto Creek arms of Roosevelt Lake where flycatchers currently breed and initiated cowbird trapping. We commend the Forest for their protective efforts at these locations. However, on these eight allotments most riparian habitat is unsuitable for flycatchers, poor upland conditions are promoting excessive flooding, and grazing is proposed to continue. Even though the Forest proposes more conservative grazing levels and will implement monitoring, these changes will not improve upland and riparian habitat conditions sufficiently to develop potential nesting habitat into suitable habitat.

Overall, the status of the species and effects of the proposed grazing action are summarized in the following points:

1) The southwestern willow flycatcher is extremely endangered with loss of riparian habitat as the prime cause;
2) about 37 miles of potential habitat exists in the action area (primarily Sycamore Creek, Tonto Creek, Pinto Creek, Cave Creek). About 15 miles (14 miles on Pinto Creek and 1 mile on Cave Creek) are proposed to have continued grazing;
3) the environmental baseline throughout the action area is degraded with grazing being a significant contributor to poor riparian conditions (in rivers, creeks, and uplands);

4) riparian habitat is unsatisfactory throughout the action area with little to no suitable streamside habitat;
5) upland range conditions and tributary riparian habitats are largely in unsatisfactory condition;
6) poor range and tributary conditions are causing larger, unnatural flooding regimes;
7) unnatural flooding is causing erosion of streambanks and loss of riparian vegetation;
8) without any existing high-density streamside riparian habitat in the action area, unnatural flooding significantly reduces the recovery rate of riparian habitat;
9) grazing promotes the invasion of non-native plants and trees such as tamarisk, which increases the risk of fire in riparian areas; and
10) grazing promotes brown-headed cowbird parasitism of flycatcher nests.

Outside of Roosevelt Lake, the most likely location for flycatchers to nest on the Forest is along Tonto Creek, and the Salt and Verde Rivers. These low-gradient, open river bottoms have the greatest potential to develop cottonwood/willow communities. Flycatchers seem to prefer these lower gradient streams. However, the historical distribution of the flycatcher is not well known, and the population is currently at very low numbers and sparsely distributed. As a result, we are unsure of all the locations where flycatchers can nest.

The Forest, in their March 1999 BA for this project, developed a table with locations (streams) where they believed potential flycatcher nesting habitat could develop and subsequently a methodology for classifying the habitat on the ground. The Service is supportive of the process the Forest established to classify these streams. While the Forest and the Service understand that the classification of potential habitat may change as more information is collected from these streams or about flycatcher nesting habitat, we believe the Forest has been accurate in describing habitat that, based upon our current knowledge, could develop into suitable flycatcher nesting habitat.

Tributaries of Tonto Creek and the Salt and Verde rivers offer potential nesting habitat (as described in the BA) and play a crucial role in controlling unnatural flooding on larger streams. Some higher-gradient tributaries have low gradient portions that can develop dense riparian habitat suitable for nesting flycatchers (Sycamore Creek, Cave Creek, Pinto Creek, etc.). The upland range and riparian habitat along these tributaries also play a crucial role in reducing the energy of water flowing to the main stems. As a result, these tributaries are important in providing potential nesting habitat and protecting riparian habitat on larger streams from unnatural flooding. About 15 of 37 miles of potential stream habitat involved in the proposed action will continue to be grazed. However, there is still some uncertainty to the extent Pinto and Cave creeks may be used by nesting flycatchers. Little historical information exists on the distribution of the bird in this State. Almost all of the proposed grazing in potential flycatcher nesting habitat (14 of 15 miles) is on Pinto Creek.

The project proposal and analysis of effects are based on the assumption that habitat will be moving toward suitability. The proposed monitoring strategy is intended to keep use under the proposed limits, thus allowing habitat to progress toward suitability for nesting flycatchers. If

utilization limits are exceeded and habitat is not progressing toward suitability, then the premise of the analysis is violated and reinitiation of consultation may be necessary. Also, if flycatchers are found on allotments outside of the Roosevelt Lake area during the life of this consultation, it may be necessary for the Forest to reinitiate consultation with the Service.

Conclusion

After reviewing the status of the southwestern willow flycatcher, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher. Our conclusion that the proposed action is not likely to jeopardize the species is based on the following:

3. No take is anticipated to occur;
4. grazing use on the allotments has been diminished;
5. a relatively short distance of riparian area will be grazed and that grazing will occur during winter months;
6. the uncertainty of flycatcher use of Pinto, Cave, and Queen Creeks; and
7. monitoring will be conducted as proposed;
8. no critical habitat is currently designated.

INCIDENTAL TAKE STATEMENT

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

Recent, comprehensive survey data documenting presence or absence of the southwestern willow flycatcher is lacking for some areas in the allotments addressed in this consultation. As a result, the Service cannot reasonably conclude that incidental take is likely to occur as a result of the proposed action. Thus we anticipate no take of southwestern willow flycatchers. If a southwestern willow flycatcher is located in an allotment or nearby, and it may be adversely affected by the proposed action, then reinitiation of consultation is warranted [50 CFR 402.16(b)]. The Service would reevaluate the need for an incidental take statement then.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of The Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of 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 the recovery plan (US Fish and Wildlife Service 1995d), or to develop information.

1. Remove cattle grazing from riparian areas that could potentially provide nesting habitat for the flycatcher.

2. Build fences to restrict cattle from these riparian areas.

3. Where fences do exist, ensure that fences are maintained at least annually so trespass cattle do not enter recovery areas.

4. Grazing on upland ranges in the same watershed of potential, occupied, or suitable habitat, where soil conditions are *satisfactory* and range condition is *excellent*, should not exceed 30-40 percent use of palatable perennial grasses and grass-like plants.

Less than excellent range conditions (with satisfactory soil conditions) would require lower use levels to improve ecological conditions. Based upon the Amended Forest Plan and supporting literature (under the general grazing schemes on the Tonto), utilization should generally be between 0 and 25 percent for very poor to fair conditions, and 30 to 35 percent for good to excellent conditions.

5. Grazing in tributaries which are *not* classified as potential flycatcher habitat, but are within a watershed which contains potential, occupied, or suitable habitat, and has satisfactory soil conditions, should not exceed 10 percent bank alteration, 40 percent use (current year's growth) of woody species (includes trampling, bedding, and feeding), and 35 percent use of palatable perennial grasses and grass-like plants.

These levels would be in accordance with associated ecological conditions. In other words, the levels described above are appropriate for tributaries that are in good to excellent shape, but would have lower utilization in very poor to fair conditions.

6. Grazing in riparian areas upstream generally (4000-6000 ft) in elevation of *all* potential, occupied, or suitable habitat should not exceed 10 percent bank alteration, 40 percent use (current year's growth) of woody species (includes trampling, bedding, and feeding), and 35 percent use of palatable perennial grasses and grass-like plants.

These levels would be in accordance with associated ecological conditions. In other words, levels described above are appropriate for upstream riparian areas that are in good to excellent shape, but would have lower utilization in very poor to fair conditions.

7. Grazing in unoccupied suitable habitat should occur in the dormant season, typically January and February for low desert elevations less than 1230 m (4000 ft), and should not exceed 10 percent bank alteration, 40 percent use of woody species (current year's growth, includes trampling, bedding, feeding, and trailing), and 35 percent use of palatable perennial grasses and grass-like plants. This could typically occur when all habitat has recovered, and satisfactory management actions are in place, such as fencing, appropriate stocking rates, monitoring, etc.

8. A monitoring plan should at least include: establishment of key areas, identification of species to monitor, development of closed reference areas, evaluation of current year's forage production before cattle are placed on allotments or pastures to establish stocking rates, and examination of the allotments or pastures during and after use to establish level of use, condition of land, need to move cattle, etc.

    a) Stocking rates should be based upon the determination of available current forage production each year.
    b) Stubble height baselines should have a forage/acre figure associated with them, so a baseline is not established for areas that are too poor to graze.
    c) Annuals should be excluded from the forage base because reliance on annuals indicates overuse of perennial grasses and grass-like plants and woody vegetation.
    d) Monitoring should subsequently drive vegetation utilization and stocking rate. Having a data driven grazing program is the proper way to manage.

9. If grazing occurs along any riparian area, whether it is unoccupied, occupied, suitable, unsuitable habitat, upstream, or downstream of habitat, the riparian area should be rested from grazing one or two years (perhaps more) following a significant flood event or fire to allow riparian plants, root systems, and plant structure to develop.

REINITIATION STATEMENT

This concludes formal consultation on the Forest's proposed livestock grazing program. 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 adversely affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a way that causes an effect to a 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 this

action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation, if it is determined that the impact of such taking will cause an irreversible and adverse impact to the species.

Any questions or comments should be directed to Glen Knowles (x233) or Sherry Barrett (520) 670-4617 of the Arizona Ecological Services Field suboffice in Tucson.

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APPENDIX A - TABLES

Table 1. Allotment information for the 20 Tonto National Forest allotments, including acreage information provided by the Forest, 2001 (see text for discussion of capable range).

Allotment	Total Acres	Acres of Capable Range
Bohme/Sleeping Beauty/Bellvue (3 allotments managed jointly)	28,000	app. 11,000
Bronco	3,070	3,070
Buzzard Roost	46,224	40,085
Christopher Mountain/Ellinwood (2 allotments managed jointly)	25,120	19,045
Deadman Mesa	32,347	15,388
Devils Canyon	25,676	21,603
H-4	16,361	9,373
Jones	13,386	11,253
Millsite	43,471	33,035
OW	4,511	4,052
Payson/Cross V (2 allotments managed jointly)	76,700	40,800
Pinto Creek	34,170	28,800
Roosevelt	22,606	15,089
Seventy Six	23,571	17,860
Star Valley	25,508	17,912
Sunflower	153,300	115,900
Total (acres)	**574,021**	**404,265**

Table 2. Allotment information for Seventy Six allotment, Tonto Basin Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual Ams:**	
Total Acres	23,571	**1994**	3/1 to 2/28 - 3163; 6/1 to 2/28 - 573; Total AMs - 3736
Capable Range	17,860	**1995**	3/1 to 2/29 - 3538; 8/1 to 2/29- 447; Total AMs - 3985
		1996	3/1 to 2/28 - 4235 Total AMs - 4235
Elevation	3500-5000	**1997**	3/1 to 7/9 - 1441; 7/10 to 2/28 - 2106; Total AMs - 3547
		1998	3/1 to 2/28 - 2884 Total AMs - 2884
		1999	2346 AMs
Term permit #s	362 Adult Livestock	**2000**	2172 AMs
		2001	2280 AMs
Permitted AMs: 2001	2340 AMs	**Projected stocking rate: 2002, 2003, 2004**	10.07
Projected #s: 2002, 2003, 2004	2340 AMs		
Major Vegetation type	Chaparral		
Type of grazing system/ # of pastures	Rest Rotation 27 pastures		
Allotment Condition			
Ecol. C/T	?		
Soils	Unsatisfactory (67 percent Satisfactory)		
Riparian	Unsatisfactory		
Utilization Limits			
Streambank	Limit impacts to 10 percent of alterable banks		
Herbaceous	Riparian - limit use to 30 percent of plant biomass (Dec-Feb), 20 percent other months		
Woody	Riparian - limit use to 40 percent of leaders on plants < 6 ft. tall (Dec-Feb), 20 percent other months		
Uplands	35 percent maximum allowable use		
TEP Spp/CH Present	Mexican spotted owl - (protected/restricted habitat), Bald eagle, Spikedace/Loach Minnow CH	**Pot. Hab. Present**	SW willow flycatcher, Lesser long-nosed bat, Gila topminnow Spikedace, Woundfin, Loach minnow, Pygmy-owl
AMP completed	11/24/86	**percent Implemented**	
BAE Completed	11/25/86	**BO Completed**	
Livestock excluded from Tonto Creek.			

Table 3. Allotment information for Bohme/Sleeping Beauty/Bellevue allotments, Globe Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual AMs[1]:**	**1994** 193 = 2316 AMs
Total Acres	28,000		**1995** 193 = 2316 AMs
Capable Range	11,000+Bellevue		**1996** 179 = 2148 AMs
Elevation	3800-6300		**1997** 179 = 2148 AMs
			1998 179 down to 113 = 1356 AMs
			1999 7.2 ac/AM; 128 = 1536 AMs.
Term permit #s	193 CYL+110 YL 1/1-5/31		**2000** 1605 Ams **2001** 0
Permitted #s: 2001	193 CYL+110 YL 1/1-5/31	**Projected stocking rate[1]**	**2002** **2003** **2004** All dependent upon utiliz. transects to be in 1999,2000, 2001,2002
Projected #s: 2002, 2003, 2004	See table to right		
Major Vegetation type	chaparral		
Type of grazing system/	year round; Bohme 10/15-3/30; Bellevue 4/1-4/25; Sleeping Beauty 4/26-10/15		
# of pastures	2		

Allotment Condition

Ecol. C/T ???
Soils Satisfactory (74 percent Satisfactory)
Riparian Unsatisfactory

Utilization Limits

Streambank limit impacts to <20 percent of alterable banks; 10 percent on Pinto Cr. Below spill
Herbaceous Riparian - limit use to <30 percent of plant biomass
Riparian - limit use to < 50 percent of leaders on plants <6 ft. tall; 35 percent on Pinto Cr
Woody 35 percent
Uplands 35 percent

TEP Spp/CH Present	Mexican spotted owl (protected/restricted habitat) AZ hedgehog cactus	**Pot. Hab.** **Present**	Lesser long-nosed bat Gila topminnow
AMP completed	none	**percent Implemented**	
BAE Completed		**BO Completed**	

Livestock removed due to drought.

Table 4. Allotment information for Bronco allotment, Cave Creek Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** 3070 **Capable Range** 3070	**Actual AMs:** **1994** 1/1-5/15 = 292.5 AMs 11/15-12/31 = 97.5 AMs **1995** 1/1-5/15 = 292.5 AMs 11/21-12/31 = 88.5 AMs **1996** 1/1-5/15= 265.5 AMs 11/15-12/31 = 88.5 AMs **1997** 1/1-5/15 = 265.5 AMs 11/15-12/31 = 82.5 AMs **1998** 1/1-5/15 = 247.5 AMs 11/15-12/31= 94.5 Ams **1999** 63 from 1/1-5/15 = 283.5 **2000** 65 -11/15-5/15 = 390 AMs
Elevation 2400 - 4840	
Term permit #s 65 from 11/15-5/15 = 390AMs	
Permitted #s: 390 AMs **2001**	**Projected stocking rate** **2002** 7.9 **2003** 7.9 **2004** 7.9
Projected #s: 65 -11/15-5/15 **2002, 2003, 2004** = 390 AMs	
Major Vegetation type Desert Scrub: 2460 ac MH; 300 acres H; 270 acres ML; Riparian: 40 acres L & ML	
Type of grazing system/ # of pastures Winter/spring/early summer seasonal; deferred rotation 5	
Allotment Condition **Ecol. C/T** see above **Soils** Satisfactory (81 percent Satisfactory) **Riparian** Unsatisfactory	
Utilization Limits **Streambank** limit impacts to 10 percent of alterable banks. **Herbaceous** Riparian - limit use to 20 percent of plant biomass **Woody** Riparian - limit use to 20 percent of leaders on plants <6 ft. tall **Uplands** Allowable use not to exceed 35 percent current year's growth of perennial grasses	
TEP Spp/ CH Present Gila topminnow, Arizona agave	**Pot. Hab. Present** SW willow flycatcher, lesser long-nosed bat, ? Cactus ferruginous pygmy owl, Spikedace, Desert pupfish
AMP completed 1/26/83	**percent Implemented** 100 percent
BAE Completed	**BO Completed**
Graze Cave Creek pasture Nov. 15-mid Feb. or until utilization levels are approached. A monitoring plan and selection of key areas may occur before livestock return.	

Table 5. Allotment information for Buzzard Roost allotment, Pleasant Valley Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual AMs:**	**1994** 5035 AMs
Total Acres	46,224		**1995** 5003 AMs
Capable Range	40,085		**1996** 4488 AMs
Elevation	4000 - 6676 feet		**1997** 4060 AMs
			1998 3842 AMs
Term permit AMs	5339 AMs		**1999** 5339 AMs
			2000 5339 AMs
Permitted AMs:		**Projected stocking rate**	
2001	3800 AMs	**2002**	7.5
Projected AMs:		**2003**	7.5
2002, 2003, 2004	5339 AMs	**2004**	7.5
Major Vegetation type	Ponderosa Pine, Grassland/woodland, P/J		
Type of grazing system/ # of pastures	Rest/Deferred Rotation System for the summer pastures and a Rest every other year system for the winter pastures. Two winter pastures and 3 main summer pastures and one holding pasture and one shipping pasture.		
Allotment Condition			
Ecol. C/T	This allotment overall is 50 percent/50 percent in moderately high condition and moderately low condition with most of the allotment in a static trend. There is approximately 4000 ac in high condition and 249 ac in low condition. Info from Range Analysis approved on 1/28/65. Recent inspections confirm that the above data is correct for the pine type, however, for the Grassland/Woodland type conditions have improved.		
Soils	Unsatisfactory (62 percent Satisfactory)		
Riparian	No call		
Utilization Limits			
Streambank	limit impacts to <20 percent of alterable banks.		
Herbaceous	Riparian - limit use to <30 percent		
Woody	Riparian - limit use to <50 percent of leaders on plants <6 ft. tall.		
Uplands	Maximum 50 percent allowable use.		
TEP Spp/CH Present	Mexican spotted owl (restricted/protected habitat) Bald eagle Spikedace/Loach Minnow CH (watershed)	**Pot. Hab. Present**	lesser long-nosed bat
AMP completed	3/18/86	**percent Implemented**	100
BAE Completed	4/8/86	**BO Completed**	none

Table 6. Allotment information for Christopher Mountain/Ellinwood allotments, Payson Ranger District, Tonto National Forest, 2001.

<table>
<tr><td colspan="2"><u>Allotment Acres</u>
Total Acres 25,120
Capable Range 19,045</td><td colspan="2" rowspan="3"><u>Actual Ams:</u>
1994 962 AMs
1995 879 AMs
1996 1148 AMs
1997 850 AMs
1998 864 Ams
1999 0
2000 0</td></tr>
<tr><td colspan="2">Elevation 4000 to 7900 feet</td></tr>
<tr><td colspan="2">Term permit 2400 AMs, 600 AMs
AMs non-use</td></tr>
<tr><td colspan="2" rowspan="2">Permitted AMs:
2001 1404 AMs
Projected AMs:
2002, 2003, 2004 2400 AMs</td><td><u>Projected stocking rate</u>
2002, 2003, 2004</td><td>7.9</td></tr>
<tr><td colspan="4">Major Vegetation type Ponderosa Pine, Grassland/Woodland, Chaparral</td></tr>
<tr><td colspan="4">Type of grazing system/ Rest/Deferred Rotation System
# of pastures Six pastures</td></tr>
<tr><td colspan="4"><u>Allotment Condition</u>
Ecol. C/T <u>Ellinwood</u> - Range Analysis data 1966 - Shows range conditions over 50 percent of area was MH and 50 percent was in ML with 50 percent in upward trend and 50 percent in static trend. <u>Christopher Mtn</u> - Range Analysis 2/24/56 - Shows range conditions were in MH condition on 30 percent of the area and ML over 70 percent with upward trend over 30 percent and static trend over 70 percent. Recent inspections show range conditions in the pine type are ML, in grassland type are MH , in chaparral type range from MH to high, and in the P/J type range from ML to MH with trend ranging from static to upward.
Soils Satisfactory (90 percent Satisfactory)
Riparian Unsatisfactory</td></tr>
<tr><td colspan="4"><u>Utilization Limits</u>
Streambank Alteration is limited to less than 20 percent of alterable stream banks
Herbaceous Riparian - Limited use to <30 percent
Woody Riparian - Limited to <50 percent of leaders on plants less than 6 feet in height
Uplands limited to 45 percent on grasses, 50 percent on browse.</td></tr>
<tr><td colspan="2">TEP Spp/ CH Present Mexican spotted owl (protected/restricted habitat)
Spikedace/Loach Minnow CH (watershed)</td><td colspan="2">Pot. Hab. Present Lesser long-nosed bat</td></tr>
<tr><td colspan="2">AMP completed none</td><td colspan="2">percent Implemented</td></tr>
<tr><td colspan="2">BAE Completed none</td><td colspan="2">BO Completed none</td></tr>
<tr><td colspan="4">This allotment is currently under a 100 percent no-use agreement that will continue through 2001.</td></tr>
</table>

Table 7. Allotment information for Deadman Mesa allotment, Payson Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual AMs:**	
Total Acres	32,347	**1994**	0 Ams
Capable Range	15,388	**1995**	0 AMs
		1996	0 AMs
Elevation	???	**1997**	912 AMs
		1998	912 AMs
		1999	912 AMs
Term permit AMs	1095 AMs	**2000**	0 AMs
Permitted AMs: 2001	912 AMs	**Projected socking rate:**	
Projected AM: 2002, 2003, 2004	1095 AMs	**2002, 2003, 2004**	14.1
Major Vegetation type	P/J Woodland Type		
Type of grazing system/ # of pastures	Rest Rotation/Deferred System; This allotment contains 8 pastures. This allotment is under a Non-use Agreement for 183 AMs. This Non-use Agreement will be resolved once the area has returned to a normal precipitation pattern. At this time, only 912 AMs can be grazed on the allotment.		
Allotment Condition			
Ecol. C/T	1966 Range Analysis: Approximately 20 percent of the allotment is in ML condition; and approximately 80 percent of the allotment is in a MH condition. An inspection completed on 12/22/97 indicated that the herbaceous species had flourished in recent years and that utilization levels were light to moderate.		
Soils	Unsatisfactory (41 percent Satisfactory)		
Riparian	Satisfactory		
Utilization Limits			
Streambank	limit impacts to <20 percent of alterable banks		
Herbaceous	Riparian - limit use to <30 percent of plant biomass		
Woody	Riparian - limit use to <50 percent of leaders on plants < 4.5 ft tall		
Uplands	limit use to 50 percent		
TEP Spp/CH Present	Razorback sucker Spikedace/Loach Minnow CH Mexican Spotted Owl	**Pot. Hab. Present**	Lesser long-nosed bat, Gila topminnow, Spikedace, Loach minnow, Desert pupfish, Woundfin, Bonytail, CO pikeminnow
AMP completed	10/28/87	**percent Implemented**	80 percent
BAE Completed	7/2/87	**BO Completed**	none

Table 8. Allotment information for Devil's Canyon allotment, Globe Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual #s:**	**1994** 420 = 5040 AMs
Total Acres	25,676		**1995** 420 = 5040 AMs
Capable Range	21,603		**1996** 303 = 3636 AMs
Elevation	3800-5400		**1997** 336 = 4032 AMs
			1998 343 down to 216 = 2592 AMs
Term permit #s	420		**1999** 2640 AMs
			2000 2400 AMs
			2001 1440 AMs
Permitted #s: 2001	220 = 2640 AMs	**Projected stocking rate**	**2002** 6.4
			2003 6.0
Projected #s: 2002	All dependent on		**2004** 5.6
2003	util. transect to be		
2004	read each year.		
Major Vegetation type chaparral			
Type of grazing system/ # of pastures	6 months in each pasture. The third pasture rested all year. 3		
Allotment Condition			
Ecol. C/T	???		
Soils	Satisfactory (72 percent Satisfactory)		
Riparian	Unsatisfactory		
Utilization Limits			
Streambank	limit impacts to <20 percent of alterable banks		
Herbaceous	Riparian - limit use to <30 percent of plant biomass		
Woody	Riparian - limit use to <50 percent of leaders on plants <6 ft. tall		
Uplands	limit use to <50 percent		
TEP Spp/CH Present	hedgehog cactus Spikedace/Loach Minnow CH (watershed)	**Pot. Hab. Present**	Lesser long-nosed bat Gila topminnow
AMP completed 1985		**percent Implemented**	
BAE Completed 6/9/80		**BO Completed**	

Table 9. Allotment information for H-4 allotment, Tonto Basin Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** 16,361 **Capable Range** 9,373	**Actual AMs:** **1994** 1/1 to 4/30 - 300; 3/1 to 5/31 - 613; 9/1 to 2/28 - 1207; 6/1 to 8/31 - 613; Total AMs - 2733 **1995** 1/1 to 4/30 - 600; 3/1 to 2/29 - 2440; Total AMs - 3040 **1996** 1/1 to 4/30 - 272; 3/1 to 2/28 - 2433; Total AMs - 2705 **1997** 1/1 to 4/30 - 272; 3/1 to 2/28 -2105; Total AMs - 2377 **1998** no cattle **1999** no cattle **2000** no cattle
Elevation 4000 - 5500	
Term permit #s 200 Adult, 150 YL	
Permitted #s: **1999** no cattle	**Projected stocking rate** **2002, 2003, 2004** 3.9
Projected AMs: **2002, 2003, 2004** 2377	
Major Vegetation type Chaparral	
Type of grazing system/ # of pastures Rest rotation Four pastures	
Allotment Condition **Ecol. C/T** ??? **Soils** Unsatisfactory (41 percent Satisfactory) **Riparian** Unsatisfactory	
Utilization Limits **Streambank** limit impacts to <20 percent of alterable banks **Herbaceous** Riparian - limit use to <30 percent of plant biomass **Woody** Riparian - limit use to <50 percent of leaders on plants <6 ft. tall **Uplands** ???	
TEP Spp/ CH Present Mexican spotted owl (protected/restricted habitat) Spikedace/Loach Minnow CH (watershed)	**Pot. Hab. Present** Lesser long-nosed bat, Gila topminnow, Loach minnow Spikedace, Woundfin, Pygmy-owl
AMP completed 2/18/86	**percent Implemented**
BAE Completed none	**BO Completed**
No grazing until at least 2002. Before restocking occurs, an EA, management plan, and consultation will be done. Monitoring plan will be prepared and key areas selected before 2001 grazing season.	

Table 10. Allotment information for Jones allotment, Globe Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual #s:**	
Total Acres	13,386	**1994**	180 = 2160 AMs
Capable Range	11,253	**1995**	180 = 2160 AMs
		1996	49 = 588 AMs
Elevation	3500-6600	**1997**	49 = 588 AMs
		1998	100 = 1200 AMs
		1999	150 = 1800 AMs
Term permit #s	220 = 2640 AMs	**2000**	97 = 1164 AMs
		2001	984 AMs
Permitted #s:		**Projected stocking rate**	
2001	220	**2002, 2003, 2004**	6.3
Projected #s:	Will be based on util. transects to be read.		
2002, 2003, 2004			
Major Vegetation type	desert grassland/chaparral/ponderosa pine		
Type of grazing system/ # of pastures	Deferred rotation 9		
Allotment Condition			
Ecol. C/T	???		
Soils	Satisfactory (82 percent Satisfactory)		
Riparian	No call		
Utilization Limits			
Streambank	limit impacts to <20 percent of alterable banks		
Herbaceous	Riparian - limit use to <30 percent of plant biomass		
Woody	Riparian - limit use to <50 percent of leaders on plants <6 ft. tall		
Uplands	limit use to <50 percent		
TEP Spp/ CH Present	Mexican spotted owl (restricted habitat)	**Pot. Hab. Present**	Lesser long-nosed bat Gila topminnow
AMP completed	1987	**percent Implemented**	
BAE Completed	none	**BO Completed**	???

Table 11. Allotment information for Millsite allotment, Mesa Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** 43,471 **Capable Range** 33,035	**Actual #s: 1995** 301 cyl = 3612 AMs; 191 1/1-5/15 = 860 AMs; Total AMs = 4472 **1996** 296 cyl = 2552 AMs; 184 1/1-5/15 = 828 AMs; Total AMs = 3380 **1997** 293 cyl = 3516 AMs; 164 1/1-5/15 = 738 AMs; Total AMs = 4254 **1998** 290 cyl = 3480 AMs; 106 1/1-5/15 = 477 AMs; Total AMs = 3957 **1999** 4204 AMs **2000** 4070 AMs **2001** 3526 AMs
Elevation 2500-6050	
Term permit #s 307 cyl, 197 yls 1/1-5/31	
Permitted #s: 2001 4669 AMs	**Projected stocking rate** **2002, 2003, 2004** 4669 AMs
Projected #s: **2002, 2003, 2004** 4669 AMs	
Major Vegetation type Sonoran Desert/Chaparral	
Type of grazing system/ # of pastures Rest Rotation; six pastures, two herds. Northern Unit: Red Tank - Jan.-May 1999; Woodbury- June-Nov. 1999; Cottonwood- Dec. 1999-May 2000; Red Tanks- June-Nov. 2000; Woodbury- Dec. 2000-May 2001; Cottonwood- June-Nov. 2001; Red Tanks- Dec. 2001-May 2002; Woodbury- June-Nov. 2002; Cottonwood- Dec. 2002-May 2003. Southern Unit: Millsite- Jan-May 1999; Hewitt- June-Nov. 1999; Bear Tank- Dec. 1999-May 2000; Millsite- June-Nov. 2000; Hewitt- Dec. 2000-May 2001; Bear Tank- June-Nov. 2001; Millsite- Dec. 2001-May 2002; Hewitt- June-Nov. 2002; Bear Tank- Dec. 2002-May 2003.	
Allotment Condition **Ecol. C/T** 1991 Clusters - Poor Condition, Trend Static on 4 clusters, Trend Up on 2 clusters **Soils** Unsatisfactory (42 percent Satisfactory) **Riparian** No call	
Utilization Limits **Streambank** limit impacts to <20 percent of alterable banks **Herbaceous** Riparian - limit use to <30 percent of plant biomass **Woody** Riparian - limit use to <50 percent of leaders on plants <6 ft. tall **Uplands** 35 percent maximum of current years growth on primary forage plants in key areas.	
TEP Spp/CH Present Hedgehog Cactus	**Pot. Hab. Present** SW willow flycatcher, Lesser long-nosed bat, Cactus ferruginous pygmy owl, Gila topminnow, Desert pupfish
AMP completed 1987	**percent Implemented** 100
BAE Completed none	**BO Completed**
Potential southwestern willow flycatcher habitat at Whitlow Dam in Hewitt pasture has been fenced.	

Table 12. Allotment information for OW allotment, Pleasant Valley Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** 4511 **Capable Range** 4052	**Actual AMs:** **1994** 180 AMs **1995** 180 AMs **1996** 135 AMs **1997** 158 AMs **1998** 158 AMs **1999** 158 AMs **2000** 131 AMs **2001** 158 AMs
Elevation 6160 - 7200	
Term permit AMs 473 AMs	
Permitted AMs: 2001 473 AMs	**Projected stocking rate** **2002, 2003, 2004** 8.6
Projected AMs: **2002, 2003, 2004** 473 AMs	
Major Vegetation type Ponderosa Pine - Meadows	
Type of grazing system/ **# of pastures** Deferred Rotation Grazing System There are five pastures, Mule Creek HQ North, HQ South, Canyon Creek E., and Canyon Creek W.	
Allotment Condition	
_Ecol. C/T 1980 Inventory, indicates the majority of the range was in ML condition with a static trend. Since the implementation of the AMP, recent inspections indicate that the Pine habitat type's range condition ranges from ML to MH and that the meadow's range condition ranges from MH to H. Approximately 70 percent of the allotment is composed of the pine type and 29 percent of the allotment is meadow open grassland type with 1 percent riparian. The allotment appears to be in an upward trend overall with forage production ranging from 2000-3000 lbs/ac in the meadows and 300-400 lbs/ac in the pine type. Livestock use occurs mostly in the meadows. **Soils** Satisfactory (91 percent Satisfactory) **Riparian** Unsatisfactory	
Utilization Limits	
__Streambank limit impacts to <20 percent of alterable banks **Herbaceous** Riparian - limit use to <30 percent of plant biomass **Woody** Riparian - limit use to <50 percent of leaders on plants <6 ft. tall **Uplands** limit use to <50 percent	
TEP Spp/ CH Present Bald eagle	**Pot. Hab. Present** Mexican spotted owl (protected/restricted habitat)
AMP completed 4/4/8	**percent Implemented** 100 percent
BAE Completed 1982	BO Completed

Table 13. Allotment information for Payson/Cross V allotments, Payson Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual AMs:**	
Total Acres	Approx. 76,700	**1994**	244 AMs
Capable Range	Approx. 40,800	**1995**	0 AMs
Elevation	4700 - 7000	**1996**	0 AMs
		1997	931 AMs
		1998	1692 AMs
Term permit AMs	3000 AMs	**1999**	2525 AMs
		2000	1484 AMs
		2001	654 AMs
Permitted AMs: 2001	3000 AMs	**Projected stocking rate**	
		2002	13.6
Projected AMs: 2002	3000 AMs	**2003**	13.6
2003, 2004		**2004**	13.6
Major Vegetation type	Conifer ~42 percent; Chaparral ~24 percent; Woodland ~34 percent.		
Type of grazing system/ # of pastures	Rest deferred rotation system for the summer pastures with 2 wintering areas used every other year, plus 2 bull pastures. 2 winter pastures, 9 summer pastures, 4 riparian pastures, 2 bull pastures.		
Allotment Condition			
___Ecol. C/T	Payson Allotment: 1966 Range Analysis - about 1/3 of allotment is in MH range condition and 2/3 is in ML range condition, with overall trend which is static; Cross V Allotment: 1962 Range Analysis - about 14 percent is in H range condition, 60 percent is in MH, and 26 percent of the allotment is in ML range condition, with 50 percent of the allotment in an upward trend and 50 percent of the allotment in a downward trend. Upland vegetation has improved in several areas. These areas include the Dude Fire area and the Houston Mesa and Bean Patch Pastures.		
Soils	Payson - Satisfactory (70 percent Satisfactory); Cross V - Unsatisfactory (49 percent Satisfactory)		
Riparian	Payson - Satisfactory; Cross V - No call		
Utilization Limits			
_____Streambank	limit impacts to <20 percent of alterable banks		
Herbaceous	Riparian - limit use to <30 percent of plant biomass		
Woody	Riparian - limit use to <50 percent of leaders on plants <6 ft. tall		
Uplands	45 percent limit on grasses, 50 percent on browse.		
TEP Spp/ CH Present	Mexican spotted owl (protected/restricted habitat) Spikedace/Loach Minnow CH (watershed)	**Pot. Hab. Present**	Lesser long-nosed bat Gila topminnow
AMP completed	Payson - 8/14/75; Cross V - 1/28/82; These allotments are managed together using an AOP.	**percent Implemented**	100 percent
BAE Completed	8/14/75 - 1/28/82	**BO Completed**	none

Table 14. Allotment information for Pinto Creek allotment, Globe Ranger District, Tonto National Forest, 2001.

Allotment Acres		**Actual #s:**	**1994** 486 = 5832 AMs
Total Acres	34,170		**1995** 486 = 5832 AMs
Capable Range	28,800		**1996** 486 = 5832 AMs
Elevation	3600-6200		**1997** 423 = 5076 AMs
			1998 420 down to 244 = 2928 AMs
			1999 244 = 2928 Ams
Term permit #s	486		**2000** 5244
			2001 2119
Permitted #s: 2001	350 cattle and 6 horeses 9/01/01-12/31/01+150 yearlings 12/15-12/31/01=1523 AMs	**Projected stocking rate**	**2002** 8.6
			2003 8.0
			2004 7.6
Projected #s: 2002, 2003, 2004	350 adult cattle and 6 horses, 150 yearling carryover=5244 AMs		
Major Vegetation type	desert grassland/chaparral		
Type of grazing system/ # of pastures	Rest rotation 8 pastures		
Allotment Condition			
Ecol. C/T	???		
Soils	Unsatisfactory (45 percent Satisfactory)		
Riparian	Unsatisfactory		
Utilization Limits			
Streambank	limit impacts to <10 percent of alterable banks in Pinto Creek pasture, <20 percent elsewhere		
Herbaceous			
Woody	Riparian - limit use to <20 percent of plants biomass in Pinto Creek, <30 percent elsewhere		
Uplands	limit use to <20 percent of on dominant leaders (branches) in top 1/3 of plants less than 6 feet tall in Pinto Creek, <40 percent elsewhere 35 percent in Pinto Creek, 35-45 percent elsewhere		
TEP Spp/CH Present	AZ hedgehog cactus	**Pot. Hab. Present**	Mexican spotted owl (restricted habitat) SW willow flycatcher Lesser long-nosed bat Gila topminnow Pygmy-owl
AMP completed	1998, attached to permit as special provision.	**percent Implemented**	
BAE Completed	9/4/87	**BO Completed**	

Table 15. Allotment information for Roosevelt allotment, Tonto Basin Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** 22,606 **Capable Range** 15,089	**Actual AMs:** **1994** 1/1 to 5/15 - 630; 1/1 to 2/28 - 10; 3/1 to 2/28 - 2652; Total AMs - 3292 **1995** 1/1 to 5/15 - 360; 3/1 to 2/29 - 2696; Total AMs - 3056 **1996** 1/1 to 5/15 - 585; 3/1 to 2/28 - 238; 11/11 to 2/28 - 74; Total AMs - 3047 **1997** 1/1 to 5/15 - 450; 3/1 to 2/28 - 2665; Total AMs - 3115 **1998** 1/1 to 5/15 - 270; 3/1 to 2/28 - 2220; Total AMs - 2490 **1999** 1/1 to 5/15 - 540; 3/1 to 2/28 - 2160;Total Ams = 2700 **2000** 2160 **2001** 2402
Elevation 2220 - 5000	
Term permit #s 231 adult, 172 YL	
Permitted AMs: 2001 2700	**Projected stocking rate** **2002, 2003, 2004** 5.6
Projected AMs: **2002, 2003, 2004** 2700	
Major Vegetation type Desert Shrub - Chaparral	
Type of grazing system/ # of pastures Modified Santa Rita 8 pasture - complex watering system	
Allotment Condition **Ecol. C/T** ??? **Soils** Unsatisfactory (49 percent Satisfactory) **Riparian** Unsatisfactory	
Utilization Limits **Streambank** limit impacts to <20 percent of alterable banks **Herbaceous** Riparian - limit use to <30 percent of plant biomass **Woody** Riparian - limit use to <50 percent of leaders on plants <6 ft. tall **Uplands** 40 percent maximum allowable use	
TEP Spp/CH Present	**Pot.** Lesser long-nosed bat **Hab.** Cactus ferruginous pygmy owl **Present** Gila topminnow Desert pupfish
AMP completed 8/10/92	**percent Implemented**
BAE Completed 3/9/92	**BO Completed**

Table 16. Allotment information for Star Valley allotment, Payson Ranger District, Tonto National Forest, 2001.

Allotment Acres **Total Acres** **25,508** **Capable Range** **17,912**	**Actual AMs:** **1994** 456 AMs **1995** 591 AMs **1996** 913 AMs **1997** 1,248 AMs **1998** 1,368 AMs **1999** 600 AMs **2000** 654 AMs **2001** 684 AMs
Elevation **3,300 to 5,800**	
Term permit AMs **1,403 AMs**	
Permitted AMs: 2001 **1,368 AMs**	**Projected stocking rate** **2002, 2003, 2004** 12.8
Projected AMs: **2002, 2003, 2004** **1,403 AMs**	
Major Vegetation type	P/J Woodland and Semidesert Grassland
Type of grazing system/ # of pastures	**Rest Rotation System; 5 regular pastures and three holding pastures. In 1997 AMs were reduced from 2,477 to 1,403.**
Allotment Condition	
Ecol. C/T	1966 Range Analysis; The overall trend of the allotment is static. 11 percent of the allotment was in H range condition, 39 percent of the allotment is in MH range condition, 44 percent of the allotment is in ML range condition, and 6 percent was in L range condition. The 1983 AMP lists the predominant forage type, grasslands, to be in a MH to H range condition.
Soils	Unsatisfactory (20 percent Satisfactory)
Riparian	not assessed
Utilization Limits	
Streambank	limit impacts to <20 percent of alterable banks
Herbaceous	Riparian - limit use to <30 percent of plant biomass
Woody	Riparian - limit use to <50 percent of leaders on top 1/3 of plants <6 ft. tall
Uplands	45 percent limit on grasses, 50 percent on browse.
TEP Spp/CH Present: spikedace/loach minnow ch Arizona agave	**Pot. Hab. Present** Lesser long-nosed bat Gila topminnow
AMP completed 5/2/83	**percent Implemented** 90 percent
BAE Completed 12/19/95	BO Completed

Table 17. Allotment information for Sunflower allotment, Mesa Ranger District, Tonto National Forest, 2001.

Allotment Acres	Total: 153,300; Desert Unit:	**Actual #s: 1995**	852 cyl = 10224; 500 1/1-5/15 = 2250; Total AMs = 12474
Total Acres	19,300; Dos-S Unit: 80,000;	**1996**	967 cyl = 11604; 600 1/1-5/15 = 2700; Total AMs = 14304
Capable Range	Cottonwood: 45,000; Cline: 9,000 = 115,900	**1997**	1149 cyl = 13788; 550 1/1-5/15 = 2475; Total AMs = 16263
Elevation	1500-7650	**1998**	1116 cyl = 13392; 450 1/1-5/15= 2025; Total AMs = 15417
Term permit #s	1250 cyl, 825 yls 1/1-5/15	**1999**	???
		2000	0
Permitted #s: 2001	0	**Projected stocking rate 2002, 2003, 2004**	Total AM=18825, 6.2 ac/AM Desert AM=2800, 6.9 Ac/AM Dos-S AM=8320, 9.6 Ac/AM Cottonwood AM=5147, 8.7 Ac/AM Cline AM=2558, 3.5 Ac/AM
Projected #s: 2002, 2003, 2004	1250 cyl, 825 yls 1/1-5/15, maximum; Desert - 50 cyl + 500 yls 1/1-5/31; Dos-S - 650 cyl +165 yls 1/1-5/31; Cottonwood - 400 cyl+110 yls 1/1-5/31; Cline - 200 cyl+50 yls 1/1-5/31		
Major Vegetation type	Sonoran Desert/Chaparral/Semi-Desert Grassland		
Type of grazing system/# of pastures	Dos -S - Rest Rotation (In Implementation Phase); 6 pastures. Two herds. Sycamore Creek to be excluded. To be implemented by Jan 2001. Herd 1: Maverick: Jan - May 2001; Pine Creek: June - Nov 2001; Log Corral: Dec 2001 - May 2002; Maverick: June - Nov 2002; Pine Creek: Dec 2002 - May 2003; Log Corral: June - Nov 2003. Herd 2: Picadilla: Jan - May 2001; Otero: June - Nov 2001; Adams: Dec 2001 - May 2002; Picadilla: June - Nov 2002; Otero : Dec 2002 - May 2003; Adams: June - Nov 2003. Cottonwood - None; NEPA in Process. Cline - None; NEPA in Process. Desert - Winter/Spring 500 yls; 50 cows. No Rotation, has Management Plan. One Pasture.		
Allotment Condition			
Ecol. C/T	Desert - 1992 clusters, poor condition, trend static. Cottonwood - 1983 clusters, fair condition, trend static. Cline - no clusters or upland transects, utilization high on some riparian areas. Dos S - upland paced transects established 1999. Scheduled to be read later in year (1999).		
Soils	Cline- U (50 percent est. S) Lone Fire; Cottonwood- U (48 percent S); Desert- U (12 percent S); Dos S- U (29 percent S).		
Riparian	Cline - Unsatisfactory. Cottonwood - Unsatisfactory. Desert - No riparian. Dos S - Unsatisfactory		
Utilization Limits			
Streambank	limit impacts to 10 percent of alterable banks		
Herbaceous	Riparian - limit use to <30 percent of plant biomass		
Woody	Riparian - limit use to 40 percent of leaders on plants <6 ft. tall		
Uplands	Limit use to 35 percent Jojoba and key forage species; 35 percent (average) on annual grass and forb production.		
TEP Spp/CH Present	Gila topminnow: Cottonwood, Dos-S; Bald eagle: Cottonwood	**Pot. Hab. Present**	Mexican spotted owl (restricted/protected habitat): Cline, Cottonwood, Dos-S; Lesser long-nosed bat: all units; SW willow flycatcher: Cottonwood, Dos-S; Loach minnow: Dos-S; Cactus ferruginous pygmy owl: Cottonwood, Desert, Dos-S; Desert pupfish: Cottonwood, Dos-S; Gila topminnow: Cline; Spikedace
AMP completed	Desert: Completed, 1990 Dos-S: Completed 1994	**percent Implemented**	Desert: 100 percent Dos-S: 40 percent
BAE Completed	Dos-S 4/12/94	**BO Completed**	Dos-S: Feb 11, 1994
The permittee was directed to remove livestock due to drought. Before restocking, an EA, BAE, and consultation will be completed. For Cottonwood and Cline a monitoring plan will be prepared and key areas selected before 2001 grazing season for riparian and upland areas. Dos S Unit: The Sycamore fence will be completed and livestock excluded.			

Table 18. Revised soil condition by allotment, Tonto National Forest, 1999.

Allotment	Satisfactory	Impaired	Unsatisfactory	Capable	percent Satisfactory
Star Valley	3060	7013	5040	15113	20
Deadman	5098	5105	2117	12320	41
H-4	4128	4452	1491	10071	41
Millsite	16203	16491	6042	38736	42
Pinto Creek	14875	15427	2549	32851	45
Cross V	15376	8995	6983	31354	49
Roosevelt	8853	7909	1414	18176	49
Sleeping Beauty	3954	2635	0	6589	60
Buzzard Roost	16030	6813	2919	25762	62
Seventy Six	14177	1993	4967	21137	67
Sunflower					
Cline Unit	6960	2928	1080	10968	63
Cottonwood Unit	21216	16833	5722	43771	48
Desert Unit	2040	10665	4575	17280	12
Dos S Unit	21783	34058	19848	75689	29
Payson	19109	5298	2802	27209	70
Devils Canyon	14657	3624	2160	20441	72
Bronco	6201	1486	0	7687	81
Jones	8761	310	1665	10736	82
Bohme	5080	621	0	5701	89
Christopher Mountain-Ellinwood	15824	1527	226	17577	90
OW	4100	417	0	4517	91
Total	227485	154600	71600	453685	57

Table 19. Status of natural Gila topminnow populations in the US.

Site	Ownership	Extant?[1]	Non-native?	Mosquitofish?	Habitat Size[2]	Threats[3]
Bylas Spring[5]	San Carlos	YES	NO[4]	NO[4]	S D	M/ N G
Cienega Creek	BLM	YES	NO	NO	L	M/ R N
Cocio Wash	BLM	NO 1982	UNKNOWN	UNKNOWN	S	H/ M
Cottonwood Spring	Private	YES	NO	NO	S	M/ N
Fresno Canyon	State Parks	YES	YES	NO[4]	M	H/ N G U
Middle Spring[5]	San Carlos	YES	NO[4]	NO[4]	S	H/ N G
Monkey Spring	Private	YES	NO	NO	S	L/ W U
Redrock Canyon	USDA Forest Service	YES	YES	YES	M D	H/ W R G N
Sabino Canyon	USDA Forest Service	NO 1943	YES	NO	M	H/ R N
Salt Creek[5]	San Carlos	YES	NO[4]	NO[4]	S	M/ N G
San Pedro River	Private	NO 1976	YES	YES	-	H/ W N G R
Santa Cruz River San Rafael Tumacacori Tucson Peck Canyon	Private, State Parks, TNC	 YES[6] YES NO 1943 YES	 YES YES[4] YES YES	 YES YES NO YES	L D	H/ W N R G C U
Sharp Spring	State Parks	YES	YES	YES	M	H/ N G U
Sheehy Spring	TNC	NO 1987	YES	YES	S	H/ N G U
Sonoita Creek	Private, TNC, State Parks	YES	YES	YES	L D	H/ W N G
Tonto Creek	Private, USDA Forest Service	NO 1941	YES	YES	L	H/ N R G W

[1] if no, last year recorded
[2] L = large M= medium S = small D = disjunct
[3] Immediacy H = high M = moderate L = low
Type W = water withdrawal C = contaminants R = recreation N = non-native G = grazing M = mining
U = urbanization
[4] none recently, they have been recorded
[5] recently renovated
[6] in Mexico, U.S. in 1993

Table 20. Known or potential Gila topminnow sites on 25 allotments on the Tonto National Forest (Weedman and Young 1997, Bazan 1999, USDA Forest Service 1999, 2000).

Allotment	Extant sites	Sites recommended for restocking	Sites called potential by USDA Forest Service	Other riparian areas	Sites officially declared extirpated
Seventy Six	-	-	-	Tonto & Gun Cr	-
Bohme/ Sleeping Beauty	-	-	-	Pinto Creek	-
Bronco	-	Cave Creek	-	Cottonwood Cr	Rock Tank Sp.
Cross V	-	East Verde R.	-	-	-
Deadman Mesa	-	Fossil Springs and Creek	-	-	-
Devil's Canyon	-	Unnamed Reservoir	-	-	-
H-4	-	-	-	Slate, Tonto, & Spring Creeks	Unnamed Spring
Jones	-	-	-	Russell Can.	-
Millsite	-	Benson Sp.	-	Queen Creek, Red Tanks, Hewitt, Millsite, Rogers, & Randolph Cans., Byous Sp.	Pilot Tank, Mesquite Tank #1
Pinto Creek	-	West Fork Pinto Creek	Pinto Creek (USDA Forest Service 1999:III-84)	-	-
Roosevelt	-	-	Cottonwood Creek	SF Pine Creek, Alchesay Can., Yellowjacket Sp.	-
Star Valley	-	-		Stewart, Green Valley, Houston, & Tonto Creeks, Dry Pocket Wash	-
Sunflower	Hidden Water Sp., Mud Springs	Mesquite Wash, Rock Creek.	-	Picadilla, Cottonwood, Alder, Boulder, Camp, Sycamore, & Pine Creeks, Cane & Tejanos Sps.	-

(1) not recommended for restocking (Weedman and Young 1997)
(2) not in allotment
(3) unlikely that potential habitat occurs

Table 21. Information on allotments under consultation for the lesser long-nosed bat on the Tonto National Forest, 1999.

Allotment	percent Unsatisfactory Soils	Grazing during April 15 - October	Range		Authorized Max Upland Utilization[18]
			Condition[1]	Trend[2]	
Seventy Six	29.6	Y	ND	ND	30-40 percent
Bohme/Sleeping Beauty/Bellevue	9.6	Y	ND	ND	30-50 percent
Bronco	19.3	N	10/80/9/1	ND	30-40 percent
Buzzard Roost	21.4	Y	0/50/50/0	S	50 percent
Christopher Mtn-Ellinwood	4.3	Y	LD[4]	LD[4]	45-50 percent
Deadman Mesa	33.9	Y	LD[5]	LD[5]	50 percent
Devils Canyon	28.3	Y	ND	ND	50 percent
H-4	77.1	Y	LD[6]	LD[6]	30-?
Jones	17.8	Y	LD[7]	LD[7]	50 percent
Millsite	52.9	Y	LD[8]	LD[8]	30-60 percent
OW	9.2	Y	LD[10]	LD[10]	50 percent
Payson/Cross V	24.4	Y	LD[11]	LD[11]	45-50 percent
Pinto Creek	52.6	Y	LD[12]	LD[12]	30-50 percent
Roosevelt	46.5	Y	LD[3]	LD[3]	30-40 percent
Star Valley	51.4	Y	LD[14]	LD[14]	45-50 percent
Sunflower	Variable[15]	Y	LD[16]	LD[16]	30-50 percent

Table 21. Information on allotments under consultation for the lesser long-nosed bat on the Tonto National Forest, 1999.

[1] ND= no data, LD =limited or old data. Where range condition information is available, it is presented as percentage of allotment acreage in the four condition classes, i.e. percent of acres in high/moderately high/moderately low/low condition class.
[2] ND= no data, S=static, U=upward, D=downward. Percentages of allotment in each trend class may be given in parentheses.
[3] Upland areas were underutilized in 1992, which precipitated changes in management. No recent data.
[4] Old data from 1966 range analysis. Recent observations suggest variable range condition with static to upward trends.
[5] Old data from 1966 range analysis.
[6] 1982 analysis indicated allotment was overstocked, which precipitated changes in management. No recent data.
[7] Early 1980s analysis indicated the allotment could not sustain permitted numbers of cattle. Changes in management were implemented. No recent data.
[8] 1991 condition on examined "clusters" was poor. Trend was static on 4 clusters, upward on 2.
[9] Old data from 1960 range analysis. Degraded condition and very heavy stocking rates precipitated changes in management in the 1980s. No recent data.
[10] Recent observations suggest range condition is variable and trend is upward.
[11] Old data from 1962 and 1966 range analysis.
[12] Vegetation condition was poor in 1987, which precipitated changes in management. No recent data.
[13] 73.1 percent unsatisfactory soils in the Poison Springs allotment, 48.9 percent unsatisfactory in the Sierra Ancha allotment.
[14] Old data from 1966 range analysis. 1983 AMP lists the predominant forage type, grasslands, in moderately high to high range condition.
[15] BA gives conditions by pastures, which range from 44.1-88.2 percent unsatisfactory.
[16] 1983 &1992 "clusters" showed range in poor and fair condition with static trend.
[17] Upland areas were underutilized in early 1990s. Changes were made in management in 1995. No recent data.
[18] Where 30 percent appears, this utilization rate would be applied in desert scrub communities below 1,219 m (4,000 ft). Higher utilization rates would be authorized elsewhere.

Table 22. Pygmy-owl occurrences in the vicinity of Tonto National Forest in Maricopa and Pinal County by general area, the date collected, reference, and the number of records collected.

Year collected	Reference	Number records
Blue Point Cottonwood		
1897 1949, 1951 1933 1971	Bennett Phillips, A. and L. Yaegar Hargrave, L. Johnson, R.	
New River		
1892	Fisher, A.K	
Cave Creek		
1895	Lusk, R.D.	
Phoenix (specific location unknown)		
1895 1896, 1897, 1898, 1899, 1905 1897	Campbell, R.A. Breninger, G.F. Bennett, F.W	6 2, 3, -, -, -
Gila River		
1908	Gilman, M.F.	3
Casa Grande		
1885	Mearns, E.A	
Lower San Pedro River and Aravaipa Canyon		
1985 1987 1987 1986	Sutton, B. Bock, J. Monson, G. Bagnoli, C., and C. Hunter	
Pinal County (west of Tortolita Mountains only)		
1998 1999	Harris *et al.* BLM & AGFD unpubl. data	2 4

Table 23. Rangewide population status for the southwestern willow flycatcher based on 1993 to 1999 survey data for Arizona, California, Colorado, New Mexico, Nevada, Utah, and Texas[1].

State	Number of sites with WIFL territories 1993-99[2]	Percentage of sites with WIFL territories 1993-99	Number of territories[3]	Percentage of total territories
Arizona	81	45 percent	297	33 percent
California	52	29 percent	183	20 percent
Colorado	5	3 percent	48	5 percent
Nevada	10	6 percent	44	5 percent
New Mexico	28	15 percent	321	35 percent
Utah	6	3 percent	22	2 percent
Texas	?	?	?	?
Total	182	100 percent	915	100 percent

[1]Sogge *et al.* 2000.
[2]Site boundaries are not defined uniformly throughout the bird's range.
[3] Total territory numbers recorded are based upon the most recent years survey information from that site between 1993 and 1999.

Table 24. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency[1]	Incidental Take Anticipated
Arizona			
Cedar Bench allotment (Yavapai)	1995	Tonto NF	Indeterminable
Tuzigoot Bridge (Yavapai)	1995 *	NPS	None
Windmill allotment (Yavapai)	1995	Coconino NF	Loss of 1 nest annually/for 2 years
Solomon Bridge (Graham)	1995	FHWA	Loss of 2 territories
Tonto Creek Riparian Unit (Maricopa)	1995	Tonto NF	Indeterminable
Eastern Roosevelt Lake Watershed Allotment (Maricopa)	1995	Tonto NF	Indeterminable
Cienega Creek (Pima)	1996	BLM	1 nest annually by cowbird parasitism
Glen Canyon Spike Flow (Coconino)	1996	USBR	Indeterminable
Verde Valley Ranch (Yavapai)	1996 *	Corps	Loss of 2 flycatcher territories
Modified Roosevelt Dam (Gila/Maricopa)	1996 *	USBR	Loss of 45 territories; reduced productivity/ survivorship 90 birds
Lower Colorado River Operations (Mohave/Yuma)	1997 *	USBR	Indeterminable
Blue River Road (Greenlee)	1997	A/S NF	Indeterminable
Skeleton Ridge (Yavapai)	1997	Tonto NF	Indeterminable
White Canyon Fire – Emergency Consultation (Pinal)	1997	BLM	Harassment of 4 pairs
U.S. Hwy 93 Wickenburg (Mohave/Yavapai)	1997	FHWA	Harassment of 6 birds in 3 territories and 1 bird killed/decade
Safford District Grazing allotments (Greenlee, Graham, Pinal, Cochise & Pima)	1997	BLM	Indeterminable
Lower Gila Resource Plan Amend. (Maricopa, Yavapai, Pima, Pinal, La Paz & Yuma)	1997	BLM	Indeterminable
Storm Water Permit for Verde Valley Ranch (Yavapai)	1997	EPA	Indeterminable

Table 24. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency[1]	Incidental Take Anticipated
Gila River Transmission Structures (Graham)	1997	AZ Electric Power Coop. Inc.	Indeterminable
Arizona Strip Resource Mgmt Plan Amendment (Mohave)	1998	BLM	Harm of 1 nest every 3 years
CAP Water Transfer Cottonwood/ Camp Verde (Yavapai/Maricopa)	1998	USBR	Indeterminable
Cienega Creek Stream Restoration Project (Pima)	1998	BLM	Harassment of 1 bird
Kearny Wastewater Treatment (Pinal)	1998	FEMA	Indeterminable
Fort Huachuca Programatic (Cochise)	1998	U.S.Army	None
SR 260 Cottonwood to Camp Verde (Yavapai)	1998	FHWA	Indeterminable
Wildlife Services (ADC) Nationwide	1998	Wildlife Services	in consultation
Alamo Lake Reoperation (LaPaz,	1998	ACOE	Loss of 1 nest w/ 2 eggs
Grazing on 25 allotments on the Tonto	1999	Tonto NF	in consultation
Mingus Avenue Extension (Yavapai)	1999	ACOE	Indeterminable
The Homestead at Camp Verde	2000	Prescott NF/EPA	in informal consultation
Wikieup/Big Sandy Caithness power	2000	WAPA/BLM	in informal consultation
Big Sandy/Santa Maria Grazing	2000	BLM	in consultation
California			
Prado Basin (Riverside/San Bernardino)	1994	Corps	None
Orange County Water District (Orange)	1995	Corps	None
Temescal Wash Bridge (Riverside)	1995	Corps	Harm to 2 flycatchers
Camp Pendleton (San Diego)	1995	DOD	Loss of 4 flycatcher territories
Lake Isabella Operations 1996 (Kern)	1996	Corps	Inundation 700 ac critical habitat; reduced productivity 14 pairs

Table 24. Agency actions that have undergone formal section 7 consultation and levels of incidental take permitted for the southwestern willow flycatcher rangewide.

Action (County)	Year	Federal Agency[1]	Incidental Take Anticipated
Lake Isabella Long-Term Operations (Kern)	1997	Corps	Indeterminable
H.G. Fenton Sand Mine and Levee near Pala on the San Luis Rey River (San Diego)	1997	Corps	None
Colorado			
AB Lateral - Hydroelectric/Hydropower Facility, Gunnison River to Uncompahgre River (Montrose)	1996	USBR	None
TransColorado Gas Transmission Line Project, Meeker, Colorado to Bloomfield, New Mexico	1998	BLM	None
Nevada			
Gold Properties Resort (Clark)	1995	BIA	Harm to 1 flycatcher from habitat loss
Las Vegas Wash, Pabco Road Erosion Control Structure	1998	Corps	Harm to 2-3 pairs of flycatchers
New Mexico			
Corrales Unit, Rio Grande (Bernalillo)	1995	Corps	None
Rio Puerco Resource Area	1997	BLM	None
Farmington District Resource Management Plan	1997 *	BLM	None
Mimbres Resource Area Management Plan	1997 *	BLM	1 pair of flycatchers
Belen Unit, Rio Grande (Valencia)	1998	Corps	Consultation in progress

[1] BIA = Bureau of Indian Affairs; BLM = Bureau of Land Management; Corps = Army Corps of Engineers; DOD = Dept. of Defense; EPA = Environmental Protection Agency; FEMA = Federal Emergency Management Agency; FHWA = Federal Highway Administration; NF = National Forest; NPS = National Park Service; USBR = U.S. Bureau of Reclamation; USDA Forest Service = U.S. Forest Service.

* Jeopardy opinions.

Table 25. Habitat suitability and occupancy of southwestern willow flycatchers on 7 grazing allotments, Tonto National Forest, Arizona, 2000.

Watershed, allotment, and stream	Location	Habitat suitability		
		Potential	Suitable	Occupied
Tonto Creek Watershed				
Seventy Six allotment				
Tonto Creek	Gisela to Gun Creek, ~ 13 km (8 mi)	X	-	-
Salt River Watershed				
Pinto Creek allotment				
Pinto Creek	Pinto Creek, ~ 11 km (7 mi)	X	X	-
Bohme & Sleeping Beauty & Bellvue allotments				
Pinto Creek	Pinto Creek, ~ 11 km (7 mi)	X	-	-
Verde River Watershed				
Sunflower allotment				
Sycamore Creek	Pine Creek to Verde River, ~ 21 km (13 mi)	X	-	-
Cave Creek	Below Ashdale, ~ 2 km (1 mi)	X	-	-
Millsite allotment				
Queen Creek	Whitlow Dam, ~ 2 km (1 mi)	X	X	-

Table 26. Soil and riparian conditions for eight grazing allotments which are likely to affect southwestern willow flycatchers, Tonto National Forest, Arizona, 1999.

Allotment	Riparian Condition		Soil Condition	
	Satisfactory	Unsatisfactory	Satisfactory	Unsatisfactory
Tonto Creek Watershed				
Seventy Six	-	X	X	
Salt River Watershed				
Pinto Creek	-	X	-	X
Bohme	-	X	X	-
Sleeping Beauty	No riparian-		-	X
Verde River Watershed				
Sunflower	-	X	-	X
Other Watersheds				
Bronco	-	X	X	-
Millsite	No call-		X	X

Table 27. Proposed utilization limits for seven grazing allotments which may affect southwestern willow flycatchers, Tonto National Forest, Arizona, 2000.

Allotment	Proposed utilization limits				
	WIFL habitat			Upland	
	bank alteration	herbaceous	woody	riparian	herbaceous
Tonto Creek Watershed					
Seventy Six[1,3]	None	None	None	<40 percent	<35 percent
Salt River Watershed					
Pinto Creek[2,4]	<10 percent	<20 percent	<20 percent	<40 percent	<35 percent
Bohme[2,5] (above spill)	<10 percent	<35 percent	<35 percent	<35 percent	<35 percent
Bohme[2,5] (below spill)	<10 percent	<20 percent	<20 percent	<35 percent	<35 percent
Sleeping Beauty[2,6]	None	None	None	<35 percent	<35 percent
Verde River Watershed					
Sunflower[2,7]	None	None	None	<40 percent	<35 percent
Other Watersheds					
Bronco[2,8]	<10 percent	<20 percent	<20 percent	<35 percent	<35 percent
Millsite[1,9]	None	None	None	<35 percent	<35 percent

[1] May affect, not likely to adversely affect determination by Forest Service.

[2] May affect, likely to adversely affect determination by Forest Service.

[3] No use of potential WIFL habitat on Tonto Creek.

[4] December and January use of riparian pastures on Pinto Creek.

[5] October 15 to March 30 use of Pinto Creek.

[6] No potential WIFL riparian habitat in allotment.

[7] No use of potential WIFL habitat on Sycamore Creek.

[8] November 15 to mid-February (about Feb. 14th?) or until use limits are reached on Cave Creek.

[9] No use of potential WIFL habitat on Queen Creek near Whitlow Dam.

APPENDIX B - CONCURRENCES

This section contains all concurrences with "may affect, not likely to adversely affect" and "not likely to jeopardize" determinations. The status of the species and much of the environmental baseline for some of the following species concurrences were also in the formal section of this biological opinion. Any relevant parts of those sections are incorporated here by reference.

BONYTAIL CHUB (*Gila elegans*)

The biological assessment identified Deadman Mesa as an allotment where grazing may affect, but was not likely to adversely affect, bonytail chub. Deadman Mesa allotment is along Fossil Creek in the Verde River drainage. The status of the species is summarized in the listing determination and recovery plan (US Fish and Wildlife Service 1980, 1990b).

Environmental Baseline

There are no extant bonytail populations in the Salt or Verde rivers. The extent to which populations once existed is uncertain. The specific reasons why populations may have disappeared are not known, but likely were a combination of the introduction of non-native fish species and alterations to the habitat, with the former likely the more important. There are no plans to reestablish the bonytail chub to the Salt or Verde rivers at this time. All hatchery and rearing facilities available for bonytail chub are engaged in raising fish for the ongoing programs on Lakes Havasu and Mohave on the lower Colorado River, or for augmentation programs in the upper Colorado River basin. These programs are nowhere near completion so fish for any other effort will not be available for at least the next five years. Therefore, it is not likely that any bonytails will be in the Salt or Verde rivers during the period covered by this consultation. If plans are developed, issues of physical and biological habitat suitability will require evaluation. Riparian condition on the Deadman allotment is satisfactory (USDA Forest Service 1999).

Conclusion

After reviewing the status of the bonytail chub, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that the proposed action may affect but is not likely to adversely affect bonytail chub.

LOACH MINNOW

The biological assessment identified Deadman Mesa and H-4 as allotments where grazing may affect, but was not likely to adversely affect, loach minnow. Deadman Mesa is along Fossil Creek in the Verde River drainage and H-4 is in the Tonto Creek drainage. The Forest reached

this determination for the Deadman Mesa allotment because livestock are excluded from Fossil Creek, watershed condition is satisfactory, and livestock grazing is not altering potential habitat (USDA Forest Service 1999). H-4 allotment is currently not grazed. Additional section 7 consultation will be completed before these allotments are restocked (USDA Forest Service 2000).

In 2001, the Forest completed an analysis of the effects of Forest-wide ongoing grazing on critical habitat for spikedace and loach minnow (USDA Forest Service 2001a). This analysis identified 25 allotments where ongoing grazing could potentially have an affect on loach minnow critical habitat. Ten of these allotments are part of this consultation. Of these ten, the Forest determined that grazing on the 7/K, Christopher Mountain/Ellinwood, Deadman Mesa, Devil's Canyon, H-4, and Tonto Basin allotments would not affect loach minnow critical habitat. Our policy is that we do not comment on agency "no effect" determinations unless we believe the action would adversely affect a listed species or its critical habitat, in which case the Service would request that the agency enter into formal consultation on species adversely affected [50 CFR 402.14(a)]. Information available to us does not warrant such a request in this instance. However, we recommend that the Forest Service maintain a complete administrative record documenting the decision process and supporting information for "no effect" determinations.

The 2001 analysis of spikedace and loach minnow critical habitat (USDA Forest Service 2001a) also found that grazing on two allotments which are part of this consultation may affect, but are not likely to adversely affect loach minnow critical habitat. These two allotments are Buzzard Roost and Payson/Cross V. Buzzard Roost is within the Tonto Creek watershed, approximately 15 miles upstream of loach minnow critical habitat. Very small portions of Payson-Cross V are in the Tonto Creek watershed.

The Forest used guidance criteria, which were concurred with by the Service, to evaluate effects of grazing on loach minnow critical habitat. According to the criteria, several factors must be met to conclude grazing is not likely to adversely affect loach minnow critical habitat. These are:

1. Livestock are permitted on the allotment within the watershed that contains critical habitat, and;
2. livestock do not have direct access to critical habitat, perennial streams, or perennial interrupted streams within the allotment, and;
3. based on data collected within the last 10 years, upland areas subject to livestock grazing have watershed conditions that are "satisfactory," with either a stable or upward trend in indicators of soil and vegetative conditions using accepted Forest Service methodologies, and;
4. based on recent data using accepted Forest Service evaluation methods, aquatic and riparian conditions, including constituent elements of critical habitat, in the watershed are in satisfactory condition and improving, and;

5. appropriate monitoring of aquatic and riparian conditions, including constituent elements of critical habitat, is in place.

The Forest determined that grazing on the Buzzard Roost allotment was not likely to adversely affect critical habitat because all of the guidance criteria were met. Specifically: 1) livestock are permitted on the allotment year long under a rest/deferred rotation system; 2) livestock do not have direct access to critical habitat, but do have access to perennial or perennial-interrupted streams on the allotment that drain to Tonto Creek via Spring Creek. This access is very limited, as Spring Creek is in a steep canyon on much of the allotment; 3) soil conditions are 79 percent satisfactory; 4) there is no determination of riparian or aquatic conditions on the allotment; 5) utilization limits for riparian and upland vegetation, and streambank alteration are in place; 6) monitoring for compliance is occurring; 7) and monitoring methods minimally address constituent elements of critical habitat.

The Forest determined that grazing on the Payson/Cross V allotment may affect, but was not likely to adversely affect, critical habitat because all of the guidance criteria were met. Specifically: 1) livestock use pastures in the Middle Tonto watershed in winter; 2) streams draining the allotments are ephemeral or intermittent; 3) critical habitat is 5 to 10 miles distant from the downstream border of the allotments; 4) these allotments comprise two of five allotments in the watershed, three of which have generally satisfactory watershed conditions; 5) soils and riparian areas on Payson allotment are rated satisfactory; 6) soils on Cross V are rated unsatisfactory with no call on riparian conditions; 7) streams draining the allotments are ephemeral or intermittent; 8) riparian conditions on Payson allotment are satisfactory and undetermined on Cross V allotment; 9) utilization limits for riparian and upland vegetation, and streambank alteration are in place, and monitoring for compliance will occur; 10) the channels in the Middle Tonto Watershed on these allotments are ephemeral and intermittent so it is unlikely that monitoring will be high priority; and methods of monitoring minimally address constituent elements of critical habitat.

Conclusion

According to the Forest, all of the guidance criteria for a "may affect, not likely to adversely affect" decision were met for all 5 allotments, although some criteria appear to have not been strictly met. Nevertheless, after reviewing the status of the loach minnow, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that grazing on the Buzzard Roost, Deadman Mesa, H-4, and Payson/Cross V allotments may affect, but is not likely to adversely affect, loach minnow and its critical habitat.

COLORADO PIKEMINNOW (*Ptychocheilus lucius*)

Status of the Species

The Colorado pikeminnow (= Colorado squawfish) was listed as an endangered species on March 11, 1967 (US Fish and Wildlife Service 1967) under a precursor to the Act. Critical habitat was proposed in 1978 for portions of the Colorado, Green, Gunnison, and Yampa rivers in the upper Colorado River Basin in Colorado and Utah (US Fish and Wildlife Service 1978). This proposal was withdrawn in 1979 (44 FR 12382) because of procedural issues. Critical habitat for the pikeminnow was designated in 1994 (US Fish and Wildlife Service 1994e) for portions of the Colorado, Green, San Juan, White, and Yampa rivers in the upper Colorado River basin. No critical habitat was designated in Arizona.

Two historically occupied rivers, the Salt and Verde rivers, were not eligible for designation as critical habitat because of the 1985 designation of portions of these rivers as an Experimental Non-Essential Population (ENE population)(US Fish and Wildlife Service 1985). The Salt River from Roosevelt Dam upstream to the Highway 60 bridge and the Verde River from Horseshoe Dam upstream to Perkinsville was designated under the final rule. Sub-adult pikeminnow have been stocked into the Salt and Verde rivers in an effort led by Arizona Game and Fish Department with the assistance of the Service. Stockings of approximately 2,000 individuals per year into the Verde River are continuing. Stockings of pikeminnow into the Salt River have been put on hold due to concerns voiced by the White Mountain Apache Tribe.

Life history data on the pikeminnow has been compiled in the Colorado Squawfish Recovery Plan (US Fish and Wildlife Service 1991c) and in the biological support document for the critical habitat designation (Maddux *et al.* 1993). Please refer to these documents for specific life history information. Pikeminnow in the Verde River select habitats dissimilar to those selected by upper basin fish. Backwaters, slow runs, eddies and other low-velocity habitats have been documented in the upper basin (Maddux *et al.* 1993). Surveys on the Verde River by AGFD in 1996 to 1997 found pikeminnow in faster water situations such as midchannels near bars, riffles, and runs not in quiet water (AGFD 1997). Differences in the size of the river under evaluation and the flows at the time of the survey may have an effect on these preferences.

Environmental Baseline

The population in the Verde River receives continued stockings in the Childs and Beasley Flat areas. The number of fish stocked yearly, approximately 2,000, also contributes to the small population size. Pikeminnow have never been stocked into Fossil Creek. Pikeminnow are also slower-growing than razorback suckers and take longer to reach stockable size (14-18 in) and

existing hatchery and rearing space is not able to produce many fish per year for reestablishment efforts. Natural recruitment has not been documented in either the Salt or Verde river populations.

The Verde River is heavily modified by human activities. Significant diversions of water for agricultural, industrial, and municipal purposes upstream of the action area have greatly altered flow patterns and sediment transport. Riparian forests were likely more common along the Verde River owing to its broader valley, and are now more limited and fragmented in extent. The change in river flow patterns has an effect on the ability of riparian trees to become established and maintain their position along the banks. Alteration in flows also affects the ability of the river to carry sediment and larger bedload materials, causing changes in aggrading and degrading reaches, width of the active channel, and formation of pools. Prior to reintroductions, pikeminnow in the Verde River were extirpated by the middle of the 20th century.

The habitat changes caused by the introduction of non-native fish, invertebrates, and disease causing organisms were a significant part of the extirpation of the pikeminnow from the Verde River. The specific mechanism of these unfavorable interactions is not known, but is likely a combination of predation on and competition with young pikeminnow, and an alteration of the forage base used by all age classes of pikeminnow (US Fish and Wildlife Service 1991c).

Effects of the Action

Deadman Mesa allotment is along Fossil Creek in the Verde River drainage. As there is a complete discussion of the effects of livestock grazing on aquatic habitats elsewhere in this biological opinion, that information will not be repeated here.

The ENE population designation for the pikeminnow in the Verde River provides for a different level of protection than is afforded fully protected populations. Under the regulations for experimental population designation, an ENE population is treated as if it were a species proposed for listing as threatened. Proposed species are not subject to the protection of section 7 (a)(2) consultation provisions of the Act; however, all Federal agencies are required to confer with the Service on any actions that might jeopardize the continued existence of a proposed species. Under provisions in the final rule, there is no prohibition on taking of individuals of an ENE population if the taking is done according to State or Tribal wildlife regulations.

Aquatic habitat stabilization and improvement that might benefit the pikeminnow are analyzed as part of consultation for the razorback sucker. Although the habitat requirements for these two fish species are not entirely the same, they are sufficiently close that improvements for the razorback sucker would likely benefit the pikeminnow.

Operation of Deadman Mesa allotment for livestock will have effects on the uplands that translate to effects on streams and streamflow. Riparian and upland conditions on this allotment are good, with only some areas of unsatisfactory soils. Livestock do not have access to Fossil Creek from this allotment. As a result, pikeminnow in the Verde River will not be directly affected by livestock.

Conclusion

After reviewing the status of the Colorado pikeminnow, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that grazing on the Deadman Mesa allotment is not likely to jeopardize the continued existence of the pikeminnow. Because of the regulatory status of the ENE populations, adverse effects of less than jeopardy levels do not trigger any section 7 consultation or conference requirements.

RAZORBACK SUCKER (*Xyrauchen texanus*)

Status of the Species

The razorback sucker was listed as an endangered species on November 22, 1991 (US Fish and Wildlife Service 1991d). The limited success of the stockings into the Gila, Salt, and Verde rivers was a factor in the 1991 listing. Critical habitat for the razorback sucker was designated in 1994 (US Fish and Wildlife Service 1994e) and included portions of the Gila, Salt, and Verde rivers in central Arizona. The critical habitat reaches in the Salt and Verde rivers may be affected by the proposed action.

Stocking of razorback suckers into the Verde River continues at the rate of approximately 2,000 fish per year. The AGFD is the lead agency in the stocking effort, assisted by the Service. There have been no recent stockings into Fossil Creek itself. Razorback suckers had been extirpated from the Salt River and its reservoirs and the Verde River by the mid 1950s (Minckley 1973) until their reestablishment in the 1980s. Razorback sucker populations throughout the range of the species are not stable, and without the various ongoing augmentation efforts, the species would very likely be lost in the wild within a few years.

Life history data on the razorback sucker has been compiled in the Razorback Sucker Recovery Plan (US Fish and Wildlife Service 1998a) and in the biological support document for the critical habitat designation (Maddux *et al.* 1993). Please refer to these documents for specific life history information. Razorback suckers in the Verde River use a variety of the available habitats, from backwaters and pools to main channel areas of faster water near bars and riffles (AGFD 1997). Information from other populations shows a similar pattern of habitat selection (summarized in Maddux *et al.* 1993 and US Fish and Wildlife Service 1998a).

Environmental Baseline

The razorback sucker populations in Fossil Creek and the Verde River are very small. Yearly stockings of approximately 2,000 fish are made to the Verde River. There have been no recent stockings to Fossil Creek. In the Verde River, fish are relocated at least several months post-stocking, however, no indication of breeding has yet been found. These populations are thus dependent upon continued stocking to maintain themselves in the system. Recent surveys in Fossil Creek found two razorback suckers.

Judging from the reestablishments, physical habitat characteristics of the Verde River are suitable for at least sub-adult and adult razorback suckers. Information about Fossil Creek habitats indicates that this stream may be suitable for nursery and juvenile razorback suckers, but does not appear to have appropriate spawning habitat. The size of the creek may also limit its suitability for adults. These waters also support populations of non-native fish species that have considerable influence on the native fish populations. In recent years, the native fish species have substantially disappeared from the middle and lower reaches of the Verde River. Native fish species persist in Fossil Creek.

The condition of the Verde River and Fossil Creek are discussed in the Colorado pikeminnow section, and are incorporated here by reference. Prior to reintroduction efforts, razorback suckers in the Verde River were extirpated by the mid-1950s. The last record was for Peck's Lake in 1954. In Fossil Creek and both the Salt and Verde rivers, biological habitat changes caused by the introduction of non-native fish, invertebrates, and disease causing organisms were a significant part of the extirpation of the razorback sucker from these waters. The specific mechanism of these unfavorable interactions is not known, but is likely a combination of predation on and competition with young razorback suckers. Critical habitat has been designated on the Forest in the Verde River from the forest boundary to Horseshoe Dam.

Effects of the Action

Grazing in the Deadman Mesa allotment may affect the razorback sucker population and its critical habitat. As there is a complete discussion of the effects of livestock grazing on aquatic habitats elsewhere in this biological opinion and in the supporting materials from the Forest Service, that information will not be repeated here. Operation of Deadman Mesa allotment for livestock will have effects on the uplands that translate to effects on streams and streamflow. Riparian and upland conditions on this allotment are good, with only some areas of unsatisfactory soils; and this may translate to a lower level of such effects than in areas of unsatisfactory conditions. Livestock do not have access to Fossil Creek from this allotment. This limits the scope of direct effects to individual fish from the livestock management and thus reduces the opportunity for direct take.

The nature of the proposed actions and their potential for effect to the razorback sucker focus on alterations to the physical habitat and the effects to designated critical habitat. For the Verde River, effects of operations on Deadman Mesa affect flows and sediment loads in Fossil Creek. With the uplands in mostly satisfactory condition and Fossil Creek excluded from livestock use, these effects may not, of themselves, cause significant habitat degradation in the Verde River.

Conclusion

After reviewing the status of the razorback sucker, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that grazing on the Deadman Mesa allotment may affect, but is not likely to adversely affect, the razorback sucker or its critical habitat.

SPIKEDACE

The biological assessment identified Deadman Mesa and H-4 as allotments where grazing may affect, but was not likely to adversely affect, spikedace. Deadman Mesa is along Fossil Creek in the Verde River drainage and H-4 is in the Tonto Creek drainage. The Forest reached this determination for the Deadman Mesa allotment because livestock are excluded from Fossil Creek, watershed condition is satisfactory, and livestock grazing is not altering potential habitat. No potential habitat is on the H-4 allotment, but the allotment is upstream of Tonto Creek. The Forest determined that grazing on H-4 allotment may adversely affect spikedace because riparian and soil conditions are unsatisfactory and site inspections have not recently occurred (USDA Forest Service 1999). This allotment is not being grazed. There will not be grazing on H-4 until at least 2002 (USDA Forest Service 1999). Additional section 7 consultation will be completed before the allotment is restocked (USDA Forest Service 2000).

The 2001 analysis of spikedace and loach minnow critical habitat (USDA Forest Service 2001a) found that grazing on two allotments which are part of this consultation may affect, but are not likely to adversely affect, spikedace critical habitat. These two allotments are Buzzard Roost and Payson/Cross V. Buzzard Roost is within the Tonto Creek watershed, approximately 22 miles upstream of spikedace critical habitat. Very small portions of Payson-Cross V are in the Tonto Creek watershed.

The Forest used guidance criteria which were concurred with by the Service to evaluate effects of grazing on spikedace critical habitat. According to the criteria, several factors must be met to conclude grazing is not likely to adversely affect spikedace critical habitat. These are:

1. Livestock are permitted on the allotment within the watershed that contains critical habitat, and;
2. livestock do not have direct access to critical habitat, perennial streams, or perennial interrupted streams within the allotment, and;
3. based on data collected within the last 10 years, upland areas subject to livestock grazing have watershed conditions that are "satisfactory," with either a stable or upward trend in indicators of soil and vegetative conditions using accepted Forest Service methodologies, and;
4. based on recent data using accepted Forest Service evaluation methods, aquatic and riparian conditions, including constituent elements of critical habitat, in the watershed are in satisfactory condition and improving, and;
5. appropriate monitoring of aquatic and riparian conditions, including constituent elements of critical habitat, is in place.

The Forest determined that grazing on the Buzzard Roost allotment may affect, but was not likely to adversely affect, critical habitat because all of the guidance criteria were met. Specifically: 1) livestock are permitted on the allotment year long under a rest/deferred rotation system; 2) livestock do not have direct access to critical habitat, but do have access to perennial or perennial-interrupted streams on the allotment that drain to Tonto Creek via Spring Creek (that access is very limited, as Spring Creek is in a steep canyon on much of the allotment); 3) soil conditions are 79 percent satisfactory; 4) there is no determination of riparian or aquatic conditions on the allotment; 5) utilization limits for riparian and upland vegetation, and streambank alteration are in place, and 6) monitoring for compliance is occurring; and monitoring methods minimally address constituent elements of critical habitat.

The Forest determined that grazing on the Payson/Cross V allotment was not likely to adversely affect critical habitat because all of the guidance criteria were met. Specifically: 1) livestock use pastures in the Middle Tonto watershed in winter; 2) streams draining the allotments are ephemeral or intermittent; 3) critical habitat is 5 to 10 miles distant from the downstream border of the allotments; 4) these allotments comprise two of five allotments in the watershed, three of which have generally satisfactory watershed conditions; 5) soils and riparian areas on Payson allotment are rated satisfactory; soils on Cross V are rated unsatisfactory with no call on riparian conditions; 6) streams draining the allotments are ephemeral or intermittent; 7) riparian conditions on Payson allotment are satisfactory and undetermined on Cross V allotment; 8) utilization limits for riparian and upland vegetation, and streambank alteration are in place, and 9) monitoring for compliance will occur. The channels in the Middle Tonto Watershed on these allotments are ephemeral and intermittent so it is unlikely that monitoring will be high priority; methods of monitoring minimally address constituent elements of critical habitat.

Conclusion

According to the Forest, all of the guidance criteria for a "may affect, not likely to adversely affect" determination were met for all 5 allotments, although some criteria appear to have not been strictly met. Nevertheless, after reviewing the status of the spikedace, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs that grazing on the Buzzard Roost, Deadman Mesa, H-4, and Payson/Cross V allotments may affect, but is not likely to adversely affect spikedace or its critical habitat.

GILA TOPMINNOW

The status of the species and much of the environmental baseline for the Gila topminnow was discussed in the formal section of this biological opinion. Deadman Mesa is along Fossil Creek in the Verde River drainage. The Forest reached this determination because livestock are excluded from Fossil Springs, watershed condition is satisfactory, and livestock grazing is not altering potential habitat. Potential habitat on the Cross V allotment includes the East Verde River, which is recommended for restocking (Weedman and Young 1997). A determination that grazing was not likely to adversely affect Gila topminnow was made because the area is excluded from livestock.

Conclusion

After reviewing the status of the Gila topminnow, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that the operation of the Deadman Mesa and Cross V livestock allotments may affect, but is not likely to adversely affect, Gila topminnow.

DESERT PUPFISH

The status of the species and much of the environmental baseline for the desert pupfish was discussed in the formal section of this biological opinion. As previously stated, the pupfish does not occur on the Forest. However, one allotment, Deadman Mesa, may have potential unoccupied habitat. Deadman Mesa allotment has the greatest potential for supporting desert pupfish in Fossil Creek, as it supports deep pools with abundant submergent and emergent vegetation. Streambanks are stable and vegetation consists of abundant woody species and herbaceous vegetation. Although desert pupfish does not exist there now, there are many native fish in Fossil Creek such as speckled dace (*Rhinichthys osculus*), longfin dace (*Agosia chrysogaster*), roundtail chub (*Gila robusta*), and desert and Sonoran suckers (*Pantosteus clarki* and *Catostomus insignis*). The area south of Fossil Creek (and its spring) is fenced off and

access by livestock is restricted; livestock grazing is excluded year-long from this habitat. Fossil Creek and its spring on the Deadman Mesa allotment have been recommended for restocking with desert pupfish. The constant discharge and water temperature of 43 cfs 73° F should be suitable habitat. Desert pupfish reproduce year round in the constant temperatures of springs.

Conclusion

After reviewing the status of the desert pupfish, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that the operation of the Deadman Mesa allotment may affect, but is not likely to adversely affect, desert pupfish, due to the uniqueness of both of these habitats, and their exclusion from grazing,

WOUNDFIN (*Plagopterus argentissimus*)

Status of the Species

The woundfin was listed as an endangered species on October 13, 1970 (US Fish and Wildlife Service 1970) under a precursor to the Act. Critical habitat for the woundfin in the Virgin River was proposed in 1995, but has not been finalized. An experimental nonessential population of woundfin (ENE population) was designated on July 24, 1985 (US Fish and Wildlife Service 1985) in central Arizona rivers. The Verde River from the upper end of Horseshoe Dam upstream to Perkinsville and Tonto Creek from Punkin Center upstream to Gisela were included in the designated areas.

Now limited to the Virgin River, woundfin were recorded historically from the Gila-Colorado River confluence and the Salt River near Tempe (Minckley 1973) and may have been more widespread in the Gila River basin before 1900. None of the designated ENE population locations has a documented history of supporting the species. Woundfin were translocated to the Hassayampa River, but a population failed to establish.

Information on the life history of the woundfin is in the Virgin River Fishes Recovery Plan (US Fish and Wildlife Service 1995e). Please refer to that document for additional information on the species.

Environmental Baseline in the Action Area

Areas with an ENE population designation within the action area are the Verde River and Tonto Creek. As described elsewhere in the opinion, two allotments, H-4 and Seventy Six, may have effects to Tonto Creek. Deadman Mesa, through Fossil Creek, may affect the Verde River.

Without a history of woundfin from the Verde River or Tonto Creek, it is difficult to assess the quality of the habitat available for the species in these locations. However, based on similarities in habitat to historically and currently occupied habitats, suitable habitat appears to exist in these locations. Further, the quality of the physical habitats has not been evaluated through monitoring of stocked woundfin since none has been introduced to either the Verde River or Tonto Creek.

Effects of the Action

Continued grazing on the three allotments of interest will continue to have effects to watersheds, streams, and riparian areas. Changes in flows and sediment input to the waterways have effects on fish habitat. Livestock are excluded from Tonto Creek in the Seventy Six allotment and from Fossil Creek on Deadman Mesa allotment. Livestock will not graze the H-4 allotment until at least 2002.

The extent to which important features of the aquatic habitat used by woundfin would be affected by the continued grazing is not determinable. What effects there are would continue at some level, and should decline as watershed and riparian conditions improve. There would be no direct effects to individual woundfin because they are not currently present.

As discussed for the Colorado pikeminnow, an ENE population is not given the protection of section 7 consultation except through conferencing. A formal conference would be required if the proposed action would be likely to jeopardize the continued existence of the species. The proposed action is not likely to eliminate habitat features potentially important to the woundfin on the Verde River or Tonto Creek. Thus, the potential to establish the ENE population would be retained.

Conclusion

After reviewing the status of the woundfin, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the H-4, Seventy Six, and Deadman Mesa allotments are not likely to jeopardize the continued existence of the designated woundfin ENE population sites. No proposed critical habitat occurs in the action area, thus none will be affected.

ARIZONA AGAVE

The status of the species and much of the environmental baseline for the Arizona agave was discussed in the formal section of this biological opinion.

The Star Valley allotment contains a single clone of this species. Livestock grazing is not allowed near the one known clone of Arizona agave on this allotment. However, grazing occurs in potential habitat. The clones are fenced and excluded from grazing. Livestock grazing is managed by a rest/rotation regime; four pastures are used and one is rested each year. The Forest Service proposes to graze nearby portions of the allotment at moderate use levels, and to follow the grazing guidance criteria designed to achieve the determination that grazing may affect, but is not likely to adversely affect, Arizona agave.

The proposed action on the Star Valley allotment will manage livestock grazing to meet the grazing guidance criteria that led to the Forest's determination.

Conclusion

After reviewing the status of the Arizona agave, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the Star Valley allotment is not likely to jeopardize the continued existence of Arizona agave. No proposed critical habitat occurs in the action area, thus none will be affected.

ARIZONA HEDGEHOG CACTUS

On the Millsite allotment, Arizona hedgehog cactus occurs in Rogers Trough Canyon (in the northeast corner of the allotment). The species is found on both canyon sides, on grassy slopes, rocky outcrops, and in dense chaparral. Grazing has not occurred in this area since 1997 when the species was discovered here. More than half of the known cacti are inaccessible to livestock, but some are vulnerable to livestock pressures. However, a fence and gate are in current use and kept in repair, excluding this canyon from livestock use.

The proposed action will manage livestock grazing on the Millsite grazing allotment to meet the grazing guidance criteria that results in the "may affect, not likely to adversely affect" determination, by excluding grazing in Rogers Trough Canyon (USDA Forest Service 1999).

Conclusion

After reviewing the status of the species, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the Millsite allotment may affect, but is not likely to adversely affect, the Arizona hedgehog cactus. No critical habitat has been designated, thus none will be affected.

LESSER LONG-NOSED BAT

The status of the species and the environmental baseline for the lesser long-nosed bat was discussed in the formal section of this biological opinion. Any relevant parts of those sections are incorporated here by reference. There are no known maternity or post maternity roosts within a 100 miles of the OW allotment; however, surveys have not been conducted to see if any roosts exit. The OW allotment contains 5 pastures in a deferred rest-rotation grazing system, soil condition is satisfactory, and range condition is improving. The allotment probably does not contain significant foraging habitat; it is a small allotment and is mostly montane conifer and woodland vegetation types.

The proposed action of livestock grazing on the OW allotment meets the grazing guidance criteria for may affect, not likely to adversely affect the lesser long-nosed bat, based primarily on the lack of suitable habitat and proximity to known roosts, as well as the condition of the allotment (USDA Forest Service 1999).

Conclusion

After reviewing the status of the species, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the OW allotment may affect, but is not likely to adversely affect, the lesser long-nosed bat. No critical habitat has been designated, thus none will be affected.

BALD EAGLE (*Haliaeetus leucocephalus)*

The bald eagle south of the 40th parallel was listed as endangered under the Endangered Species Act of 1966 on March 11, 1967. It was reclassified to threatened status on July 12, 1995, and proposed for delisting on July 6, 1999. No critical habitat has been designated for this species.

The bald eagle both nests and winters on parts of the Forest, primarily in areas associated with larger water bodies (rivers, streams, and reservoirs), such as the Verde and Salt rivers, and their associated reservoirs. The lower Verde River has the highest concentration of nesting eagles in Arizona.

Environmental Baseline

Status of the Species in the Project Area

Wintering, migrating, and nesting bald eagles occur on the Forest and neighboring Tribal Lands. Sites along or associated with drainages possibly affected by the proposed grazing action involve breeding eagles on Tonto Creek (Seventy Six, Sheep, and Tonto breeding areas), the Verde River

(Sycamore and Orme breeding areas), and Salt River (Orme and Horse Mesa breeding areas). Grazing allotments associated with effects to breeding areas are the Seventy Six allotment (Seventy Six, Sheep, Tonto breeding areas), Sunflower allotment (Horse Mesa, Sycamore, and Orme breeding areas), and OW allotment (Canyon breeding area). All allotments and drainages can have migrating and wintering eagles.

Effects of the Action

Grazing can affect bald eagles directly and indirectly. Livestock can directly disturb eagles at roosting, foraging, and nesting sites. Livestock gathering and herding activities around nests and perches has elicited reactions from bald eagles and could cause eagles to abandon the nest, or flush from the nest suddenly breaking eggs, etc.

Indirect effects of livestock are those that may affect riparian vegetation, or the functioning of aquatic systems and their watersheds. Livestock can affect riparian trees that eagles may use for roosting, foraging, or nesting. Livestock grazing in riparian zones and in the upland watershed can affect specific components of them and degrade the entire system. These effects are discussed in greater detail in other sections of this opinion (e.g., southwestern willow flycatcher).

For the proposed action of livestock grazing to meet the guidance criteria for a "may affect, not likely to adversely affect" determination, livestock grazing in riparian areas must not be reducing long-term nest tree regeneration, and livestock management activities (beyond the presence of livestock) that occur within 0.25 miles of bald eagle roost or nest must not constitute a disturbance to eagles.

Tonto Creek (Seventy Six Allotment)

The establishment and maintenance of nesting, perching, roosting, and foraging trees on Tonto Creek is expected to improve with the proposed action. Grazing in the riparian area has been removed from the Seventy Six Allotment. Increasing the amount of riparian habitat (as a result of removing grazing) is expected to reduce the force of flood flows, reducing impacts to habitat in the Seventy Six Breeding Area and breeding areas downstream of the allotment (Sheep and Tonto breeding areas). Removing grazing from the stream is expected to improve conditions for fish, the main prey item for bald eagles. Increasing the amount of riparian habitat is expected, in the future, to produce replacement perching, roosting, and foraging trees and additional trees for these important activities.

While grazing is to continue in the uplands of the Seventy Six allotment, it is proposed to not exceed 35 percent annual use on herbaceous plants, 40 percent annual use of woody plants on tributaries of Tonto Creek (Gun Creek, etc.), and 10 percent bank alteration of upland tributaries.

Monitoring will occur to maintain use within limits. Current upland conditions were rated as satisfactory. Thus, maintaining the proposed annual utilization is expected to maintain satisfactory soil, range, and upland riparian tributary conditions. Maintaining these limits is expected to reduce the force of flood flows and as a result, impacts to habitat in breeding areas within and downstream of the allotment (Seventy Six, Sheep and Tonto breeding areas).

Sycamore Creek, Verde and Salt Rivers (Sunflower Allotment)

The establishment of potential nesting, perching, roosting, and foraging trees on Sycamore Creek, and the maintenance and establishment of nesting and perching habitat along the Verde and Salt Rivers is expected to improve with the proposed grazing action on the Sunflower Allotment. Grazing will be eliminated along lower Sycamore Creek, a tributary of the lower Verde River (which flows into the Salt River). Increasing the amount of riparian habitat in this allotment should reduce the force of flood flows to the Verde River. Reducing flood flows will reduce impact to occupied downstream Verde River (Sycamore and Orme breeding areas) and Salt River (Orme Breeding Area) nesting and foraging habitat.

Grazing is to continue in the uplands of the Sunflower allotment. Livestock use is proposed to not exceed 35 percent annual use on herbaceous plants in the Dos S Unit of this allotment. Current upland conditions were rated as unsatisfactory (soils were rated as 70 percent unsatisfactory). Monitoring will occur to maintain use within limits, which is expected to improve soil and range conditions. Improving soil and range conditions, is expected to reduce the force of flood flows and as a result, reduce effects to habitat in breeding areas downstream of the allotment (Sycamore and Orme breeding areas).

Canyon Creek (OW Allotment)

Elevation and topography of this allotment are in zones that would not be expected, and currently do not provide habitat for nesting bald eagles. Eagles do however, nest on cliffs along Canyon Creek further downstream on White Mountain Apache Tribal Land (near the stream's confluence with the Salt River). Canyon Creek provides habitat for wintering and migrating eagles. Canyon Creek riparian habitat (which constitutes 1 percent of the allotment) is largely fenced. As a result, effects to winter-time foraging habitat and breeding/foraging/roosting habitat downstream are not expected to occur from cattle. Ecological conditions are rated as good to excellent. Improvement in management over the last 20 years has improved overall conditions of conifers and meadow habitat. Therefore, continuing with current operations is expected to maintain good to excellent range conditions.

Sierra Ancha Mountains (Buzzard Roost allotment)

Bald eagles (the Dupont eagles) have two nests in tall pine snags in the Copper Mountain Pasture of this allotment that are approximately 13 miles from what are considered their foraging

grounds (Roosevelt Lake and/or Tonto Creek). Catfish bones and fishing line were found below the nest and no other dependable source of catfish (able to support a pair of breeding eagles) is known to be closer. Thus, concern for how grazing activities may disturb nesting is the primary issue. The Grazing Guidance Criteria includes a criterion that no human activity related to grazing operations (herding, range improvements) occurs within 0.25 mi of the nest during the breeding season (December 1 through June 30 in Arizona). As a result, the Forest has provided specific measures to ensure the protection of the Dupont eagles within the Copper Mountain Pasture.

1. During years when livestock are scheduled to use the Copper Mountain Pasture (every other year), the permittee will check with the District Ranger Staff prior to removing them from the pasture. If the bald eagle nest (#2) located just east of Dupont Cabin is occupied, livestock may not be driven out of the pasture via Forest Road #2738, but must be taken via another route away from the nest (greater than 0.25 mi away). If the permittee is told by the District that the eagles are not using that nest, or the nest has been determined to have failed by the Arizona Game and Fish Department (conducting monitoring of eagle nests), livestock may be driven out of the pasture on Forest Road # 2738. Cattle entering the pasture will occur prior to December, thus there will not be a conflict with disruption of nesting activities.

2. No potentially disturbing management activities, such as range improvement construction or maintenance will occur within 0.25 mi of any bald eagle nest during the breeding season (December 1 through June 30) of any year. However, if the eagles are not using any of the nests on the Buzzard Roost Allotment or the breeding attempt has failed, then cattle grazing management activities can resume.

The Forest reported that soils are 78.6 percent satisfactory and that recent analysis concluded that the pine portion of the allotment is in a static trend with half in moderately high and half in low condition. Maintaining existing grazing strategies ought to maintain current conditions and continue to maintain pine trees for nesting eagles. Nearby Salome Creek flows into Roosevelt Lake, thus negative watershed effects to downstream nesting, foraging, and/or roosting habitat is not expected to occur.

Conclusion

The Service concurs with the Forest's determination that the proposed action on the Seventy Six, Sunflower (Dos S Unit), Buzzard Roost, and OW allotments may affect, but is not likely to adversely affect, the bald eagle. This concurrence is based on the following:

1. Grazing is being removed from riparian habitat on Tonto Creek (Seventy Six Allotment), lower Sycamore Creek (Sunflower Allotment - Dos S Unit), and will continue to be excluded from Canyon Creek (OW allotment). This will remove direct effects to important nesting, foraging, roosting, wintering, and migratory habitat.

2. Grazing in uplands of Tonto Creek (Seventy Six allotment) and Sycamore Creek (Sunflower allotment) is reduced to 35 percent annual use of herbaceous plants, 40 percent of tributary woody species, and 10 percent bank alteration. This is expected to maintain satisfactory soil/range conditions on the Seventy Six allotment and improve poor conditions on the Sunflower allotment. As a result, excessive flooding due to overgrazed uplands is expected to be reduced. Current grazing strategies in the uplands surrounding Canyon Creek (OW allotment) are expected to maintain excellent ecological conditions.

3. Grazing management activities (range improvements, herding, etc.) will remain greater than 0.25 mi from all nesting pairs of eagles (Seventy Six and Buzzard Roost allotments) during the breeding season (December 1 to June 30).

4. Monitoring, as described in the Forest's June 2, 2000, amendment to their biological assessment, will be associated with all allotments to ensure that utilization limits are not surpassed. We expect maintenance of satisfactory conditions and improvement of poor conditions in the allotment.

5. The Forest concluded in their June 2, 2000 amendment that the proposed use in riparian habitat for flycatchers, "should move potential habitat toward suitability, but at a slower rate than if they were not grazed." Because bald eagles and flycatchers depend on healthy riparian habitat and watersheds, the project proposal and analysis of effects are based on the assumption that the watershed (riparian habitat and uplands) will also improve for eagles. The Forest's proposed monitoring strategy is intended to keep use under the proposed limits, thus allowing habitat and the watershed to improve. If utilization limits are exceeded and habitat is not improving, then the premise of the analysis is violated and re-consultation may be necessary.

6. Proposed grazing activities meet the guidance criteria for "may affect, but not likely to adversely affect."

MEXICAN SPOTTED OWL

The status of the species and the environmental baseline for the Mexican spotted owl were discussed in the formal section of this biological opinion. Any relevant parts of those sections are incorporated here by reference.

The amended proposed action on the Seventy Six, Bohme/Sleeping Beauty/Bellevue, Buzzard Roost, Christopher Mountain/Ellinwood, H-4, Jones, OW, Payson/Cross V, and Sunflower allotments will reduce effects to Mexican spotted owl by moving riparian vegetation corridors toward suitability for Mexican spotted owl wintering or migration and dispersional behavior. Revised and reduced utilization limits, and designation of key areas for monitoring effects, located near the Mt. Ord Mexican spotted owl PAC and the area around Four Peaks, is expected to maintain Mexican spotted owl prey species cover and diversity. The proposed action meets the grazing guidance criteria for a "may affect, not likely to adversely affect" determination because: 1) livestock grazing and interrelated and interdependent actions occur in PACs, but no human disturbance or construction action associated with the grazing allotments occur in PACs during the breeding season; 2) livestock grazing in PACs is at levels that provide the woody and herbaceous vegetation necessary for cover of rodent prey species, good to excellent range and ecological condition and fuel loading that will support prescribed natural and ignited fires that would reduce the risk of catastrophic wildfire in the Forest; and 3) livestock grazing occurs outside of PACs, but within Mexican spotted owl habitats (including riparian areas), at levels that maintain the woody and herbaceous vegetation necessary for cover of rodent prey species, and consistent with management to reduce the risk of catastrophic wildfire.

Conclusion

After reviewing the status of the species, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the Seventy Six, Bohme/Sleeping Beauty/Bellevue, Buzzard Roost, Christopher Mountain/Ellinwood, H-4, Jones, OW, Payson/Cross V, and Sunflower allotments may affect, but is not likely to adversely affect, the Mexican spotted owl. No critical habitat occurs in the action area, thus none will be affected.

SOUTHWESTERN WILLOW FLYCATCHER

The status of the species and the environmental baseline for the southwestern willow flycatcher were discussed in the formal section of this biological opinion. Any relevant parts of those sections are incorporated here by reference.

<u>Seventy Six allotment</u>

Tonto Creek (Gisela to Gun Creek), portions of its Sierra Ancha tributaries (Gun Creek, Pigeon Creek, Del Shay Creek), and Mazatzal Mountain tributaries (Rye Creek, Hardt Creek) lie within the Seventy Six allotment. This allotment since at least 1988 has been under Holistic Resource Management type grazing, a process of high intensity, short duration grazing contingent upon monitoring and frequent movement of cattle. However, the grazing strategy has been changed to a rest rotation system this past year. This allotment was not part of the TCRU.

No flycatchers are known to exist on the allotment, and no suitable habitat is present. However, there is great potential for suitable habitat to develop along the length of Tonto Creek in this allotment. There have been no specific Forest objectives to develop dense stands of riparian habitat in this allotment. The Forest reported some willows growing in 1991 on Tonto Creek, but flooding in 1993 and 1995 removed most of them. Riparian conditions in 1998 indicated that use was heavy and woody vegetation appeared to have been utilized by livestock above standards. The allotment consists of 23,571 acres, riparian habitat was considered unsatisfactory, and soils were unsatisfactory. Tonto Creek has recently been fenced and excluded from livestock which should greatly improve the potential habitat within the allotment.

Millsite allotment

The Millsite allotment contains portions of Queen Creek behind Whitlow Dam (a flood control structure) west of the town of Superior. No flycatchers are known to exist (surveys were conducted in 1997 and 1998), but about 20 acres of potential and suitable habitat (dense tamarisk with interspersed willow) exist. The suitable habitat was used as a holding pasture for cattle for about 10 days during the spring, but no monitoring of livestock use has occurred. Just over half of the suitable habitat is under management of the Army Corps of Engineers. This allotment is 43,471 acres in size; soils were rated as unsatisfactory and no determination was made for riparian habitat. Suitable habitat is in the process of being fenced and excluded from livestock.

The proposed action meets the grazing guidance criteria for a "may affect, but not likely to adversely affect" determination for both the Seventy Six and Millsite allotments because grazing does not occur within two miles of the occupied habitat located on the Tonto Basin allotment, and continuing cowbird trapping and monitoring programs are in place.

Conclusion

After reviewing the status of the species, the environmental baseline for the action area, and the effects of the proposed action, the Service concurs with your finding that continued grazing on the Millsite and Seventy Six allotments may affect, but is not likely to adversely affect, the flycatcher because no flycatchers are known to occur, little potential habitat is present, and the potential habitat at Whitlow Dam will be excluded from livestock grazing.