



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
3616 W. Thomas, Suite 6  
Phoenix, Arizona 85019

2-21-90-F-222

November 7, 1990

R. Forrest Carpenter  
U.S. Forest Service  
517 Gold Avenue, S.W.  
Albuquerque, New Mexico 87102-0084

Dear Mr. Carpenter:

This responds to your request of August 2, 1990, for formal consultation pursuant to Section 7 of the Endangered Species Act (Act) of 1973, as amended, for the Pinaleno Mountains Recreation Projects. These projects involve the construction of trailheads, loop trails, dispersed recreation sites, and a visitor center parking lot in the Pinaleno Mountains, Coronado National Forest, Graham County, Arizona. The species of concern are the Arizona trout (Oncorhynchus apache) and Mt. Graham red squirrel (Tamiasciurus hudsonicus grahamensis). The 90-day consultation period began on August 24, 1990.

RECREATION PROJECTS NOT CONSIDERED

Several of the proposed recreation projects have been determined to have no effect to either the Arizona trout or Mt. Graham red squirrel. The Fish and Wildlife Service (FWS) concurs with the finding of no effect for the following recreation projects:

Arcadia Interpretive Loop Trail and Trailhead  
Clark Corral  
Clark Peak Trailhead  
Noon Creek Trailhead and Trail  
Peters Flat Dispersed Area  
Shake Trail and Trailhead  
Snow Flat Dispersed Area  
Twilight to Arcadia Trail  
Webb Peak Trailhead

These projects may have some effects on candidate wildlife species, and as such may be subject to Forest Service (USFS) policy or management decisions, but they are not discussed in this biological opinion.

### BIOLOGICAL OPINION

It is my biological opinion that implementation of the Pinaleno Mountains Recreation Projects is not likely to jeopardize the continued existence of the Arizona trout or Mt. Graham red squirrel (red squirrel). None of the proposed projects are within the red squirrel's designated critical habitat, nor would they affect the critical components of that habitat. Thus, it is my biological opinion that your action is not likely to adversely modify critical habitat.

### BACKGROUND INFORMATION

#### Project Description

There are nine recreation projects that come under the may affect determination. Table 1 lists the projects, their acreage needs, and the quality of red squirrel habitat that exists on the site. Table 2 shows the number of trees that would be removed for each project. Only one project, Upper Hospital Flat Loop Trails, would affect both Arizona trout and red squirrels. A brief description of each may affect project is given below. For more detailed information, please refer to the USFS biological evaluations and descriptions of the actions provided with the request for consultation.

Bible Camp Trailhead and Trail - A 0.33-acre trailhead and 0.48-mile long (0.10-acre) trail would be constructed. No trees would be removed for the trailhead location as it is in an existing clearing adjacent to a road open to public use. The new trail segment would connect the existing Ash Creek Trail to Bible Camp utilizing an existing recreationist made trail. No trees would be removed for this project. Red squirrel middens are within 1/8 mile of trailhead and 40 feet of the trail. Relocation of the trailhead may be necessary in the future contingent on closing the Bible Camp.

Columbine Public Corrals, Roadside Recreation Area, Trailhead Relocation - This existing site would be modified under the new proposal. The existing corrals would be relocated and camping areas more clearly defined. The trailhead location would be moved to the edge of the new corral area and would tie into the existing Ash Creek Trail. The project would occupy 0.52 acres with 0.34 acres being new clearing. Several small trees and snags would be removed. The nearest known red squirrel midden is 1/8 mile away. Use of the area would not be expected to increase under this proposal.

Table 1. Acreages of recreation projects proposed by Forest Service that may effect red squirrel habitats

Project Name	Total Acres	New Disturbance Acres	Red Squirrel Habitat Quality
Bible Camp			
Trailhead	0.33	0.18	G-E
Trail	0.10	0.00	VP
Columbine Corrals	0.52	0.34	VP
Columbine Visitor Parking Area	0.27	0.27	VP
Cunningham			
Dispersed Area and Trailheads	0.76	0.76	VP
Trail	0.02	0.00	VP
Grant Hill			
Trailhead	0.14	0.07	VP
Loop Trail	0.25	0.25	VP-F
Heliograph Trailhead	0.05	0.03	P-F
Lower 507			
Trailhead	0.09	0.06	VP
Trail	0.08	0.00	VP-E
Upper Grant Creek			
Trailhead	0.10	0.06	G-E
Trail	0.02	0.02	G-E
Cunningham Trail	0.10	0.10	G-E
Upper Hospital Flat Trails	0.75	0.75	VP-E
Cumulative Totals	3.58	2.89	VP-E
Separated Totals			
Trails	1.32	1.12	
Trailheads	0.71	0.40	
Dispersed Rec.	1.55	1.37	
Other			

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Key to Habitat Quality

E = Excellent  
G = Good  
F = Fair  
P = Poor  
VP = Very Poor

Table 2. Numbers and sizes of trees to be removed for each recreation project

Project	Small	Medium	Large	Snags
Bible Camp				
Trailhead	0	0	0	0
Trail	0	0	0	0
Columbine Corrals	18	0	0	7
Columbine Visitor Parking Area	12	0	1	0
Cunningham				
Dispersed Area and Trailheads	47	0	0	10 (est)
Trail	0	0	0	0
Grant Hill				
Trailhead	8	0	1	3
Loop Trail	10 (est)	0	0	0
Heliograph				
Trailhead	0	0	0	0
Lower 507				
Trailhead	0	0	1	0
Trail	0	0	0	0
Upper Grant Creek				
Trailhead	10	0	0	0
Trail	0	0	0	0
Cunningham Trail	0	0	0	0
Upper Hospital Flat				
Trails	0	0	0	0
Cumulative	105	0	3	17

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est = estimate

Columbine Visitor Information Station Parking Area - The USFS is proposing to convert the existing "Big House" at Columbine Work Center to a Visitor Information Center. All existing parking and access to the "Big House" currently goes through the work center and would conflict with USFS operations if visitors were to utilize that access. The proposal calls for a new parking area utilizing an existing road bed for access to Swift Trail. The road bed is reforesting naturally. A total of 0.27 acres, all new clearing would be needed. A total of 912 conifers less than six feet tall would be transplanted to adjacent areas as part of this proposal. The nearest red squirrel midden would be 1/8 mile away.

Cunningham Dispersed Area, Two Trailheads, Trail Segment Relocation - This project would create a new dispersed recreation area in an opening created by past logging efforts. The dispersed area would consist of a new loop road with dispersed campsites located along it. Due to the nature of this proposal, there would likely be secondary effects to acreage adjacent to the 0.76 project acres. The trail relocation would utilize an old logging road and would require no tree removal. The nearest red squirrel midden would be 7/8 mile away.

Grant Hill Trailhead and Loop Trail - The new trailhead would be located at the juncture of several old logging roads that access the Grant Hill area. Several trees and snags would be removed to provide for parking. The nearest red squirrel midden would be approximately 220 feet away from the trailhead. The new loop trail would utilize existing logging roads and small pieces of new trail construction to act as connectors. There would be two red squirrel middens located 1/4 mile away from the trails

Heliograph Trailhead - This project would provide a parking area for recreationists hiking up the Heliograph Peak road which is closed to vehicle access. The trailhead would be in an existing clearing adjacent to the existing road and would utilize 0.05 acres with no trees removed. The nearest red squirrel midden would be 1/2 mile away.

Lower 507 Trailhead and Trail - The new trailhead would be located at the junction of Swift Trail and FR 507. One mature ponderosa pine would be removed to provide for parking. The new trail construction would create a loop trail from FR 507 to an old logging road. The nearest red squirrel midden to the trail would be 1/2 mile away.

Upper Grant Creek Trailhead and Trail, Cunningham Trail - A small, 0.10-acre parking area would be constructed adjacent to an existing road. The closest known midden would be 1/4 mile away. The Upper Grant and Cunningham trails would utilize existing logging roads for most of their length. The Grant Creek trail would require an additional 0.02 acres of new trail to connect the logging roads. A red squirrel midden would be 3/8 mile away; however, much of the area has not been surveyed. The Cunningham Trail would require 0.10 acres of new trail construction.

Upper Hospital Flat Loop Trails - New connections to existing logging roads would create a loop trail system. The new trails would require 0.75 acres and the nearest red squirrel midden would be 1/4 mile away. Two crossings of Big Creek are anticipated, one of which may affect Arizona trout.

Summary of Projects - The recreation projects proposed by the USFS are intended to replace recreation opportunities lost with the closure of the Mt. Graham red squirrel refugium. Several hiking trails had to be closed and dispersed campsites along FR 507 and on the peaks and cienegas were no longer available to the public. Creation of new recreation opportunities would, according to the USFS, allow for better control of recreationist use of open sites.

Trailheads have been located adjacent to existing roads and provide parking access to new or existing trails. Trailheads are sized for a small (usually 4) number of cars and, because of their location adjacent to roads, are not likely to contribute to new edge effects. The 19 (Table 2) trees to be cut on these projects are mostly small (18 of 19) and are not significant contributors to the canopy. The one large tree is located in an open park-like expanse between two existing roads. A total of 0.71 acres would be committed to trailheads, 0.40 acres of that new clearing. The USFS defines new clearing as the disturbance of vegetated ground. Vegetated ground includes grasses, forbs, shrubs and trees, not areas currently in gravel, sand or rock.

The new loop trails would utilize existing logging roads for much of their length. Reforestation of all but a 1.7-foot wide path along the roads is part of the proposed action, reclaiming over 14 acres of roadbed. New trail segments would also be 1.7 feet wide and would be constructed around larger trees, thus existing canopy would not be disturbed. The USFS states that an occasional less than 3-inch DBH would be removed for the trail. No specific numbers of such trees are available as no on-the-ground trail routes have been marked.

New dispersed recreation opportunities would be made available in the Cunningham project. The site is a large meadow with scattered, larger conifers and snags, with some conifer regeneration, at an elevation of 8900 to 9000 feet. This site would have the highest tree removal of any project, yet new edge would not likely be created due to the meadow character of the site. The other dispersed recreation area, Columbine Corrals, is currently in existence and would be reconfigured within the impact area. The 18 trees which would be removed are mostly in one thicket.

The Columbine Visitor Center parking area would also be located in a regenerating meadow adjacent to the work center. Regeneration of small conifers in this area may be encouraged by the sewage leach field from the Columbine "Big House." With retention of the work center, the parking lot may have some long-term contribution to edge effects.

## Background Information

### Arizona Trout

This species was stocked in several drainages in the Pinaleno Mountains during the 1960's by the Arizona Game and Fish Department (AGED) and USFS. The Pinaleno Mountains are outside documented historic range for Arizona trout but populations have persisted in the Grant Creek drainage (USFWS 1983).

A member of the cutthroat trouts of western North America, the Arizona trout is known from the White Mountains of eastern Arizona. It is yellow to yellow-olive in color; no characteristic pink or red lateral bands are known in fish of pure genetic inheritance. Arizona trout interbreed with the widely introduced rainbow trout (Oncorhynchus mykiss formerly Salmo gairdneri) and hybrids often show pink or red markings. Habitat for Arizona trout is recorded as small high-mountain streams (USFWS 1983).

### Mt. Graham Red Squirrel

The Mt. Graham red squirrel is found only in the mixed-conifer, transitional and spruce-fir forests of the Pinaleno Mountains. Based on October 1990 midden surveys, the red squirrel population is estimated between 250 and 300 (USFS 1990c). The increase from the spring estimate of between  $132 \pm 16$  and  $146 \pm 15$  (USFS 1990a) largely represents the young of the year that have survived to disperse. Extensive information on red squirrel biology and habitat are given in the Expanded Biological Assessment (USFS 1988) and the final biological opinion for the Coronado National Forest Plan and Mt Graham Astrophysical Area Plan issued by the FWS July 14, 1988 (USFWS 1988).

Additional biological information developed since 1988 showed the importance of the transitional forest (between spruce-fir and mixed conifer) to the red squirrel (University of Arizona 1990) especially in years of differential food availability, use of middens by individual red squirrels (Froehlich 1990) and habitat quality parameters (Mannon and Smith 1990). Population surveys and records of cone crops have also provided insight into the dynamics of the red squirrel population in the Pinalenos (USFS 1990b).

## ENVIRONMENTAL BASELINE

The forested elevations of the Pinaleno Mountains have been influenced by both natural forces and human activities to create the present mosaic of habitats for the red squirrel. No baseline for the Arizona trout is presented herein as this species was introduced to the Pinalenos.

Extensive forest areas have been eliminated or degraded by human activities such as logging, road construction, recreation site development and man-caused fire events. Natural forces such as lightning strikes and associated

fire, tree diseases, and climate cycles also result in habitat losses. Windthrow and edge effects occur at both naturally made and human created forest edge.

Losses of forested habitat occur continuously over time at a level that varies with effects of natural forces, catastrophic events and human factors. Regeneration, over the long term, replaces habitat that has been lost. When the rate of loss exceeds rate of conifer regeneration, a net loss of habitat is recorded. In the Pinaleno Mountains, there has been a significant net loss of habitat in the last 100 years, largely due to man's activities. The USFS expanded biological assessment (USFS 1988) addressed the status of red squirrel habitat and knowledge of red squirrel ecology. Much of the information in the assessment remains valid today and is incorporated herein by reference. New information from surveys and research projects have shown that while spruce-fir habitats are important, the transitional forests to mixed-conifer are necessary as well to maintain the red squirrel population. Locations of middens in these habitats were confirmed by surveys in the summer of 1990.

In addition to habitat changes, the baseline also contains elements that directly affect survival of individual animals. Rates of predation on red squirrels from naturally occurring predators may be influenced by changes in habitat. The presence of the introduced tassel-eared squirrel (Sciurus aberti) may have an effect on the red squirrel, directly or indirectly. Human activity in red squirrel habitat may also affect individual animals. Mortality or harassment may result. While the refugium is closed to recreation access, red squirrels on the rest of the mountain are exposed to varying degrees of human activity.

Natural mortality rates, disease vectors and other demographic factors are affected by or are considered part of the baseline. Responses of the red squirrel population to cone crop failures is an example of these types of interactions that have to be taken into account.

Catastrophic changes in habitat or non-habitat factors are unpredictable both in timing and level of effect to the red squirrel. Human intervention has altered the natural probabilities of some catastrophes. For example, fire suppression commitments reduce the risk of a major fire burning out of control, and on the other hand disease vectors may be more easily transported to the mountains. We believe there is insufficient data to predict the actual occurrence of any catastrophic event in the Pinalenos.

#### IMPACTS OF THE ACTION

##### Arizona Trout

The proposed Upper Hospital Flat Loop trails would require two crossings of Big Creek. One would be a bridge over the stream and would likely have only construction impacts. The other crossing is an existing logging road that



dips through the stream. Sediment from the road would wash into the stream and may degrade trout habitat.

Hikers along the new trail may use Big Creek as a water source and recreation opportunity. Wading in the stream could stir up sediments, disturb the periphyton and invertebrate community, and introduce foreign substances to the stream. Since the trail would cross Big Creek twice, once near the headwater and again further down, effects may extend throughout the reach.

#### Mt. Graham Red Squirrel

The proposed projects would have effects on both habitat and individual animals. Long-term commitments of recoverable red squirrel habitat to recreation use would influence recovery strategies.

There would be a commitment of 3.58 acres to recreation use, which does not include the acreage of existing roads that would be used for trails. Of that acreage, 2.89 acres would be new disturbance. A total of at least 108 trees and 17 snags would be removed for implementation of the project. Equally important, over 14 acres of existing clearing along the roads to be used as trails would be regenerated to forest and the canopy allowed to close.

Physical effects to red squirrel habitat from the hiking trails would likely be minor as a narrow trail would be interspersed around canopy trees and not involve extensive earthwork. There may be some compaction of the soil from hiker use, thus affecting trees in the area, and some small trees (less than 3" DBH) would be removed, thus removing some natural regeneration opportunity from the forest stand.

Trailheads would involve maintaining a clear area for parking adjacent to existing roads. Soil compaction and tree root damage are likely at these trailheads. Not all trailheads are in areas that currently support trees, and due to the proximity to the road, would most likely affect trees already affected by the road. The presence of trailhead parking opportunities would limit disturbance of other sites; however, by encouraging use of the new trailheads, parking capacity could be exceeded and result in damage to adjacent areas.

The Columbine Visitor Center parking area would experience soil compaction in addition to direct loss of trees. Small trees would be transplanted to the area beyond the project, but the project itself would require maintaining a larger forest opening than may have been envisioned.

Of the two dispersed recreation areas, Cunningham would have the least impact on existing forest habitat. Largely open meadow, it would require a long-term commitment to recreation, not red squirrel recovery. Columbine Corrals, the existing facility, would not have significantly different effects under the new design but its location at the entrance to Ash Creek would raise questions about the long-term use of the drainage by recreationists. Additional impacts on habitat are difficult to evaluate for this site. Some

Additional impacts on habitat are difficult to evaluate for this site. Some changes in soil compaction may occur at campsites. Fire danger from recreationists may or may not increase. The presence of organized camping areas with fire rings would encourage use of campsites and reduce the use of open areas where campfires may not be so well contained. Concentrating campers nearer to primary roads may also enable faster reporting of fires and quicker response times from fire crews, thus decreasing risks of large fire events.

Direct effects to red squirrels would come from increased use of their habitat by hikers. There is one midden near the Columbine Corral project, but that area is currently used for camping and occupancy levels are not likely to change. Thus, effects to that midden territory would be retained. Hikers using the new trails would have a limited potential to see a red squirrel if they remain on the trail. Red squirrels may use the trail areas for foraging and could be seen by hikers, but the probability of such contact is difficult to determine. It may, in some instances, be possible to see the flagging used to mark the midden location from the trail or areas near it. The curiosity factor could draw people to the midden. If the midden was active, there would be an opportunity for harassment of the resident red squirrel. Recreationists also bring dogs with them when hiking or camping. In campsites, leashes are required but dogs may run free on the trails. Most of the middens are likely too far from the trail to be found by a dog, but the midden at the Bible Camp trail is close enough to be potentially affected by dogs.

We believe the proposed projects would not significantly alter red squirrel habitat in the short-term, since all areas to be utilized are either degraded already due to existing openings or would not require the creation of new openings in the canopy. Providing new trail access may expose red squirrels to more human contact, but the probabilities of that contact and the actual degree of risk to individual red squirrels remain undefined. Appropriate management of people using the new facilities could reduce habitat damage from recreationists using an area of their choice for camping or hiking because existing facilities are full.

Over the long-term, most of the projects occurring in degraded edge habitat would continue. Closure of major access routes in the Pinalenos is not currently foreseen and trailheads along SR 366 (Heliograph, Lower 507, Grant Hill, and Columbine Corral) would remain within the degraded edge caused by the road. Upper Grant would require maintenance of part of a side road, thus the area of degradation from that opening would be maintained. Vehicle access to the Bible Camp trailhead would be transitory as the July 14, 1988, biological opinion requires the removal of the Bible Camp so the road would not be necessary. Studies required by the Arizona-Idaho Conservation Act of 1988 concerning retention of the Bible Camp and Columbine Summer Homes should begin soon. If the Bible Camp is shut down, the trailhead location would require relocation but all trails are currently scheduled to remain open for public use.

The largest long-term impacts would come from the dispersed camping areas. Full construction of the Cunningham dispersed area would prevent restoration of the area to closed canopy forest. Given the current successional stage, the restoration of forests in this area will be many years into the future. Use of an area such as this for recreation is preferable to using a currently forested area that could be recovered to red squirrel habitat sooner. Columbine Corrals is an example. Although near to SR 366, and thus in the area of degraded edge, maintaining the Columbine facility would push the area of degradation further into the forest.

Depending on the plans for the open meadows around Columbine Work Center, there may or may not be any additional long-term effects due to the new parking area. The work center is unlikely to be removed and is near Swift Trail, placing it in a degraded area. There would be some lost recovery potential due to maintaining the facility.

The projects would result in a gain of over 14 acres of forest and elimination of some fragmentation in the existing forest. As addressed in the 1988 biological opinion, the USFS has other reforestation and road removal commitments that would complement gains from this project. It is also important to consider that natural habitat losses and regeneration would continue to occur on the mountain.

Certain types of human activities would continue to affect red squirrel habitat. Recreation use levels and thus, demand for facilities, fire risks, harassment possibilities, and other potential effects, would continue to increase over time, eventually requiring a coordinated recreation plan that would be subject to future consultation.

#### INCIDENTAL TAKE

Section 9 of the Act prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species without a special exemption. 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 taking within the bounds of the Act provided that such taking is in compliance with the incidental take statement.

The FWS does not anticipate that any additional incidental take of red squirrels would result from implementation of the proposed Pinaleno Mountains Recreation Project actions. The July 14, 1988 biological opinion on the Coronado National Forest Plan anticipated an incidental take of five red squirrels, in part because of recreational activities. The new facilities addressed in this opinion would be used by the current and future recreationists addressed in the biological opinion issued in 1988. We believe the following reasonable and prudent measures are necessary to reduce incidental take.

1. The USFS will check line-of-sight from all new trails to determine if flagging at or leading to a red squirrel midden is visible. If flagging is visible, it should be removed and another marking system used. All excess flagging from research and monitoring work at any midden visible from a road or trail should be removed.
2. Information presented at the new Columbine Visitor Center should at least include information telling recreationists to avoid harassing red squirrels, proper observing techniques if a red squirrel is seen, avoiding firewood collection around middens, proper control of pets around middens and red squirrels, and the importance of maintaining safe vehicle speeds in red squirrel habitat.
3. Recreationists should be advised to restrain pets on the Bible Camp Trail segment near the red squirrel midden located 40 feet off the trail.

For the Arizona trout, the FWS anticipates two fish a year may be lost due to human activities in its habitat. We believe the following reasonable and prudent measure is necessary to reduce incidental take:

1. Signs will be posted at trailheads where trails go through Arizona trout streams explaining that the streams are sensitive areas and that the streams and fish in them should not be disturbed.

The following terms and conditions must be complied with in order to implement all the above measures.

1. All red squirrels or Arizona trout killed, wounded or harmed by vehicles or other human related causes shall be immediately reported to the FWS-Phoenix Ecological Services Office. The handling and disposition of all carcasses will follow FWS procedures.

If during the course of the action, the amount or extent of incidental take (currently set as five red squirrels and two Arizona trout) is exceeded, the USFS must reinitiate formal consultation with the FWS on both the Coronado National Forest Plan and the Pinaleno Mountains Recreation Project. The USFS should provide an explanation of the causes of the taking.

#### 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. The term "conservation recommendations" has been defined as suggestions of the FWS regarding discretionary measures to minimize or avoid adverse effects of a

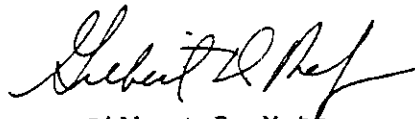
proposed action on listed species or critical habitat or regarding the development of information. The following conservation recommendations are provided for your consideration:

1. Reforestation efforts on roads converted to trails should proceed as quickly as possible.
2. The USFS should consider implementing a study to quantify the effects of recreationists on red squirrels and their habitat.
3. An overall plan committing certain areas for recreation use and development and other areas for red squirrel recovery should be developed.
4. Plans for crossings over streams containing Arizona trout should ensure no increase in sediment load into stream. Correction of existing sedimentation problems would be appropriate.
5. Surveys of remaining unsurveyed areas at Upper Grant Creek should be accomplished as soon as possible.
6. The FWS recommends that the Bible Camp trailhead not be developed in order not to increase recreational activity in that area. If this trailhead is developed, and the Bible Camp is closed, we recommend this area be reforested.

This concludes formal consultation on this action. Reinitiation of formal consultation is required if the amount or extent of incidental take is exceeded, if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, if the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion, and/or if a new species is listed or critical habitat designated that may be affected by the action.

If we can be of further assistance, please contact Ms. Lesley Fitzpatrick or Sam Spiller, Field Supervisor (Telephone: 602/379-4720; FTS 261-4720).

Sincerely,



Gilbert D. Metz  
Acting Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, New Mexico  
(FWE/HC)  
Director, Fish and Wildlife Service, Washington, D.C. (HC)  
Director, Arizona Game and Fish Department, Phoenix, Arizona

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