



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
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Phoenix, Arizona 85019

2-21-91-F-299

October 3, 1991

David F. Jolly
Regional Forester
U.S. Forest Service
517 Gold Avenue, SW
Albuquerque, New Mexico 87102-0084

Dear Mr. Jolly:

This responds to your request of May 9, 1991, for formal consultation pursuant to Section 7 of the Endangered Species Act (Act) of 1973, as amended, on the proposed Quien Sabe fire management treatment on the Cave Creek Ranger District of the Tonto National Forest, Maricopa County, Arizona. The species of concern is the Gila topminnow (Poeciliopsis occidentalis occidentalis). The 90-day consultation period began on May 14, 1991, the date your request was received in our office.

The following biological opinion is based on information provided in the March 20, 1991 biological evaluation (BE), the July 10, 1990 Prescribed Burning Plan (Plan), a September 5, 1991 letter from the Cave Creek Ranger District to the Fish and Wildlife Service (FWS), data in our files, and other sources of information.

BIOLOGICAL OPINION

It is my biological opinion that implementation of the proposed Quien Sabe fire management treatment is not likely to jeopardize the continued existence of the Gila topminnow.

BACKGROUND INFORMATION

Species Description

The Gila topminnow was listed as an endangered species on March 11, 1967. No critical habitat has been designated for this species. The Gila topminnow is a small, livebearing fish found in the Gila, Sonora, and de la Concepcion River drainages in Arizona, New Mexico, and Sonora, Mexico (Minckley 1973, Vrijenhoek et al. 1985). It was once among the commonest fishes of the Gila River and its tributaries (Hubbs and Miller 1941). Destruction of its habitat through water diversion, stream downcutting, backwater draining, vegetation clearing, channelization, water impoundment, and other human uses of natural resources; plus competition with and/or predation by nonnative fish species, most notably mosquitofish (Gambusia

affinis), have resulted in extirpation of the Gila topminnow throughout most of its range (USFWS 1984, Meffe et al. 1983).

The Cave Creek-Seven Springs stream system, tributary to the Salt River, lies within the historic range of the Gila topminnow. This system was stocked with Gila topminnow in 1965, 1975, and 1980 (Minckley 1969, Bagley et al. 1990). The apparent failure of the first two stockings has been attributed to large flood events in 1965-66 and 1978 (Minckley 1969, AGFD files). Sampling by Arizona Game and Fish Department (AGFD) in 1987, 1989 and 1991 found Gila topminnow still surviving at Seven Springs, and in 1989 Gila topminnow were also reported in Cave Creek (Simons 1987, Bagley et al. 1990). Sampling by the U.S. Forest Service (USFS) in December 1990 found Gila topminnow in Cave Creek below the Ashdale Administrative Site.

Project Description

The proposed Quien Sabe fire management treatment would involve conducting a controlled burn on a targeted area of 4,000 acres in T7N, R4E, Sections 11-15, and 22-26, and T7N, R5E, Sections 17-20 and 30 on the Cave Creek Ranger District of the Tonto National Forest. The objective is 60-80 percent burn within the target area. The allowable burn area includes 10,000 acres in T7N, R4E, Sections 10-16, 21-28, 35, and 36, and T7N, R5E, Sections 7-9, 15-22, and 27-30 (Figure 1). The allowable area is that which may be burned if the fire does not act as expected, escapes the predetermined boundaries, and must be brought back under control. A 350 foot buffer zone would be maintained along Bronco Creek, Skunk Tank Canyon, and Matty's Fork. A large, but unquantified, buffer zone would remain unburned along the length of Cave Creek. Some of the steeper slopes along Cave Creek would also not be burned; the number and location of those slopes is unspecified. The project is expected to be carried out in June of 1992. Gila topminnow populations in Cave Creek would be monitored by the USFS following post-fire precipitation events to determine effects of the burn.

The stated purposes of the USFS for the proposed prescribed burn are to improve livestock forage production and utilization on the Cartwright Allotment, increase water yield from the watershed, improve wildlife habitat, and reduce fuel hazard buildup of old-growth chaparral. Herbaceous forage production is expected to be increased by 100 pounds per acre and turbinella oaks are expected to improve in palatability and availability by 60 to 80 percent. Fuel hazard reduction is expected to be achieved by removal of 60 to 80 percent of the brush overstory and manipulation of age classes of chaparral. Wildlife benefits are expected from reduction of brush overstory to diversify the plant community thus increasing the edge effect by 60 to 80 percent, and by rejuvenation of the "browse component" through new sprouting and new growth. Water yield off the watershed is expected to increase by 200 acre-feet per year for the first year, decreasing until negligible after three years. Access for livestock and wildlife is expected to increase due to removal of 60 to 80 percent of the brush overstory.

The project area is bounded by Cave Creek on the north and west, Seven Springs wash on the east and Cottonwood Creek on the south. Upland vegetation in the area is primarily manzanita, turbinella oak, ceanothus, mountain mahogany, catclaw, june grass, hairy and sideoats grammas, curly mesquite, and snakeweed. The dominant tree species along the riparian corridor include cottonwood, sycamore, and walnut.

EFFECTS OF THE ACTION

The proposed Quien Sabe prescribed burn would be expected to have adverse impacts to the Gila topminnow through increased flood severity in the first few years following the burn, increased input of sediment into the stream, and changes in water chemistry. These effects would be exacerbated by the project timing and size, steepness of the project area topography, and potentially by livestock grazing following the burn. Adverse effects would be partially alleviated through preservation of non-burned buffer zones along the streams. The primary effect would be on the Gila topminnow in Cave Creek below the confluence with Seven Springs Wash. However, if the fire exceeds the targeted area and burns into the allowable area, the potential exists for adverse impacts to the Gila topminnow in Seven Springs Wash.

1. Increased Flood Severity.

In general, native Gila River basin fish species are adapted to and thrive under the frequent, severe flooding which is normal to southwestern stream systems (Minckley and Meffe 1987). However, Gila topminnow populations in small, confined streams appear to be relatively susceptible to population reduction or loss during large flood events (Collins *et al.* 1981, Brooks 1986). This apparent inconsistency is due primarily to the degraded conditions existing in many Sonoran desert streams. Degraded aquatic habitat has low complexity, thus providing few areas for fish to shelter from the high velocities and moving bedloads of flood events. Degraded stream channels have less stability and are subject to greater amounts of erosion and changes in stream channel morphology during flooding, resulting in alteration or loss of Gila topminnow habitat.

The proposed Quien Sabe burn would be expected to increase the severity of flooding during the first three years following the burn, a common phenomenon following wild or prescribed fire (Hibbert *et al.* 1974, Ffolliott, *et al.* 1975, Swanston 1991). The USFS hydrologists calculate the pre-burn annual water yield from the area of the proposed burn to be approximately 200-250 acre-feet. The U.S. Geological Survey records (9 years of record) indicate a median yearly discharge of 1,660 acre-feet from the Cave Creek watershed, as measured at Cottonwood Creek just downstream from the lower end of the project area. The estimated increase in yearly watershed yield as a result of the proposed project is 200 acre-feet in the first year; a 100 percent increase in yield from the proposed project area and a 12 percent increase in the median yield of the watershed above the project area. If this increase were spread out as a constant flow over the year it would equal only 0.28 cubic feet per second (cfs). However, it

would not be spread evenly but would tend to be concentrated in a few flood events resulting in peak increases substantially higher than 12 percent (Hibbert et al. 1974, Ffolliott et al. 1975).

Increased flooding and other changes in water yield of the watershed would result in changes in the stream channel (Hibbert 1974, Heede and Rinne 1990). Increased sediment input into the stream channel would also play a role in channel changes. The character of these changes and their impact to Gila topminnow are difficult to predict. However, destabilization of aquatic habitat tends to simplify the ecosystem in the short term. Such simplification may reduce the ability of the Gila topminnow to cope with other effects of the proposed project.

A potential exists for the proposed burn to increase long-term water yield, thus resulting in increased perennial flow in Cave Creek. Such increases in perennial flow have been documented as a result of fire in chaparral habitats in Arizona (Hibbert 1974). However, those increases occurred in areas with higher annual rainfall than the proposed project area. The 12-18 inches annual rainfall in the project area falls below the 18 inches annual rainfall recommended by Hibbert (1983) as the minimum necessary to achieve water yield increases in chaparral by burning. The low rainfall and the clumped distribution of rainfall events in the proposed project area, make it unlikely that a long-term increase in base flows in Cave Creek would result from the proposed burn. If such flow increases did occur, they would result in beneficial effects to the Gila topminnow population, providing the topminnow had not been eliminated by short-term adverse effects. The level of benefit from the flow increases would depend upon the timing of the increases. The increased perennial flows documented by Hibbert (1974) occurred primarily in November through April, while the limiting flows for Gila topminnow tend to be the low flows of early summer.

Overall the increase in water yield and flood severity would be likely to cause substantial adverse impacts to the Gila topminnow population in Cave Creek, particularly if intense storms occur in the area in the first year. The protection of unburned buffer zones along the major drainage channels would be expected to reduce the water yield from the proposed burn (Hibbert 1974) and thus decrease the adverse impacts from increased flood severity.

If the burn enters the allowable area, increases in watershed yield and flood severity would be larger and would affect additional stream areas. If the watershed above Seven Springs Wash is burned, the Seven Springs Wash portion of the population would likely sustain substantial adverse impacts.

2. Increased Sediment and Water Chemistry Alteration.

The proposed burn would be expected to increase sediment input into Cave Creek. Prescribed burns on USFS lands in Arizona have been shown to result in large increases in sediment loads in adjacent streams and washes (Hibbert 1974, A. Medina, USFS Rocky Mountain Forest and Range Experiment Station, pers. comm., September 1991). Like the increased water yield, the

increase in sediment would be largest the first year after the burn, decreasing as the burn revegetates.

Gila topminnow can persist in habitats with high proportions of sand and silt substrates. However, the ash-laden sediment that enters a stream from a burned area is of much different chemistry and finer composition than that resulting from general erosion. High sediment input may result in direct fish mortalities through suffocation, abrasion, and toxic effects (Newcombe and MacDonald 1991, Spencer and Hauer 1991, Swanston 1991). High sediment input also reduces habitat complexity, thus making the Gila topminnow more susceptible to other threats such as flooding, predation, and competition. Runoff and ash deposition from burned areas in the southwest often results in major losses of fish populations (Propst *et al.* In press; J. Stefferud, Tonto National Forest, pers. comm., August 1991).

Large influxes of ash-laden sediment from burned slopes and aerial deposition of ash and smoke into the stream may also indirectly impact Gila topminnow through a variety of effects on the aquatic system. These effects include alteration of water chemistry, smothering of invertebrates and aquatic plants, alterations of productivity, and reduction of surface flow during low flow periods (Newcombe and MacDonald 1991, Spencer and Hauer 1991).

Protection of a "large" buffer along Cave Creek and a 350-foot wide buffer zone along three major tributaries would prevent a large proportion of the sediment washing off the burned slopes from entering the streams. Intact riparian vegetation acts as a filter to stop overland flow of sediment (Medina, pers. comm., 1991; Meehan 1991). However, the proposed buffers include only the major drainage channels. The buffers would reduce overland flow of sediment directly into those major channels, but would not affect the sediment which enters the system through overland flow into minor channels without buffers. These minor channels contribute a large proportion of the sediment (Medina, pers. comm., 1991).

Leaving a significant portion of the steeper slopes along Cave Creek unburned would also reduce the amount of sediment entering the stream, this level of impact amelioration being dependant upon the size and distribution of protected slopes. The steepness of these slopes makes them more susceptible to erosion and their proximity to the stream increases the probability of that eroded material entering the stream. Hibbert (1983) recommends that use of prescribed fire treatment in chaparral be restricted to slopes under 60 percent. The average slope in the proposed project area is estimated at 50 percent with a range from 25 to 80 percent.

3. Effects of Project Timing.

The proposed date for implementation of the Quien Sabe burn has been changed several times due to administrative constraints. At the time of this biological opinion, the burn is planned for June 1992. Implementation of the proposed burn in June may exacerbate the impacts to Gila topminnow. To minimize impacts to the Gila topminnow, burning should be accomplished when the likelihood of major rain events following the burn is lowest and

when the greatest amount revegetation and litter accumulation can be achieved between the burn and the onset of the rainy season. Burning just prior to the onset of the annual rains in July would increase the probability of transport of large amounts of sediment and the magnitude of flood increases, thus increasing the adverse effects on Gila topminnow.

The time of year in which the burn is carried out would affect the completeness of the burn. Relatively low burning temperatures and spottiness of the burn are important in reducing sediment yield (Hibbert 1974; Medina, pers. comm., 1991). Low burning temperatures would leave residual litter, which is thought to be the most important factor in reducing sediment yield. The proposed June burn time would most likely result in a hotter more complete burn due to the dryness and the hotter ambient temperatures.

4. Effects of Project Size.

The proposed Quien Sabe burn, at 4,000 acres, covers a relatively large area, and will affect several miles of Cave Creek. It is within the 3,000-7,000 acre average size burn in chaparral on the Tonto National Forest. However, water and sediment yield rises with increase in area burned. The size of the proposed burn would result in much greater adverse impacts to Gila topminnow than a smaller burn.

5. Potential Indirect Effects from Livestock Grazing.

Neither the BE nor the Plan indicate how soon after the proposed burn the cattle would be allowed back into the burned area and at what stocking rate; however, Patty Fenner, Cave Creek Ranger District Range and Wildlife Staff, indicated in a September 27, 1991 telephone conversation, that they hope to return grazing to the burned area "shortly" after the burn. Without grazing, the burned area is expected to return to approximately pre-burn levels of water and sediment yield after three years. Grazing would decrease accumulation of litter which is thought to be a major controlling factor in water and sediment yield (Orodho *et al.* 1990, Medina, pers. comm., 1991). If grazing is resumed on the proposed project area before recovery occurs, flooding, erosion, and sedimentation effects would be increased.

Summary

Extirpation of the Gila topminnow in Cave Creek may result from short-term effects of the proposed action, including increased flood intensity, sedimentation, and water chemistry alteration. These effects would decrease over time reaching a level after several years which would no longer be adverse to Gila topminnow. The effects would be partially alleviated by the protection of buffer zones and steep stream-side slopes. If the watershed above Seven Springs Wash is burned, the increased adverse effects might result in loss of the entire Gila topminnow population in both Seven Springs Wash and Cave Creek.

Fire is a natural event in chaparral communities and it would be expected that animal species inhabiting chaparral communities would have adaptive mechanisms to survive fire events. This may have been true of Gila topminnow when it was abundant and widely distributed and its habitats were large and interconnected. However, the topminnow has now been confined to tiny remnant habitats each totally isolated from all other Gila topminnow populations. Non-natural conditions, such as degraded habitats, unstable stream channels, and predation and competition with nonnative fish species, exert continuous adverse pressures on the Cave Creek/Seven Springs topminnow population. Under these conditions, the topminnow may no longer be able to survive certain natural events. Conservation of the Gila topminnow, as mandated by the Endangered Species Act, may now be dependant upon human intervention to prevent, alter, or manage those natural events to lessen the adverse effects upon the Gila topminnow and its habitat.

If the Seven Springs population is not directly affected by this action, Cave Creek might be repopulated by Gila topminnow from Seven Springs Wash. However, the long-term viability of the Seven Springs Wash population may be adversely affected by the short-term loss of the habitat in Cave Creek. Gila topminnow are a short lived species with high fecundity. Their populations fluctuate dramatically from year to year and season to season. The availability of habitat outside of the core area, into which the population can expand during peaks in the population cycle, is vital to the long-term survival of the population. The Cave Creek habitat may function as such expansion habitat and reduction or loss of such habitat on even a short-term basis might result in reduction or loss of the Seven Springs Wash population.

The Cave Creek/Seven Springs population of Gila topminnow is one of about 30 existing reintroduced populations of Gila topminnow now existing in the wild. Although the first two stockings were short-lived, the present population has occupied the area for 11 years, making it second in longevity among reintroduced Gila topminnow populations. Over this period, the Cave Creek/Seven Springs population has remained small and fluctuating. Mosquitofish are present in Cave Creek. In a ranking of Gila topminnow reintroduced populations for their importance to the recovery effort, this population is considered to be in the middle. While a significant reduction in or loss of the Cave Creek/Seven Springs Gila topminnow population would not constitute jeopardy to the species as a whole, it would significantly retard recovery of the species.

INCIDENTAL TAKE

Section 9 of the Act, as amended, 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 of fish and wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to, and not intended as part of,

the agency action is not considered a prohibited taking provided that such taking is in compliance with the incidental take statement. The measures described below are nondiscretionary, and must be undertaken by the agency or made a binding condition of any grant or permit issued to the applicant, as appropriate.

The FWS anticipates that the proposed Quien Sabe burn would result in incidental take of Gila topminnow through direct mortality and through habitat destruction and modification. This take cannot be quantified because reliable population estimates of Gila topminnow are not obtainable due to sampling difficulties and the rapid population changes inherent in a short-lived species with high fecundity. Incidental take for this proposed action is anticipated to be a major reduction in or loss of the Gila topminnow population in Cave Creek and possible reduction in or loss of the Gila topminnow population in Seven Springs Wash.

It is normally required that if during the course of the action the amount or extent of the incidental take limit is exceeded, the action agency must reinitiate consultation with the FWS immediately to avoid violation of Section 9. Standard procedures call for operations to be stopped in the interim period between the initiation and completion of the new consultation if it is determined that the impact of the additional taking would cause an irreversible and adverse impact on the species. Because the effects of the proposed Quien Sabe burn would not be known until after the project is completed those requirements are not applicable. To accommodate the all-or-nothing nature of the proposed project, the anticipated incidental take for the Quien Sabe burn has been estimated using a worst-case scenario.

Reasonable and Prudent Measures

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

1. Conduct the proposed Quien Sabe burn in a manner which will minimize direct mortality of Gila topminnow.
2. Conduct the proposed Quien Sabe burn in a manner which will minimize destruction or modification of Gila topminnow habitat.
3. Maintain complete and accurate records 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 USFS is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above.

1. The USFS shall implement the prescribed burn plan as proposed, including buffer zones at least 350 feet wide along Bronco Creek, Matty's Fork, Skunk Tank Canyon, and Cave Creek and exclusion from the burn of a substantial proportion of the steep slopes along Cave Creek. The steep slopes to be excluded from burning shall include, at a minimum, all slopes over 40 percent adjacent to the stream channel. The designated burning boss shall have available on the project site during implementation a map which clearly delineates all areas to be excluded from the burn.
2. If the burn exceeds the targeted area, the USFS shall take all reasonable measures to prevent burning of the buffer zones, including a 350-foot buffer zone on Seven Springs Wash. Protection of these buffer zones shall be a priority exceeded only by protection of human lives and homes.
3. During the proposed action, the USFS shall not remove or divert the discharge of any flowing water or volume of any standing water present in Cave Creek, Seven Springs Wash or any of their tributaries unless necessary to prevent loss of human life.
4. The USFS shall not operate motorized vehicles within the channel of Cave Creek or Seven Springs Wash or in the buffer zones (except on established roads) during action implementation unless necessary to prevent loss of human life. Crossing of streams and washes by motorized equipment shall be done at existing road and trail crossings.
5. The USFS shall monitor the Gila topminnow in Cave Creek and Seven Springs Wash for two years following the proposed action. This monitoring shall include estimates of gross abundance of Gila topminnow, distribution of the species throughout the area from Seven Springs through the downstream boundary of the burn, gross abundance and distribution of nonnative fish species, general habitat condition, and gross changes in stream channel morphology and sedimentation. Photo points shall be set up along the portion of Cave Creek within the burn area. These photo points shall be selected to depict Gila topminnow habitat, the channel morphology within the area, and the condition of the riparian buffer zone. Monitoring of Gila topminnow and photography shall be accomplished at the minimum of once within six months before the burn, immediately after the completion of the burn, one year after the burn, and two years after the burn. Monitoring results and copies of photographs shall be furnished in writing to the FWS within 60 days after completion of each monitoring segment. Monitoring may be conducted by the USFS or by arrangement with Arizona Game and Fish Department or other agencies, organizations, or individuals which hold or obtain appropriate Federal and State permits.
6. The USFS shall prepare a written report on the implementation of the proposed Quien Sabe burn. This report shall include documentation of the actual actions taken during the project and the final outcome,

including a map showing the mosaic of burned and unburned areas achieved. A copy of this report shall be furnished, in writing, to the FWS within 90 days following completion of the proposed action.

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 FWS suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibility for these species.

1. Revise the burn plan to refine the proposed protective measures for Gila topminnow and incorporate additional measures. The revision should be assisted by a team consisting of the FWS fish biologist, Tonto National Forest threatened and endangered fisheries biologist and hydrologist, Al Medina and John Rinne of the USFS Forest and Range Experiment Station, Arizona Game and Fish Department Nongame fish biologist, Cave Creek Ranger District range conservationist and wildlife biologist, and any other appropriate parties. The final plan should be mutually acceptable to all above parties.
2. Move the outside perimeter of the allowable area west from Seven Springs Wash to the top of the ridge between Seven Springs Wash and East Fork. This will minimize the potential for loss of the Gila topminnow in Seven Springs Wash.
3. Conduct the proposed burn in a manner which would leave a mosaic of burned and unburned areas throughout the project area. Unburned areas should comprise at least 40 percent of the target, and if necessary, the allowable area. Slopes over 60 percent should not be burned, unless such burning is found acceptable by the group provided for in Conservation Recommendation 1.
4. Do not conduct the proposed Quien Sabe burn later than June 15. This will help reduce the probability of severe erosional impacts of major rainstorms on exposed soils.
5. Incorporate the proposed Quien Sabe burn into studies currently being conducted by the USFS Rocky Mountain Forest and Range Experiment Station on the effects of burns on sediment transport and aquatic ecosystems. This would allow the losses of Gila topminnow to be partially offset by increased knowledge of the effects of fire on the species and would be valuable in planning addition prescribed burns near Gila topminnow habitats.

6. Do not graze livestock on the burned areas for at least three years after implementation of the burn, or until criteria developed by the group provided for in Conservation Recommendation 1 are met. These criteria should be based upon measurement of variables affecting water and sediment transport, such as vegetation regrowth and litter deposition.
7. Take steps to ensure that no pollutants (other than ash and sediment) enter any washes or streams during action implementation.
8. Minimize actions that would increase erosion and sediment transport in the project area during and following project implementation.

In order for the FWS to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

CONCLUSION

This concludes formal consultation on the actions outlined in the May 9, 1991 request for consultation on the proposed Quien Sabe prescribed burn. As required by 50 CFR 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is reached; (2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

In future communications on this project, please refer to consultation number 2-21-91-F-299. If we can be of further assistance, please contact Sally Stefferud or me (Telephone: 602/379-4720 or FTS 261-4720).

Sincerely,



Sam F. Spiller
Field Supervisor

cc: Director, Arizona Game and Fish Department
Regional Director, Fish and Wildlife Service, Albuquerque, NM
(FWE/SE)
Director, Fish and Wildlife Service, Washington, D.C. (HC)
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FIGURE 1. PROPOSED QUIEN SAGE
 PRESCRIBED BURN
 Cave Creek Ranger Station, Tonto
 National Forest, Maricopa Co., AZ

