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In Reply Refer To:
AESO/SE
2-21-95-F-046

November 22, 1995

MEMORANDUM

TO: Superintendent, Papago Indian Agency, Bureau of Indian Affairs, Sells, Arizona

FROM: Field Supervisor

SUBJECT: Biological Opinion on the Proposed Two Hills Housing Project

The U.S. Fish and Wildlife Service has reviewed the biological evaluation (BE) and measures that will be taken to avoid and minimize impacts to listed species for the proposed Phase I housing development in the Two Hills area located on the Tohono O'odham Nation, San Xavier, Arizona. Your October 10, 1995, request for formal consultation was received on October 12, 1995, along with the BE. This document represents the Service's biological opinion on the effects of that action on the Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.).

This biological opinion is based on information provided in the March 22, 1995, BE, the October 10, 1995, proposed measures to minimize impacts, telephone conversations, field investigations, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, the construction of subdivisions and its effects, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

It is the Service's biological opinion that the proposed Two Hills housing development project is not likely to jeopardize the continued existence of the Pima pineapple cactus.

CONSULTATION HISTORY

Informal consultation regarding this project began with a request for information on proposed housing developments on the Tohono O'odham Nation, received in our office on October 31, 1994. The Service responded by submitting a species list and comments regarding other general concerns on November 25, 1994. Subsequent information on the project was submitted through the mail and through telephone conversations and meetings. A site visit occurred on September 8, 1995. A request for formal consultation on the project dated October 10, 1995, was received in this office on October 12, 1995 and an acceptance notification was sent on October 31, 1995.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The Tohono O'odham Housing Authority is proposing to construct homes on 22 lots and associated road alignments as part of Phase I of the proposed Two Hills Development in the San Xavier District of the Tohono O'odham Nation. The proposed development includes approximately 12 acres within the Arizona Upland subdivision of the Sonoran Desert. Five plants are known to occur in the area of the proposed development and the following measures will be implemented to minimize impacts to Pima pineapple cactus. Two plants are located outside of the immediate area of development. These plants will be fenced and clearly marked during construction to avoid disturbance. Fences will be removed upon completion of construction and the plants will be monitored periodically by qualified personnel on a biannual basis. The three plants that are located within the development site will be transplanted into open space prior to the commencement of construction. A biologist qualified and experienced in cactus transplantation will handle the transplanting. To minimize root infections, the cacti will be bare-rooted and left in a shady place for at least two weeks before they are replanted. The replanted cacti will be watered. Any proposed supplemental planting or reseeding will be with native vegetation.

STATUS OF THE SPECIES

Pima pineapple cactus was listed as an endangered species on October 25, 1993. Critical habitat was not designated. The final rule listing the species as endangered was published September 23, 1993 (58 FR 49875). Factors which contributed to this listing included habitat loss and degradation, habitat modification, distributional sparsity and rarity of plants, illegal collection threats, and difficulties in providing protection of an area large enough to maintain a functioning population. Biological information below is summarized from the proposed and final rules, and other sources as noted.

Pima pineapple cactus is a hemispherical succulent plant that may grow as a single-stemmed or multiheaded individual with the adults measuring 4-7 inches tall and 3-4 inches in diameter. This plant may also grow in clusters resulting from seed germination near the parent plant or the rooting of a tubercle at the base of the parent plant. Each spine cluster has one strong, straw-colored, hooked central spine and six radial spines (Benson 1982). Yellow flowers typically appear in mid-July with the onset of summer rains. The fruits are green, sweet, and succulent and disappear rapidly from the plant (Mills 1991). The disappearance of individuals over a short, three-year period in which monitoring was conducted indicates that individuals may be short-lived (Mills 1991).

Pima pineapple cactus is found between 2,300 and 5,000 feet elevation in Pima and Santa Cruz counties, Arizona, and in northern Sonora, Mexico (Phillips et al. 1981). The range extends east from the Baboquivari to the Santa Rita and Patagonia Mountains. The northernmost boundary is near Tucson with the southern boundary of the range extending into northern Sonora. The

species is rare within this range and suitable habitat within the area is not uniformly located. Pima pineapple cacti grow in alluvial basins or on hillsides in rocky to sandy or silty soils in semidesert grassland and Sonoran desertscrub. The species occurs most commonly in open areas on flat ridgetops or areas with less that 15 percent slope, primarily occurring at less than eight percent slope. Total population estimates and estimates of suitable habitat for this species are poorly assessed due to the difficulty of finding this species in the field. Dominant plant species in these habitats vary but include white-thorn acacia, desert hackberry, mesquite, burrobush, snakeweed, burroweed, nonnative grasses such as Lehmann's lovegrass, and various cacti (Mills 1991). These plant species should not necessarily be considered as associates as many of them are indicative of the poor land management regimes at many Pima pineapple cactus sites.

Urban development associated with the rapidly expanding Tucson/Green Valley/Nogales corridor is the most significant cause of habitat loss for Pima pineapple cactus and has resulted in direct mortality of hundreds of plants. Mining has also resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of this species. Much of the mining activity has been occurring in the Green Valley area which is the center of this plant's distribution. In the future, habitat loss due to urbanization, mining, and associated activities is expected to continue, and likely increase, throughout the range of the species.

Illegal collection of this species has been documented on a number of occasions. Some incidents indicate that collectors are interested specifically in Pima pineapple cacti while other incidents indicate an indiscriminate collection of all native cacti in the immediate area.

Currently, most of the range of Pima pineapple cactus outside of rapidly urbanizing areas is used for livestock grazing. Extreme overgrazing accompanied by severe drought at the turn of the century, and some continuing poor livestock management practices have significantly altered the grassland/desert scrub ecosystem upon which Pima pineapple cactus depends. Habitat effects of livestock overuse include erosion, hydrologic and microclimatic changes, invasion or expansion of woody perennials and exotic vegetation, and shifts in the composition, density, relative abundance, distributional mosaics and vigor of native plant species. Some range management practices such as imprinting, chaining, ripping, and seeding of nonnative grasses have contributed to the modification and loss of habitat and the loss of plants. Overgrazing in some areas continues today. The extent to which grazing is altering the existing vegetation, disrupting nutrient cycling, or altering the edaphic (stability and water infiltration ability) basis of the system by damaging natural microbiotic and cryptogamic crusts over the soils at Pima pineapple cactus sites is not known; however, long-term grazing in arid environments results in these direct and indirect ecosystem impacts (Schlesinger et al. 1990, Fleischner 1994). The indirect effects of overgrazing are less apparent; however, these effects may be serious and prohibit the continued sustainability of Pima pineapple cactus populations. This species' interactions with other plants is also poorly understood. The extent to which other plants may act as "nurse plants," providing shelter from predation, shading, a favorable microclimate for seedling germination and establishment, higher nutrient levels or other favorable edaphic factors has not been fully investigated (Barbour et al. 1979, Nabhan 1987).

The spread of nonnative plant species such as Lehmann's lovegrass and Mediterranean grass has altered the compositional structure of the grassland ecosystem upon which Pima pineapple cactus depends. Because these nonnative plants grow in denser, more contiguous patches, fire movement through this habitat has been drastically altered. While the historic grassland communities were subject to fire on a regular basis, the grass species were not distributed as contiguous stands but were widely separated mosaics upon the landscape. This allows for openings not subject to wildfires. Cacti located in the more open areas would not be as susceptible to both direct damage from fire nor the later predation by animals such as javelina. Javelina prey on Pima pineapple cacti that escape fire when their barrel cacti food source is removed by fire.

Although there appears to be considerable habitat available for Pima pineapple cactus, the low density and patchy distribution of plants within that suitable habitat results in small populations that are becoming increasingly isolated as urban development, mining, and other commercial activities continue to destroy the species' habitat. Habitat modification through activities such as overgrazing and the introduction of nonnative grasses with the subsequent fire movement alteration has also modified habitats to the extent that those systems may no longer support a sustainable population of Pima pineapple cactus. Unlike many cacti, the available information suggests that Pima pineapple cactus may be short-lived (Mills 1991) and repeated disturbances to any area may prevent recruitment and eliminate that population. Additionally, Pima pineapple cactus is an obligate outcrossing species. Given that, plant distribution must be sufficiently close as to allow for pollinator access and cross pollination. Outcrossing success is dependant on areas of contiguous habitat and density of individuals.

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 previously noted threats to Pima pineapple cactus are continuing. Each year, urban development in the Green Valley/Tucson area results in the loss of individuals and further fragments habitat and isolates populations. Mining activities within the Green Valley area are also continuing. Plants have been lost to construction of infrastructure facilities, housing developments, and prescribed burns. Estimates on individuals lost or acres of habitat destroyed are difficult because many of the actions are private and not subject to section 7 review. Reservoir development for water storage and recreation in the Tucson area will directly impact up to 145 plants; however, hundreds more will likely be lost as the area surrounding the proposed reservoir urbanizes with multiple housing subdivisions and associated commercial enterprises.

EFFECTS OF THE ACTION

The direct effects of the proposed action include direct and indirect impacts to five Pima pineapple cactus plants. Two plants have the potential to be affected by indirect effects from the construction of homes including hauling trucks, increased dust and traffic in the area. Three of the plants will be directly impacted by being dug up and transplanted with all the associated effects that may add to the stress factors on the plant and possibly cause its death.

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 that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of ESA.

As described previously, development within the range of Pima pineapple cactus can be expected to increase. Private lands not presently developed are likely to become urbanized or subject to mining activities. Both State and private lands will likely to continue to be subject to livestock overuse.

CONCLUSION

After reviewing the current status of Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed housing development and the cumulative effects, it is the Service's biological opinion that the housing development, as proposed, is not likely to jeopardize the continued existence of Pima pineapple cactus. No critical habitat has been designated for this species; therefore, none will be affected.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's section 7(a)(1) responsibility for this species. Actions proposed as part of the proposed project are not included here. The Service recommends the following actions:

1. Explore and develop opportunities to further educate Tribal members on the significance and uniqueness of Pima pineapple cactus and the desert ecosystem upon which it depends.

2. Continue to maintain the protection provided for Pima pineapple cactus as resolved by the Tribal Council of the Tohono O'odham Nation of Arizona.

3. Continue to avoid impacts and provide for recovery of Pima pineapple cactus on tribal lands.

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

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is 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 instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate and commend the Tribe's willing cooperation in caring for and conserving the Pima pineapple cactus on this project. For further information please contact Lorena Wada or Angie Brooks. Please refer to the consultation number 2-21-95-F-046, in future correspondence concerning this project.

Sam F. Spiller

cc: Chief, Fish and Wildlife Service, Arlington, VA (DES)
Regional Director, Fish and Wildlife Service, Albuquerque, NM (GM:GSV/LCR)

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