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DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
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September 11, 1995

In Reply Refer To:
AESO/SE
2-21-95-F-089

MEMORANDUM

TO: Area Manager, Phoenix Area Office, Bureau of Reclamation, Phoenix, Arizona

FROM: State Supervisor

SUBJECT: 95004622 8111: Sahaurita Unified School District

The U.S. Fish and Wildlife Service has reviewed the project plans for the above noted activity located in Pima County, Arizona. Your request for formal consultation was received on June 23, 1995. This document represents the Service's biological opinion on the effects of that action on Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended, (16 U.S.C. 1531 et seq.).

This biological opinion is based on information provided in the May 26, 1995, biological assessment, the July 3, 1995, attachment refining the project description, conversations with Diane Laush (Reclamation) and Peter Livingston (SWCA, Inc.) during a June 23, 1995, meeting, 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 building of a wetlands 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 wetland construction for the Sahaurita Unified School District is not likely to jeopardize the continued existence of Pima pineapple cactus.

CONSULTATION HISTORY

This consultation request began with a request for information on natural resources from the Sahaurita Unified School District on November 28, 1994. On May 26, 1995, the Bureau of Reclamation provided the Service a copy of the biological assessment for the proposed constructed wetland project. Reclamation is providing a \$14,500 grant to the Sahaurita Unified School District for the construction of a pilot wetland. A "will not adversely affect"

determination was made by Reclamation for the project's effect on Pima pineapple cactus. The Service did not concur with this determination. On June 23, 1995, the Service received the request for formal consultation regarding this project. On July 3, 1995, Reclamation provided the Service a more detailed project description which provided specific information on minimization of impacts to Pima pineapple cactus.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The following summary of the proposed action is developed from project descriptions provided in the biological assessment and the addendum to this assessment. The proposed action is to construct a pilot wetland to assess the feasibility of constructing a wetland for the treatment of wastewater generated by three Sahaurita Unified District schools at the Helmet Peak Road site. These schools are presently using 19 septic systems. The pilot wetland project will test the feasibility of this method of wastewater treatment by first treating only wastewater generated by the school gymnasium.

The pilot constructed wetland will include two treatment cells and a disposal cell. These wetland cells will be excavated basins filled with rock material and planted with cattails, bulrushes, cottonwoods, and willows. Surface runoff to surrounding areas will be prohibited by berms. The sites for the cells were chosen based on previous disturbance (use of the area as a fill disposal lot) and the mandated minimum distance of 50 feet from any natural washes. Federal project funds will also be used to construct educational amenities, a shade structure, informational display, and a storage shed.

The proposed location for the pilot constructed wetland is within the northwest corner of existing disturbed school property. Actual area to be disturbed is estimated at one-quarter acre. According to the biological assessment, the project site occurs within the Semidesert Grassland biome of the Grassland formation of Brown (1994). Dominant vegetation includes both native and nonnative grasses, creosote bush, mesquite, Opuntia species, barrel cactus and turpentine bush. One individual of Pima pineapple cactus is found within the project site.

The biological assessment and its addendum note the following measures to minimize impacts to Pima pineapple cactus. The cactus will be transplanted to an area designated for an educational display. This display will be located south of the constructed wetland in an area of at minimum 200 square feet. Other cacti and native plants salvaged from the proposed wetland site will also be relocated to this area. Transplantation techniques include marking the plant prior to transplantation with flagging on its southern edge to ensure appropriate reorientation during transplantation. The cacti will be transplanted by lifting the entire root system to maintain an intact root ball. Relocation of the cactus will be done immediately and watering will be kept to a minimum to avoid root-rot. The initial post-transplantation watering will include a vitamin B-1 solution. Portions of the root system exposed to air will be dusted with sulphur. Activities

involved in the proposed construction of the wetland will be documented in an educational brochure that will include a section on the protection and value of endangered plants. The narrative for this section will focus primarily on Pima pineapple cactus. An enlargement of this brochure will be mounted on the outdoor classroom display.

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 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 indicates that individuals may be shortlived (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 than 15 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, burrobrush, 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 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 potentially 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

plants 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 indiscriminant 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 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 shortlived (Mills 1991) and repeated disturbances to any area may prevent recruitment and eliminate that population.

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

Only one individual is presently known to occur within the project area. Transplantation success for this species is still somewhat questionable as long-term monitoring of transplants has not been completed. It is likely that a functional population of Pima pineapple cactus was present on the school property prior to development and use of the project site as a fill disposal area. It is possible that this individual and its genetic representation will be lost if transplantation efforts fail. The habitat for Pima pineapple cactus at the site will be permanently lost and converted into a wetland.

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 the 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 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 pilot wetland construction, and the cumulative effects, it is the Service's biological opinion that the pilot wetland construction, as proposed, is not likely to jeopardize the continued existence of the 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. Develop and implement monitoring of transplantation success, flowering, and fruit production of the Pima pineapple cactus individuals and other transplanted cacti. The monitoring procedures should include student participation in monitoring and reporting and be conducted over a 3-5 year period. Provide a yearly monitoring report to the Service.
2. Add a concise discussion of collection threats for rare cacti to the educational brochure being developed.
3. Add a concise discussion of the functioning and value of desert ecosystems to the educational brochure being developed.

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 actions 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.

For further information please contact Angie Brooks or Tom Gatz. Please refer to the consultation number 2-21-95-F-089, in future correspondence concerning this project.

A handwritten signature in cursive script, reading "Sam F. Spiller".

Sam F. Spiller

cc: Chief, Fish and Wildlife Service, Arlington, Virginia (DES)
Regional Director, Fish and Wildlife Service, Albuquerque, NM (AES)
Plant Program Manager, Arizona Department of Agriculture, Phoenix, Arizona
Director, Arizona Game and Fish Department, Phoenix, Arizona
Peter Livingston, SWCA Inc., Tucson, Arizona

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