



# United States Department of the Interior

## U.S. Fish and Wildlife Service

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In Reply Refer To:

AESO/SE  
2-21-99-I-190

May 13, 1999

### Memorandum

To: Area Manager, Bureau of Reclamation, Phoenix, AZ (Attn: Bruce Ellis)

From: Field Supervisor

Subject: Biological Opinion for the Construction of San Xavier CAP-Link Pipeline

The U. S. Fish and Wildlife Service (Service) has reviewed the December 11, 1998, biological assessment (BA) for the proposed San Xavier Central Arizona Project (CAP) Link Pipeline to construct 5.6 miles (9.0 kilometers) of pipeline to the San Xavier District's retired agricultural lands. The proposed pipeline is located in Sections 26, 23, 14, 11, and 2, T16S, R13E, and Sections 35 and 34, T15S, R13E, Pima County, Arizona. This document represents the Service's biological opinion on the effects of the proposed action on Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) (PPC) in accordance with section 7 of the Endangered Species Act of 1973, as amended (ESA). The Bureau of Reclamation (BR) has determined that no other threatened and endangered species will be affected by the proposed pipeline.

This biological opinion is based on information provided in the December 11, 1998, biological assessment, telephone conversations with Diane Laush, Wildlife Biologist, Bureau of Reclamation and a field visit to the proposed project site on April 8, 1999, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all the literature available on the PPC, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at the Service's Arizona Ecological Services Field Office, 2321 West Royal Palm Road, Suite 103, Phoenix, Arizona, 85021. A summary of this biological opinion is included as an attachment.

### CONSULTATION HISTORY

Informal consultation regarding this project began between BR (Diane Laush) and the Service (Angie Brooks) with an early November, 1998 informal telephone conversation.

On December 11, 1998, the Bureau of Reclamation hand delivered a Biological Assessment (BA) for the Construction of the CAP Link Pipeline on the San Xavier District of the Tohono O'odham Nation. The Service misplaced the BA and requested an additional copy pursuant to a conversation between Mike Wrigley (Service) and Diane Laush (BR) on March 1, 1999.

On March 3, 1999, the Service received the additional copy. BR was informed that work on this consultation would be completed as soon as possible.

Because the proposed project involves delivery of CAP water within the Santa Cruz River subbasin, the Service has evaluated it for consistency with the ongoing formal consultation regarding the potential for CAP water delivery in the Santa Cruz subbasin to introduce and spread nonnative aquatic species. The BR has assured the Service that although the proposed agricultural lands are very close to the most downstream of the potential sites of the fish barriers BR is planning to construction as part of the effort to control invasion of nonnative aquatic species via CAP, all of the proposed delivery to the San Xavier District through the CAP-Link pipeline would occur in areas that drain into the Santa Cruz River below the proposed barrier site. In addition, BR has stated there will be no excess water from that delivered to the San Xavier District and therefore there will be no return flows or sumps. Under these conditions, the proposed CAP-Link project is consistent with the ongoing formal consultation on nonnative aquatic species. Any future changes in the proposed delivery or usage of CAP water via the CAP-Link project may require further evaluation for effects to listed species from nonnative introduction and spread.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF PROPOSED ACTION**

The proposed project is to fulfill the Southern Arizona Water Rights Settlement Act of 1982 (SAWRSA) P.L. 97-293 commitments by distributing CAP water to rehabilitated agricultural lands on the San Xavier District. The project is located on the eastern edge of the San Xavier District of the Tohono O'odham Nation, in Pima County (Figure 1). The proposed 5.6 mile (9.0 kilometers) underground pipeline will originate north of Pima Mine Road and terminate on Tohono O'odham owned farm land; delivering water from the CAP to agricultural lands on the San Xavier District. The pipeline would connect to San Xavier turnout No.2 located on the CAP Reach 6 pipeline and angle in a northeasterly direction for approximately 2,900 feet (884 meters) to Interstate 19. The pipeline will continue north along the east side of I-19 (immediately adjacent to the I-19 right-of-way fence (ROW) for approximately 4.25 miles (6.8 kilometers), at which point it will be attached to a 52 inch (132 centimeter) casing (under the freeway) on the west side of the road. The pipeline will continue for approximately 3,900 feet (1,189 meters) to its terminus on retired agricultural land. The pipeline will be constructed of reinforced concrete (optional steel) and sized between 36 to 44 inches (91 to 112 centimeters) in diameter. The ROW will be 100 feet (30 meters) wide. The ROW will be used for the pipeline excavation, placement of side-cast soil, and two-way construction traffic. Prior to clearing the ROW for construction, one survey will be conducted for PPC. The narrow ROW limit will help reduce project impacts to PPC. No cacti will be destroyed as a result of this project and four PPC will be relocated. PPC will either be transplanted outside of the ROW or in the

District's cacti reserve lands. The pipeline ROW construction will be re-contoured to pre-project conditions. After completion of the project, a small maintenance road will be maintained. All other construction areas will be revegetated with a native seed mix. PPC will be further protected by fencing and monitoring during construction. The Service's recommended protocol for the relocation, transplanting, and monitoring PPC is as follows:

### **Relocation**

Since this species is generally distributed in clusters and the population distribution pattern may be important for successful pollination, spatial considerations were developed to mimic the population's pre-project distribution. This plant is dependent on some array of flying invertebrate pollinators, most likely various solitary bees, and honey bees and PPC can not self-pollinate. It is not known if the pollinators' ability to achieve successful pollination will be impacted by the relocation or any other element related to the proposed project, so spatial considerations must be accounted for in relocations.

### **Transplanting**

Solar orientation of each cacti will be noted and clearly non-permanently marked. Each plant will be dug up so that any damage to roots will be minimized [6 to 8 inches (15 to 20 centimeters) deep under each plant]. Damaged roots will be lightly pruned and dusted with powdered sulphur. Plants will be hardened off in a shaded and airy location and protected from rodents for at least ten days. Following the "hardening off" period, each cactus will be transplanted into a suitable area. Each cactus will be reoriented to its original solar orientation as determined prior to removal. Each cactus will be planted to the same depth as it grew in its original location and soil will be pressed firmly around the cactus roots and base. Irrigation requirements will be determined during post-transplant monitoring. Transplanting will be avoided during active flower and fruit production (from the first rain from June 15 to November 1 that is measured as greater than 3 millimeters (0.1 inch).

### **Monitoring**

PPC will be monitored for two years following transplants. The monitoring objective is to determine transplant and reproductive success. Criteria for evaluating transplant success include transplant survival, evidence of new, above ground biomass related to plant vigor, determination of fruit set, and evidence of recruitment of new seedlings. The following monitoring actions are provided to assess transplant success within a short-term interval (six months) and over a longer period of time (annually, for a two-year period). The two-year monitoring period should be conducted to assess the success by observed survival of individual cacti because, PPC can live completely on stored reserves for up to two years prior to exhibiting mortality (Bunting *et al.* 1980).

### **Short-term monitoring**

Prior to transplant, the largest diameter of a plant cluster from tubercle tip to tubercle tip (not including the length of the center spine) will be recorded. Locations of the transplanted PPC individuals will be recorded and permanently marked. The mean distance to the nearest neighbor

will be calculated for pre- and post-transplant conditions. After transplant, PPC will be monitored monthly for six months. Monitoring will record general conditions of the total population as well as individual PPC conditions.

#### **Long-term monitoring**

Monitoring actions within the six month period are aimed at identifying direct impacts associated with transplant and not aimed at determining indirect impacts related to or caused by the proposed project. The two year annual monitoring following transplant may increase the likelihood of observing factors that could have indirectly impacted transplant success by showing negative trends in the data over the longer interval allowed for observation. Following the six month monitoring, long-term monitoring will be done twice annually pre- and post-monsoon season for two years. The post-monsoon monitoring will record the largest diameter and estimate seed production to observe and consider the long-term effects of transplant.

#### **STATUS OF THE SPECIES (RANGE-WIDE)**

The final Federal rule listing PPC as endangered was published September 13, 1993, (58 FR 49875); no critical habitat has been designated. Factors contributing to listing included habitat loss, degradation, and fragmentation; distribution characteristics and plant rarity; illegal collection and other threats; and difficulties in providing protection of an area large enough to maintain a functioning population. The biological information summarized below is from the proposed and final rules and other sources.

PPC is a low growing, hemispherical cactus with individuals varying in stem diameter from 2.0 to 8.3 inches (5.1 to 21.0 centimeters) and height from 1.8 to 18.0 inches (4.6 to 46 centimeters). Individuals are considered adults when they exhibit the ability to reproduce shown by the presence of flowers. Plants can be either single or multi-stemmed with yellow flowers blooming with the summer rains. Clusters of PPC stems are formed primarily from vegetative clones produced at the plant base (Benson 1982, Roller 1996). A diagnostic characteristic of this taxon is the presence of one stout, straw-colored, hooked central spine. Radial spines extend laterally around the central spine and average 10 to 15 spines on large cacti and six on small cacti (Benson 1982).

PPC occurs south of Tucson in Pima and Santa Cruz counties, Arizona, and in the adjacent northern State of Sonora, Mexico. It is distributed throughout the Altar and Santa Cruz valleys and low-lying areas connecting the two valleys. PPC grows on gentle slopes of less than 10 percent and along the tops of alluvial bajadas between the basins and the steep, rocky slopes. PPC is found between 2,362 and 4,593 feet (718 to 1,400 meters) in elevation (Phillips *et al.* 1981, Benson 1982, Ecosphere Environmental Services, Inc. 1992) in vegetation characterized by Brown (1982) as both the Arizona upland subdivision of the Sonoran Desert scrub and semi-desert grasslands.

Groups of flowers begin to bloom for single day periods following five to seven days after the first monsoon rains. Flowering is triggered by as little as 0.04 inch (1.0 centimeter) of precipitation. Flowers begin opening in mid-morning and close at dusk. Adult plants bloom (single flowers or groups of flowers) one to three days each year, generally finishing by the end of August. Cross-pollination produces significantly more viable seed than self-pollination. Fruits mature within two weeks following successful pollination. Germination has been observed in the field during the summer monsoon season (Roller 1996).

The seedling size class of PPC ranges in diameter from 0.3-0.4 inch (0.8-1.0 centimeter) after their first year's growth following the summer monsoons. Sub-adult classes are larger than seedling classes, but are not reproductively active and generally are less than 2.0 inches (5.0 centimeters) in diameter when measured after the summer rains (Roller 1996).

The establishment phase of PPC may be the stage that limits recruitment into populations. Evidence includes the abundance of flowers, fruits, and viable seed, and the rarity of seedlings at different sites throughout the plant's range (Roller 1996). Other research has documented the establishment phase of other Sonoran cacti species as being critical for survival to reproductive maturity (Steenbergh and Lowe 1977).

PPC habitat that supports relatively dense, successfully-reproducing populations with high plant vigor often occur in the transition zone between Sonoran desert scrub and semi-desert grassland. Because the populations are healthier in this transition zone, conservation within these areas is very important (Roller and Halvorson in press).

Habitat containing vigorous, dense populations of PPC is not uniformly distributed throughout the plant's range. Plant abundance and available habitat have been roughly estimated based on elevation, topography, and range boundaries. A more advanced, technical approach would provide more reliable habitat and range information. PPC distribution is patchy and widely dispersed and densities are highly variable. Relatively high densities have been documented at three sites. Two of these sites are very small; plant densities range from three to one plant per acre. Densities across the majority of the plant's range has been documented to vary between 0.05 and 0.2 plant per acre (0.02 to 0.08 plant per hectare) (Mills 1991, Ecosphere 1992, Roller 1996).

Land surrounding and including parts of the communities of Green Valley and Sahuarita, as well as parts of the San Xavier District of the Tohono O'Odham Nation, support one of the two largest and most extensive PPC populations remaining in southern Arizona today. The second large population occurs on the King Anvil Ranch, on State lands located along the northern edge of the Altar Valley near the Three Points community.

Within the Green Valley/Sahuarita PPC populations, habitat loss and fragmentation primarily due to urbanization and mining is occurring at a rapid rate, particularly within the last three years. This area is critical for conservation. Habitat fragmentation may be an important limiting

factor for reproduction of this species. The distance between plants must not exceed a distance that would preclude transfer of pollen among cactus by pollinators. Viable seed is initiated by out-crossed pollination in this taxon. Residential development within and surrounding Green Valley is expected to increase in the future. Habitat losses will likely double within the next three years based on documentation from 1993 to 1995 (Margaret Livingston, pers. comm.; Roller 1996) and proposed, future development.

Threats due to residential and mineral development directly and immediately impact individual PPC, alter vegetation habitat and structure, geomorphology, local soil properties, and alluvial watershed characteristics. PPC will not likely survive such activities, nor will populations recover within project areas.

Overgrazing by livestock, illegal collection, and fire-related interactions involving the introduced exotic Lehmann lovegrass (*Eragrostis lehmanniana*) are additional threats that negatively affect PPC populations (U.S. Department of Interior 1993). The effects of these threats are not easily separated from compounding factors such as potential climatic changes and urbanization (McPherson 1995). It is unknown if the majority of PPC populations can be sustained given the current condition of plant communities throughout the range of this species. A critical need exists to define what is limiting this plant's distribution under current habitat conditions.

## ENVIRONMENTAL BASELINE

The following analyzes the effects of past and on-going human and natural factors leading to the current status of the species, its habitat (including designated critical habitat), and ecosystem within the action area. 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.

### Status of the species in the project area

The San Xavier District of the Tohono O'odham Nation is predominately undeveloped. Residential areas are confined to the northeastern portion of the District, as are retired and existing agricultural fields. The remaining acreage is relatively undisturbed native desert lands.

The proposed project area consists of Semidesert Grassland between 1,500 feet (457 meters) and 5,000 feet (1524 meters). The project area is predominately flat and subject to seasonal flooding at or below 3,000 feet (914 meters), or on deep soils of smooth or gently rolling hills above 4,000 feet (1219 meters) (Ecosphere 1992). The Semidesert Grassland is "potentially a perennial grass-shrub dominated landscape, positioned between desert scrub below and evergreen woodland, chaparral, or plains grassland above" (Brown 1982). Most Semidesert Grassland is not composed of prairie-like landscapes; instead, the grass cover is reduced by encroachment of a wide variety of shrubs, trees, and stem succulents. In some areas trees, shrubs, cacti, and forbs

may outnumber or completely replace grasses (Brown, 1982). Vegetation within the proposed project area varies widely. The southern 0.5 mile (0.8 kilometers) of the project ROW consists of relatively dense mesquite (*Prosopis velutina*), paloverde (*Cercidium microphyllum*), and saguaro (*Carnegiea gigantea*). This portion of the alignment contains the highest density of shrub and groundcover. Northward along the alignment, vegetation becomes less dense until reaching the central portion of the alignment, where vegetation is very sparse with almost no groundcover. The few trees present are small paloverde. Along the northern half of the alignment, vegetation is not as dense as the beginning of the alignment. The extreme northern end of the alignment is retired agricultural land and consists of sparse, scattered scrub mesquite and paloverde. Dominant shrubs throughout the alignment include triangle-leaf bursage (*Ambrosia deltoidea*), four-wing saltbush (*Atriplex canescens*), creosotebush (*Larrea tridentata*), and cholla (*Opuntia* spp.) species.

The project area occurs within PPC habitat, with almost half the project located in retired agriculture areas, along small washes, or in low-lying areas vegetated with dense, tall grass. Surveys conducted by BR personnel on July 14, August 21, and December 4, 1998, identified five PPC within the ROW. On April 9, 1999, another PPC was found, 200 feet (61 meters) north of the alignment after it crosses I-19. It is within the ROW, in the southern portion of the project area. All PPC are located in the southern portion of the alignment which has the highest vegetation density and diversity.

Two of the five cacti occur approximately 50 feet (15 meters) outside of the ROW corridor boundary. One plant is located along the perimeter of the ROW and most likely can be avoided during construction. The remaining three cacti are located close to the ROW centerline and would be impacted by construction.

## EFFECTS OF THE ACTION

Construction activities will require transplantation of four PPC. The other two PPC in the ROW are outside of the project footprint and will not be affected. The proposed action will also result in the loss of 68 acres (27.5 hectares) of PPC habitat. This represents a very small loss of habitat relative to the species range, which extends east from the Baboquivari Mountains to the western foothills of the Santa Rita. Proposed conservation measures in the BA will minimize the impacts to three PPC's. Limiting the width of the ROW will help reduce the direct impacts to the PPC in the project area by minimizing the total acreage of disturbed soil. Prior to construction of the pipeline, a crew will conduct ground surveys for any newly undetected PPC. The District has prior experience in transplanting PPC and has expressed a high priority for protecting this species. Implementing the monitoring plan to assess transplant success for a minimum of two years is recommended. Indirect effects from the proposed project will be a minor increase in traffic along the pipeline ROW for periodic maintenance. This additional maintenance is anticipated to be minimum impact to the PPC due to the low frequency of visits. Although the project area is enclosed by fencing, the potential exists for trespass for illegal cactus collection

and off- road vehicle (ORV) use. Additional security should be implemented for a period of time after pipeline construction and reclamation is complete to ensure protection of any relocated cacti within the project area.

Rehabilitation of agricultural lands on the San Xavier District is likely interrelated and/or interdependent to the proposed action because such rehabilitation of lands would not likely occur but for the proposed action. Effects of rehabilitating these agricultural lands are considered effects of the action (SO CFR 402.02); however, because these lands are disturbed habitats, no PPC are expected to occur there. As a result, rehabilitation of the agricultural lands is not expected to effect PPC or its habitat.

## **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.

The potential for off-road vehicle use, cattle grazing, future additional pipelines and maintenance facilities, and illegal plant collecting in the project area will have cumulative effects on the PPC. Much of the habitat and individual cacti are at significant risk of destruction and habitat degradation.

Urban development in this geographic area can be expected to increase. The Tucson Green Valley corridor has been experiencing accelerated growth and development in recent years. Private lands not presently developed near the action area are likely to be developed soon. State lands adjacent to the project area may be sold or leased for purposes that may result in impacts to PPC. Private and State lands are subject to cattle grazing which results in reduced habitat values for PPC. ASARCO, Incorporated is expanding their mining operation located just west of the project area. This proposed expansion is expected to impact approximately 1,300 acres (515 hectares) of land. This area likely once served as PPC habitat; however, it now appears to be unsuitable due to human disturbance.

## **CONCLUSION**

After reviewing the current status of the PPC, the environmental baseline for the action area, the effects of the action, and the cumulative effects, the proposed CAP- Link pipeline is not likely to jeopardize the continued existence of the PPC. No critical habitat has been designated for this species, therefore, none will be affected. The Service's biological opinion is based on the following:

1. The proposed action would only affect four PPC, and these would be transplanted off-site.
2. The proposed action would only affect 68 acres (27.5 hectares) of PPC habitat, which is a very small percentage of the habitat of this species.
3. The proposed action includes mitigation measures to minimize the effects of the action.

### **INCIDENTAL TAKE STATEMENT**

Section 7 (b)(4) and 7 (o)(2) of the ESA do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that ESA requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

### **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 project are not included here. The Service recommends the following actions:

1. Monitor closure of ROW for illegal off road vehicle use to ensure further protection for the PPC.
2. Coordinate with the Service on any future, activities proposed to occur within PPC habitat.
3. Salvage and transplant native plants, as practicable, from the area proposed for the pipeline construction to be placed back onto the original habitat.
4. Explore and develop opportunities to further educate Tribal members on the significance and uniqueness of PPC and the desert ecosystem upon which it depends.
5. Use the Service's protocol for transplanting PPC, as described herein.

**REINITIATION NOTICE**

This concludes formal consultation on the proposed action outlined in the request. As provided in CFR 50 402.16, reinitiating 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) new information reveals effects of the agency action that may effect PPC in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the PPC that was not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be effected by the action.

For further information, please contact Ann Watson (x 228) or Jim Rorabaugh (x 240) of my staff at (602) 640-2720. Please refer to consultation number 2-21-99-I-190 in future correspondence concerning this project.

A handwritten signature in black ink that reads "David L. Harlow". The signature is fluid and cursive, with a long horizontal line extending to the right.

David L. Harlow

**Attachments**

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (GARD-AZ/NM;PARD-ES)  
Chairman, San Xavier District, Tohono O'odham Nation, Tucson, AZ  
Director, Arizona Game and Fish Department, Phoenix, AZ  
Ms. Amy Heuslein, Bureau of Indian Affairs, Phoenix, AZ

Cap Link pipeline aw:rc

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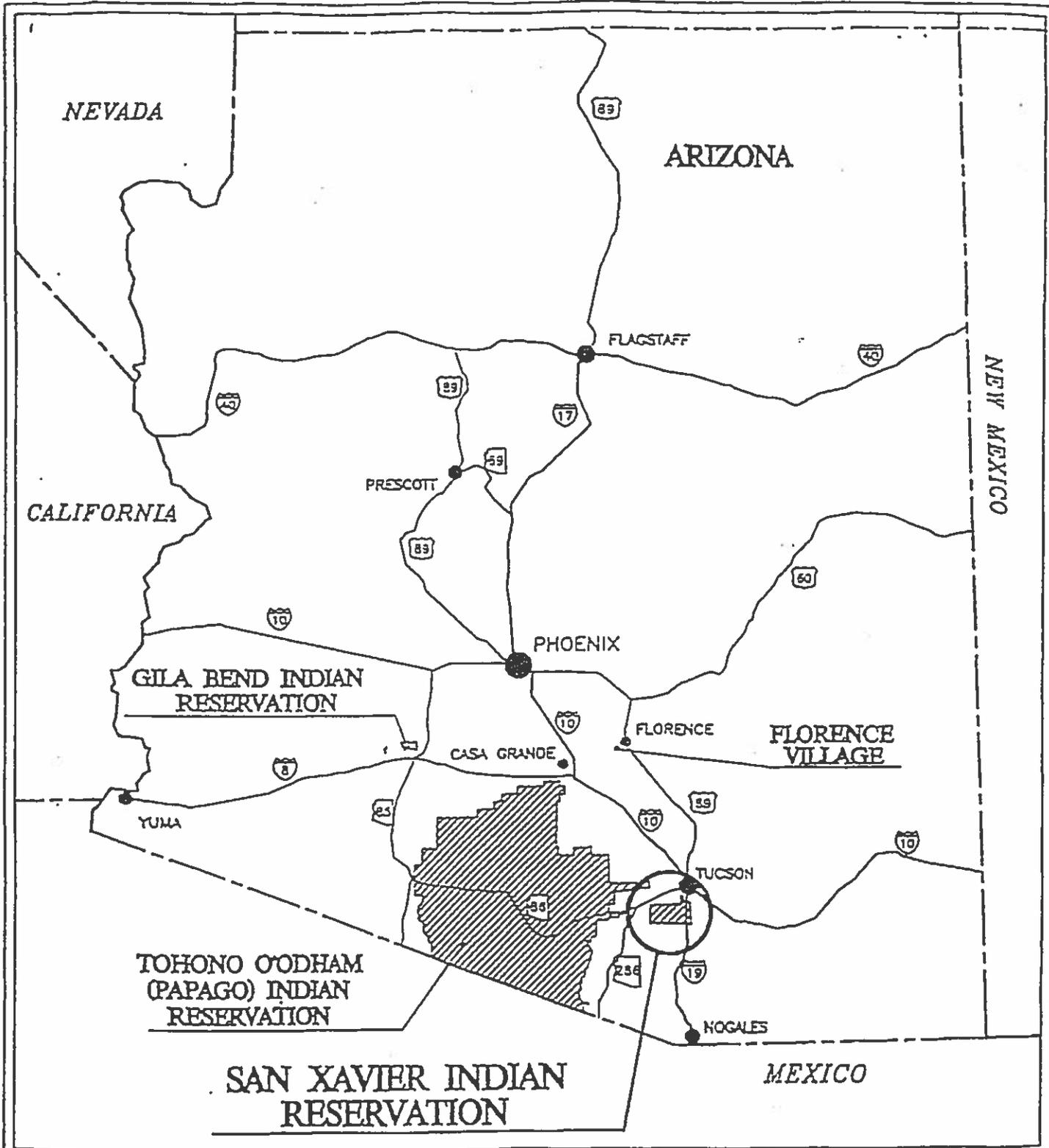


FIGURE 1  
 LOCATION MAP  
 SAN XAVIER INDIAN RESERVATION

Prepared by  
 PRESNELL ASSOCIATES, INC.