

AESO/SE
2-21-99-F-227

August 4, 2000

Mr. Terry Oda
Chief, CWA Standards and Permit Office
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Mr. Oda:

This biological opinion responds to your request for consultation with the U.S. Fish and Wildlife Service pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your original request for formal consultation was dated February 28, 2000, and received by us on March 6, 2000. At issue are impacts that may result from the proposed construction of the Arizona State Prison Expansion project proposed by the Arizona Department of Administration (ADA) located south of Tucson, Arizona. In order to proceed with the project, ADA is required to have an EPA National Pollutant Discharge Permit (NPDES) for storm water discharges associated with construction activities in Arizona. Impacts resulting from the project may affect Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*).

Your letter also found that the action would not affect the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) and the lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). Conservation measures are included in the proposed action for the cactus ferruginous pygmy owl.

This biological opinion was prepared using information contained in the February 2000 biological assessment prepared by Westland Resources, Inc., site visits and our files. Literature cited in this biological opinion is not a complete bibliography of all literature available on the affected species. A complete administrative record of this consultation is on file in our office.

CONSULTATION HISTORY

The informal consultation process for this specific project preceding initiation of formal consultation began in August 1999. In response to a draft biological assessment (BA) sent to the Service (August 10, 1999, Westland Resources, Inc.), the Service responded with comments to ADA on October 1, 1999. In that letter, ADA was informed of a potential Federal nexus for the project and the need to survey for cactus ferruginous pygmy-owls and Pima pineapple cactus. On

December 8, 1999, a meeting was held with the Service, representatives from ADA, and Westland Resources, Inc. The project was reviewed for potential effects to cactus ferruginous pygmy-owl and it was determined that there would not be effects to the owl, but Pima pineapple cacti had been located on the project site. Another meeting was held on February 1, 2000 to discuss potential conservation measures for the cactus on the site. This meeting had representatives from the Service, ADA, Westland Resources, Inc. and EPA (via telephone). ADA indicated their desire to start construction in certain areas of the site before formal consultation had been initiated. The Service advised ADA of their obligation to adhere to section 7(d) of the Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, which allows the Federal lead agency to engage in planning efforts, but not to make any irreversible commitment of resources.

The Service received the final BA and request for formal consultation on March 6, 2000. The Service visited the site with Ms. Virginia Pierce and Mr. Bruce Ringwald of ADA on April 10, 2000. During that visit, the Service requested an orthophoto map of the proposed conservation areas on the site in order to delineate specific areas for the cacti transplanting effort. That map was sent to the Service on May 5, 2000.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The proposed federal action is the issuance of an NPDES permit from EPA to the applicant, the Arizona Department of Administration. The ADA proposes to construct an extension to the existing State Prison facility located in T16S, R14E, Section 1. The project will be located within three square miles of land totaling approximately 1,920 acres in size located in T16S, R14E, Sections 12, 13 and 14 immediately south of the existing prison facility. Two phases of the project are planned. Phase I will occur on approximately 456 acres of the property and will include five separate prison units, prison administrative offices, parking areas for prison employees and visitors, a waterline, two water wells, a wastewater treatment plant, road improvements to Wilmot Road, including a bridge crossing of a jurisdictional water of the U.S., an effluent-supported riparian area and two inmate-tended gardens.

Phase II of the project is conceptual in design and would provide for future increases in demand for prison facilities beyond the existing capacity that would be provided by Phase I development. Phase II construction, which is not likely to occur for at least ten years, would develop approximately 130 acres, including two additional prison units, and additional support facilities that have yet to be designed. The 130-acre footprint of Phase II construction is included in this consultation. Maps and specific details of the proposed construction are provided in the BA and are included here by reference.

There will be no native vegetation left within the grading limits of Phase I and II facilities. Approximately 30 cacti are within the grading limits. After facility construction, approximately 1,314 acres of land will remain undisturbed.

Proposed Minimization Measures

ADA proposes the following measures to minimize potential adverse effects to Pima pineapple cactus. These measures are taken from the February 2000 BA prepared by Westland Resources, Inc. and an April 10 and July 17, 2000 conversations between Mima Falk, Fish and Wildlife Service, and Virginia Pierce and Bruce Ringwold, ADA.

1. A second survey for Pima pineapple cactus will be conducted within six months of any planned vegetation clearing for any Phase I and II development activities on any portion of the property. The survey will follow the 1996 Service protocol, but need be completed only one time. If cacti are found that were not previously found in the first survey, an area of at least 50m-diameter around the cactus will be surveyed intensively for additional cacti. This protocol should ensure that all cacti are located and moved prior to disturbance.

2. All Pima pineapple cactus within areas to be graded that were found during the initial survey efforts reported in the BA or detected during the second survey will be transplanted to the southern preserve area established within the property. The Service will provide transplanting protocols to ADA prior to the cacti being moved. ADA will coordinate transplanting efforts with the Service.

3. Approximately 586 acres of land will be established as preserves within the property, in perpetuity through deed restriction or covenant. The North preserve will protect 197 acres and the South preserve 389 acres. Certain access or utility easements will be reserved for these lands. These easements will only be utilized in a manner that minimizes any potential to adversely impact Pima pineapple cactus and the function of the preserve area. A copy of the final deed, with restrictions, will be sent to the Service when completed. A management plan will be prepared for the area and submitted to the Service one year from the start of construction.

4. All transplanted Pima pineapple cactus will be monitored for a period of five years following transplant activities. Monitoring efforts will include survival, growth, and reproductive status of transplanted cacti. All of the non-transplanted cacti within the preserves will be monitored starting in 2000 and continuing every year for five years. Transplanting and monitoring will be done by prison inmates. Monitoring for transplants will take place at the time of their move and then completed every May-June for the following years. Monitoring for the non-transplanted cacti will follow the same schedule. A copy of the monitoring form and protocol will be provided to ADA by the Service.

5. The preserve lands will be fenced with four-strand wire fencing, and the bottom strand will be barbless.

6. Temporary construction fencing will be placed at the limits of all Phase I and II grading activities. This fence will be T-post and single-wire fences clearly marked with flagging tape or

its equivalent. All construction activities and disturbance will be contained within these fenced areas.

7. ADA will survey other state lands, using prison inmates, within the northeastern portion of the range for Pima pineapple cactus. The survey effort will be equivalent to the effort required for single coverage of a single tract of land that is approximately 2,000 acres in size. The survey will be conducted as a single block or in belt transects and sample units in a manner agreed to by the Applicant and the Service. The Applicant and the Service both acknowledge that getting access to certain lands may not be possible and that surveys will only be conducted on lands that the Applicant is able to secure entry to. This survey effort will be completed within a five-year period from the date of this biological opinion.

8. Lands not part of Phase I and II construction activities and not included within the preserved lands are not part of this consultation (the Excluded Lands). Future development of the Excluded Lands would require additional survey for Pima pineapple cactus and consultation with the Service pursuant to requirements of the Act.

9. Consistent with the public safety mandates and responsibilities associated with the operation of a prison facility, ADA will allow independent researchers access to the property to study the ecology and population dynamics of Pima pineapple cactus. Clearance must be obtained through ADA and the Service prior to entry. ADA and the Service both acknowledge that long-term studies being conducted within the property by independent researchers will not: 1) interfere with the monitoring efforts required by this consultation, 2) restrict the future development of Phase II of the project, or 3) adversely affect future consultation under the Act for other development within the property not covered by this consultation. Further, the granting of access to the property by ADA creates no obligation on the part of ADA to fund, in part or in full, any research conducted on the property by independent researchers.

10. ADA will submit Annual monitoring reports to the Service (Phoenix Ecological Services Office) on or about the first day of February of each calendar year for the first four years of the five-year monitoring. These reports will contain the results of onsite and offsite survey, and monitoring activities that have been completed in the previous calendar year. At the end of the five-year monitoring period, a final report summarizing all of the survey and monitoring efforts will be submitted to the Service. These same monitoring requirements will apply to Phase II construction if and when it is initiated.

In addition to the above measures for Pima pineapple cactus, ADA has included the following conservation measures in their proposed action:

- Any subsequent vegetation/land-clearing activities planned following 2000 will comply with the recommendations for cactus ferruginous pygmy owl survey adopted by the Service in 2000.

- Should a cactus ferruginous pygmy owl be detected during survey or should ADA be made aware of the location of an owl within 600 meters of the project, all reasonable effort shall be made by ADA, Arizona Game and Fish Department (AGFD) and the Service to determine breeding status of the owl, location and extent of territory. If an owl territory is found within 600 meters of the project, ADA shall coordinate with the Service prior to proceeding with any development activities and shall not proceed with any development activities until authorized by the Service.

ANALYSES BY SPECIES:

Pima Pineapple Cactus

STATUS OF THE SPECIES

Life History

The final rule listing Pima pineapple cactus as endangered was published September 23, 1993 (58 FR 49875). The rule became effective on October 25, 1993; critical habitat was not designated at that time. Factors that contributed to the listing include habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution and plant species rareness, illegal collection and difficulties in protecting areas large enough to maintain functioning populations. The biological information below is summarized from the proposed and final rules, and other sources.

Pima pineapple cactus is a low growing hemispherical cactus with adults varying in stem diameter from 5.0 cm (2.0") to 21.0 cm (8.3") and height from 4.5 cm (1.8") to 45.7 cm (18.0"). Individuals are considered adults when they reproduce sexually. Plants can be either single or multi-stemmed with yellow flowers blooming with the summer rains. Clusters of Pima pineapple cactus stems are formed primarily from vegetative clones produced at the plant base (Benson 1982, Roller 1996). The diagnostic field character 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).

Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and adjacent northern Sonora, Mexico. It is distributed at very low densities throughout both the Altar and Santa Cruz Valleys, and in low lying areas connecting the two valleys.

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 precipitation as 3 mm. Generally flowers begin opening midmorning and close at dusk (Roller 1996). Adult plants bloom one to three days each year; flowering is usually over by the end of August. Cross-pollination produces significantly more viable seeds than self-pollination. Fruits are mature within two weeks following successful pollination. Germination has been observed in the field during the summer

monsoon rainy season (Roller 1996). Anecdotal observations indicate the species' flowers are visited by a variety of native bees and European honey bees. The insects were observed to leave the flowers with their forehead and hind legs covered in Pima pineapple cactus pollen.

Habitat fragmentation and isolation may be an important factor limiting future seed set of this cactus. Recent data show that the species cannot successfully self pollinate and is reliant on invertebrate pollinators. One hypothesis is that the spatial distribution pattern of individual Pima pineapple cacti within a given area may regulate pollinator visitations, thus resulting in more successful cross-pollination and subsequent seed set over the population (Roller 1996). If the pollinators are small insects, with limited ability to fly over large distances, habitat fragmentation may contribute to a decrease in pollinator effectiveness with a subsequent decrease in seed set and recruitment.

Population Stability

Extrapolations from recent (1992-1997) surveys of known Pima pineapple cactus locations suggest that the cactus may be more numerous than previously thought. Projections based only on known individuals may underestimate the total number of individuals. This in no way indicates that the cactus is not rare or endangered. Pima pineapple cactus is widely dispersed in very small clusters across land areas well suited for residential, commercial or mining development. As well, field observations suggest a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historic human impacts. Thus, populations are already considerably isolated from each other in many portions of the range, and population size and apparent recruitment varies significantly across the range. On a more local scale, population variability may relate to habitat development, modification, and/or other environmental factors such as slope, vegetation, pollinators, dispersal mechanisms, etc.

The transition zone between the two regions of vegetation described by Brown (1982) as semidesert grassland and Sonoran desert-scrub contains denser populations, better recruitment, and individuals exhibiting greater plant vigor. Vegetation within this transition zone is dominated by mid-sized mesquite trees, half shrubs (snakeweed, burroweed, and desert zinnia) with patches of native grass and scattered succulents. Because populations are healthier in this transition zone, conservation within these areas is very important (Roller and Halvorson 1997). However, this important habitat type is not uniformly distributed throughout the plant's range. Populations of Pima pineapple cacti are patchy, widely dispersed and highly variable in density. The higher population densities have only been documented at three sites. Compared to other surveys, two of these sites are very small in scale and range from 6.3-7.5 plants per ha (1-3 plants per acre). Other densities across the majority of the plant's range vary between one plant per 1.9 ha (4.6 acres) and one plant per 8.5 ha (21 acres) (Mills 1991, Ecosphere 1992, Roller 1996).

Land areas surrounding developed parts of Green Valley and Sahuarita, Arizona (including adjacent areas of the San Xavier District of the Tohono O'odham nation) may be important for the conservation of this species within its range. Analysis of surveys conducted from 1992 to

1995 with a multivariate statistical analysis established a pattern of greater population densities, higher ranks of cactus vigor and reproduction occurring within the transition vegetation type found in this area of the northern Santa Cruz Valley (Roller and Halvorson 1997). This area could be defined as an ecotone boundary between semidesert grassland and Sonoran desert scrub.

Seedling and sub-adult size classes are uncommon in documented populations across the range. However, this may be a function of the difficulty of finding such small, well-camouflaged plants in a large-scale survey, or because the establishment phase of the seedling may be limited in some unknown way. Research on Pima pineapple cactus reproduction has suggested that the establishment phase of Pima pineapple cactus life history may limit recruitment within populations (Roller 1996). Evidence presented to support this conclusion was the abundance of flowers, fruits and viable seed, and the rarity of seedling presence at different sites spread through the plant's range (Roller 1996). Other research has confirmed that the establishment phase of other Sonoran cacti species may be critical for survival to reproductive maturity (Steenbergh and Lowe 1977).

Status and Distribution

Generally, the Pima pineapple cactus grows on gentle slopes of less than 10% and along the tops (upland areas) of alluvial bajadas nearest to the basins coming down from steep rocky slopes. The plant is found at elevations between 720 m (2362 ft) and 1440 m (4593 ft) (Phillips et al. 1981, Benson 1982, Ecosphere Environmental Services, Inc. 1992), in vegetation characterized as either or as combination of both the Arizona upland of the Sonoran desert scrub and semidesert grasslands (Brown 1982).

The acquisition of baseline information began with surveys documenting the presence of Pima pineapple cactus as early as 1935. More intensive surveys were initiated in 1991 and other research established in 1993 further investigated the reproductive biology, distribution, fire effects and mortality associated with various threats. Therefore, the best available baseline information is relatively recent and may not represent actual changes in distribution since the declines in the status of the species began.

Widely scattered surveys have been conducted across sites that varied considerably in cacti density. Densities ranged between 0.1-7.5 plants per ha (0.05-3 plants per acre). Pima pineapple cactus occurs in 50 townships with its U.S. range. However, a considerable amount of land area within the range boundaries does not provide habitat for the species due to elevation, topography, hydrology, plant community type, and human degradation. To date, an estimated 22,959 ha (56,730 acres), (10 to 20 percent of the U.S. range) has been surveyed. Not all of this area has been intensively surveyed; some has only been partially surveyed using small land blocks to estimate densities rather than 100% ground surveys. A conservative estimate of total cacti located to date would be 3,800 individuals. The majority of those were located after 1991.

It is important to clarify that the above number represents the total number of locations ever found and not the current population size. It would be impossible to estimate densities over the remaining unsurveyed area because of the clumped and widely dispersed pattern of distribution of this species. Of the 3,800 individuals known at this time, 2,173 (57%) of them have been removed throughout the range. This quantity includes observed and authorized mortalities and individuals transplanted since the species was listed in 1993 to present. A small portion of these mortalities were caused by natural factors (i.e., drought). Moreover, this figure does not take into account those cacti that are removed from private land or other projects that have no federal nexus.

Transplanted individuals are not considered as functioning within the context of a self-sustaining population. Efforts to transplant individual cacti to other locations have only had limited success and the mortality rate has been high, especially after the first year. Further, once individuals are transplanted from a site it is considered to be extirpated as those individuals functioning in that habitat are irretrievably lost. It is the Service's hope that continued experimentation will improve the success rate of transplantation. In the meantime, until information suggests that reintroduction efforts are successful, transplanted individuals will not be counted as operative units of the entire population.

The approach to transplanting Pima pineapple cactus involves three general phases: i) selection of suitable habitat to sustain viable populations, ii) replanting techniques and, iii) salvage operations which include proper removal of the plant and root system. The Service is currently updating the transplant protocol through the recovery planning process. The Service views transplanting cacti as a measure of last resort for conserving the species. Transplanting will be allowed only when on-site and off-site habitat conservation is not possible and the death of cacti is unavoidable.

The area of habitat authorized to be modified or destroyed between 1987 and 2000 (i.e., habitat developed or significantly modified beyond the point where restoration would be a likely alternative) is approximately 8,702 ha (23,843 acres) which represents 38% of the total area surveyed to date. In 1998, more than 1,100 acres of Pima pineapple cactus were lost including 353 acres from the Las Campanas Housing Development project, and 752 acres from the ASARCO Mission complex project. The number of acres lost through private actions, not subject to Federal jurisdiction, is not known but given the rate of urban development in Pima County, is expected to be significant.

Most of the documented habitat development has occurred south of Tucson down through the Santa Cruz Valley to the town of Amado. This area is critical for the future recovery of the species. The expansion of urban centers, population and mining activities will continue to eliminate habitat and individuals, and result in habitat fragmentation.

The protection of habitat and individuals is complicated by the varying land ownership within the range of this species. An estimated 10 percent of the potential habitat for Pima pineapple cactus

is held in Federal ownership. The remaining 90 percent is on Tribal, State, and private lands. Most of the federally owned land is either at the edge of the species' range or in scattered parcels. The largest contiguous piece of federally owned land is the Buenos Aires National Wildlife Refuge, located at the southwestern edge of the species' range at higher elevations and lower plant densities.

Based on surveys and habitat analysis, land areas south of Tucson through the Santa Cruz Valley to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham Nation, appear to support abundant populations, some recruitment, and units of extensive habitat still remain. However, the primary threat to the status of this species throughout its range is the accelerated rate (i.e., since 1993) at which this prime habitat is being developed, fragmented or modified.

Under section 9 of the Act, the taking of listed animals is specifically prohibited, regardless of landownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from Federal lands. There is no protection against removal from, or destruction of, plants on any non-Federal lands under the Act by a land owner. The Arizona Native Plant Law may delay vegetation clearing on private property for the salvage of specific plants species within a 30-day period. Although the Arizona State Native Plant Law does prohibit the illegal taking of this species on state and private lands without a permit for educational or research purposes, it does not provide for protection of plants in situ through restrictions on development activities.

Section 7 protection extends to listed plants regardless of landownership. However, without Federal agency involvement, section 7 does not apply to projects on non-Federal lands. Much of the development likely on State or private lands has a limited exposure to Federal regulatory requirements. Additional Pima pineapple cacti and associated habitat on these lands are almost certain to be lost as development in southern Arizona continues through the Santa Cruz Valley. Efforts to transplant individual cacti to other locations have had limited success, and as development increases, suitable locations will become scarce as habitat is converted.

Based on current knowledge, the following threats documented with this reduction in habitat alter the landscape in a manner that would be nearly irreversible in terms of supporting Pima pineapple cactus populations: urbanization, farm and crop development, and exotic species invasion. Prescribed fire can have a negative effect if not planned properly.

Other specific threats which have been previously documented (Service 1993), such as overgrazing and mining, have not yet been analyzed to determine the extent of effects to this species. However, partial information does exist and can be applied. Mining has resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of the species. Much of the mining activity has been occurring in the Green Valley area, which is the center of the species' distribution and the area known to support the highest densities of individuals. Overgrazing by livestock, illegal plant collection, and fire-related interactions

involving exotic Lehmann lovegrass (*Eragrostis lehmanniana*) may also negatively affect Pima pineapple cactus populations (Service 1993).

Very little is known regarding the effects of low to moderate levels of livestock grazing on Pima pineapple cactus distribution. Currently, a study has been established to observe the effects of grazing on Pima pineapple cactus on the Coronado National Forest. The species is patchy in distribution and widely dispersed and occupies relatively xeric soils (i.e., these plants do not inhabit areas immediately adjacent to or along water tanks or streambanks) (Roller 1996). The grazing use of these sites varies considerably. Some areas have received use above the authorized intensity (Falk, pers. obs.). The monitoring from allotments on the Coronado have not shown significant differences between cacti in the exclosures and those that are not protected. However, the plots have been monitored only for five years and the differences may not be seen for many years to come. Young cacti could be trampled by livestock, or site hydrology altered in ways that might affect seedling establishment and recruitment.

Habitat effects of livestock overuse could include erosion, hydrological and micro-climatic changes, invasion or expansion of exotic grasses due to livestock preferences for native grass species over exotics. Some range management practices such as mechanical imprinting, chaining, ripping, and seeding of nonnative grasses have contributed to the modification and loss of habitat and individual cacti. Overgrazing in some areas continues today.

It is uncertain the extent to which overgrazing affects the cactus, by altering the structure and function of the ecosystem. However, long-term grazing, (particularly overgrazing), fire suppression, and drought in arid grassland ecosystems have all been hypothesized as being the cause, either individually or collectively, of changes in community structure and function (Bahre 1985). Altered edaphic (stability and water infiltration ability) conditions, caused by damage to micro-biotic and biological crusts over soils with grazing, have been documented in arid land systems (Schlesinger et al. 1990, Fleischner 1994).

Vegetation associated with higher Pima pineapple cactus densities, reproduction and greater levels of cactus vigor is described as a mid-sized mesquite shrub land with an assortment of other succulent species and native bunch grasses. Many of the species dominant in this vegetation type are associated with grazing (i.e., "increasers" under some grazing practices). Less intensively grazed pastures did support greater native grass coverage with more species present. However, even with an increased bunch grass abundance, the fuel structure of the community was not continuous and allowed for substantial open patches along the drip line of shrub species where the cactus often occurs (Roller and Halvorson 1997). Also, specific levels of soil movement are required for seed germination because the seed will not germinate on the surface; it generally germinates at a depth of 0.5-1.5 cm (0.2 - 0.6") (Roller 1996). Few locations throughout the plant's range have documented the presence of seedlings or sub-adults. However, all but one of the known locations had been grazed within three years of the observation. Whether light to moderate grazing practices provide the appropriate level of soil movement to cause seed germination has not been determined. Over-land sheet flow across these areas may also move

soil and deposit it over sediments. The study established on the Coronado National Forest should provide some insight on seed germination relative to specific grazing intensities.

Reduced herbaceous biomass within the immediate proximity of individuals may reduce heat intensity with fire. Reduced herbaceous cover and continuity decrease fire frequencies in semidesert grasslands, and over the long-term increase cactus survival following fire (McPherson 1995, Thomas and Goodson 1992, Wright and Bailey 1982).

The invasion of Lehmann lovegrass combined with fire is a threat to Pima pineapple cactus populations. Continuous distributions of fuels and greater biomass near the apex of individual plants are believed to increase mortality following fire (Roller and Halvorson 1997). Fire increases Lehmann lovegrass distribution; correspondingly, fire intensity and fire frequency increases with Lehmann lovegrass invasion (McPherson 1995), a positive-feedback cycle.

Even with complete data on historical change related to Pima pineapple cactus distribution and abundance, the Service cannot reliably predict population status due to compounding factors such as climate change, urbanization, legal and political complexities (McPherson 1995). We do not know if the majority of populations of Pima pineapple cactus can be sustainable under current reduced and fragmented conditions. Thus, the need for information on what limits the plant's distribution under current habitat conditions is significant.

Based on monitoring results, the range-wide status of the Pima pineapple cactus appears to have been recently affected by threats that completely alter or considerably modify more than a third of the species' surveyed habitat, and have caused the elimination of nearly 60 % of documented locations. These values are supplied to serve as an extrapolation of the situation which might be taking place across the rest of the entire population. Current information regarding the status of this species must be supplemented by more precise and thorough spatial analysis through the use of geographical information systems, databases and on the ground surveys.

Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to detrimentally impact the habitat. The remaining habitat also is subject to degradation or modification from current land management practices, increased recreational use when adjacent to urban expansion (i.e., off-road vehicle use and illegal collection), and the continuing aggressive spread of nonnative grasses into its habitat. Habitat fragmentation and degradation will likely continue into the foreseeable future based on historic data and growth projections produced by the Pima County Association of Governments (1995). There is very little Federal oversight on conservation measures that would protect or recover the majority of the potential habitat. Even some areas legally protected under the Act have been modified and may not be able to support viable populations of the Pima pineapple cactus over the long-term.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, and the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation. It also includes 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 under consultation. The action area for this project is defined as the land subject to disturbance in Phase 1 and II (586 acres).

Information on the status of the Pima pineapple cactus on State lands is not available. Within the three sections that are proposed for development, a total of 68 cacti have been located. The Service estimates that there are 1,295 acres of suitable cactus habitat within the three sections to be developed. This figure was calculated using the surficial geology map provided in the BA (Fig. 4). All acres characterized as QTbf and M2 (older soil surfaces) were considered to be habitat because that is where the majority of the cactus are located. an undisturbed state. The parcel directly to the north is occupied by the existing State prison. It is not known if Pima pineapple cactus occupied the site prior to construction. Vegetation within the proposed development site ranges from modified desert scrub to fairly undisturbed desert scrub. The surrounding parcels of State land have not been surveyed, but similar habitat surrounds the site and there are probably Pima pineapple cactus present in those areas.

EFFECTS OF THE PROPOSED ACTION

There are 1,295 acres of suitable habitat within the three sections (1,920 acres) of the project site. The area to be affected directly by the proposed development will encompass 586 acres, all of which are suitable habitat. The proposed prison expansion will directly affect 30 of 68 Pima pineapple cactus found on the entire site. Those 30 cacti will be transplanted to the South preserve, which has eight cacti on it. The North preserve has nine cacti present. The remaining 21 cacti are located outside of the preserve areas, but in areas that are not designated for development at this time and are therefore not addressed in this BO (the 748 acres of excluded lands). The South preserve was chosen as the site for the transplant effort because the vegetation is the least disturbed and it has a lower density of cacti present. Past efforts to transplant individual cacti to other locations have had only limited success. Transplanting will be done in the fall, when precipitation is low, to reduce the chances of bacterial infection from wet soil. All cacti within the preserved areas will be monitored for five years, allowing time to assess the success of this transplanting effort.

To minimize the effects of the proposed action, the applicant is setting aside 586 acres for preservation. The Service estimates that 218 acres (37%) of the conservation area encompasses suitable habitat. The remainder of the site is characterized by ephemeral washes and associated xeroriparian vegetation that is not suitable for Pima pineapple cactus. In addition, because the survival rate for transplanted cacti is low, almost half of the individuals on the site may be lost.

The Service estimates that 60% of documented cacti locations have been lost. Unfortunately, the densest clusters of cacti will have to be transplanted. This may be significant to the entire population for the following reasons: a) dense clusters probably indicate high quality habitat, b) the demography of the population may be affected if cacti in this cluster are more vigorous and reproduce at a higher rate, c) healthier individuals in better habitat have a much higher probability of surviving disturbance, extended drought, or other events that can induce widespread mortality, d) in terms of metapopulation dynamics, the cluster may represent the source for the other cacti scattered around it and e) there may be genetic implications (i.e. gene flow) in the cluster that will be lost when the cacti are separated (Silvertown and Lovett Doust 1993, Crawley 1997). There is also the unquantifiable effect on the seed bank, which could have long-term effects on the viability of this population. It is not easy to predict the long-term consequences associated with translocating cacti and the subsequent effect on the structure of the population. Additional loss of habitat and individuals continues a downward trend for the species. The ongoing high rate of habitat loss will continue to impede recovery for this species.

The North preserve area will likely benefit from protection because it is currently degraded from livestock overuse and illegal trespassing (OHV uses, target shooting). The South preserve retains relatively pristine desert scrub, and fencing should protect the area from degradation. In addition, even though the excluded lands are not being considered in this BO, those 748 acres (and the 21 cacti present) will be protected from further degradation when the perimeter fence around the entire 1,920 acres is complete. The Pima pineapple cactus surveys that ADA has proposed will directly contribute to recovery for the species. So much of the range of the cactus has not been surveyed that any additional site information will contribute to the definition of suitable habitat for this species. This will be beneficial for identifying recovery areas for the cactus. The proposed conservation actions included in the biological assessment are critical to offset this impact to Pima pineapple cactus.

The Service does not anticipate any indirect effects in the action area because the excluded lands (748 acres) will be left undisturbed and the perimeter fence around the entire three sections should protect the property from degradation.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, 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 Act.

As described previously, development in this geographic area (not as developed as Green Valley, but with significant development occurring along the north and south side of 1-10) can be expected to increase. Private lands not presently developed in the action area are likely to become urbanized, to a lesser degree in the direct vicinity of the State prison. In any event, both State and private lands will likely continue to be subject to livestock overuse. Private lands not recently

developed are likely to become so, and State lands may be sold or leased for commercial purposes that result in impacts (as these parcels of State land were). Much of this development will have little or no Federal nexus. Without any protection under the Act, the only protection available is through the Arizona Native Plant Law, which provides only for salvage for scientific and educational purposes. Regardless of salvaged cacti transplant success, the habitat would be lost.

Much of the habitat and the individuals of the species are at significant risk of destruction or continued degradation. Without the protection under section 9 that applies on non-Federal lands, there is little regulatory authority to use in reducing those risks.

CONCLUSION

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

The Service bases our conclusion on the following:

- 1) ADA will conserve 586 acres of habitat for the benefit of Pima pineapple cactus.
- 2) ADA will transplant and monitor the 30 cacti in the construction zone. ADA will also monitor the remaining cacti on the site.
- 3) ADA will conduct surveys for new Pima pineapple cactus populations.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act 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 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. 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. At the time of transplanting the cacti to the southern preserve, coordinate those activities with personnel that have experience in transplanting cacti. The Service recommends consulting with staff from the Arizona Sonora Desert Museum. This will give the prison inmates some background in the proper transplanting techniques and increase the chances for survival.

2. The Service recommends that ADA consider expanding the conservation areas to include portions of the excluded land. Suitable Pima pineapple cactus exists in the northern portion of Section 12 and in the southern portion of Section 14. Setting aside more protected land will contribute to the recovery efforts for this species.

REINITIATION NOTICE

This concludes formal consultation on the proposed State prison expansion in Tucson, Arizona. 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) new information reveals effects of the agency action that may affect Pima pineapple cactus 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 Pima pineapple cactus that was not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

If we can be of further assistance, please contact Mima Falk (520-670-4550) or Sherry Barrett (520-670-4617).

Sincerely,

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