



# United States Department of the Interior



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AESO/SE  
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August 26, 2014

Ms. Sallie Diebolt  
Los Angeles District Corps of Engineers  
Arizona-Nevada Office  
3636 North Central Avenue, Suite 900  
Phoenix, Arizona 85012-1939

Dear Ms. Diebolt:

This biological opinion responds to your April 10, 2014 request for formal consultation with the U.S. Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was received on April 15, 2014. At issue are impacts resulting from the proposed stormwater controls project for Asarco's (Applicant) Mission Complex located near the Town of Sahuarita, Pima County, Arizona, on the endangered Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) (PPC).

In your correspondence, you also requested our concurrence that the proposed action may affect, but is not likely to adversely affect the endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*). Our concurrence is provided in Appendix A of this biological opinion.

This biological opinion (BO) is based on information provided in your April 10, 2014, correspondence, including Westland Resources' January 13, 2014 Biological Assessment (BA) of the proposed action, and our December 4, 2002 Biological Opinion on the Environmental Protection Agency's proposed issuance of a National Pollution Discharge Elimination System Permit (Consultation #2-21-03-F-0014) at this same facility. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, stormwater control facilities, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at Arizona Ecological Services Office (AESO) in Phoenix, Arizona.

## **Consultation history**

- December 4, 2002 – The Service issued a final BO to the Environmental Protection Agency (EPA) related to the proposed issuance of a National Pollution Discharge Elimination System permit for Asarco’s Mission Complex near the Town of Sahuarita, Pima County, Arizona. This action was never completed, but is similar in its scope and effects as the current proposed action at this same facility.
- April 10, 2014 – The U.S. Army Corps of Engineers (Corps) requested formal consultation with the Service on the effects of proposed stormwater controls at Asarco’s Mission Complex, and provides a BA and background information related to the proposed action and the previous section 7 consultation for this facility under the Act.
- August 12, 2014 – The Service provided the draft BO to the Corps for their review.
- August 25, 2014 – The Corps responded that they have not comments on the draft BO.

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The Mission mining operation is located approximately 20 miles southwest of Tucson, Arizona. The proposed action (Project) is located on the following Township and Range coordinates based on the Arizona Gila and Salt River Baseline and Meridian: Township 16 South, Range 12 East, portions of Section 14, 23, and 25; Township 17 South, Range 12 East, portions of Section 12; and Township 17 South, Range 13 East, portions of Sections 7–10 and 15.

The South Pima Dump component is west of Interstate Highway 19, mainly along Helmet Peak Road between La Cañada Boulevard on the east and Mission Road on the west. South Pima Dump itself is located northeast of the intersection of Mission Road and Helmet Peak Road. The improvements at South Pima Dump, in concert with associated improvements downstream, span five sections of Applicant-owned lands, along the toes of the Applicant’s South Pima Dump, TSF-6, TSF-7, and TSF-8. The relatively small Ike Dump component is approximately two miles north of Helmet Peak Road, within a narrow strip of land between the eastern edge of the Mission Road right of way and the western toe of Ike Dump. The San Xavier North component is approximately one mile north of Ike Dump, west of Mission Road. This component is located along the western toe of the San Xavier North pit facilities, on lands leased from the Tohono O’odham Nation (TON). Each component includes the area adjacent to the toes of dumps or tailings storage facilities, which have ephemeral washes at their bases and where stormwater controls will be repaired or constructed.

The three components of the Project are described below (see Appendix C of the BA for the conceptual plans for the Project). The total estimated disturbance area for Project construction and repairs is 83.60 acres. This includes 10.69 acres of permanent and temporary impacts to potential waters of the U.S. (the 0.06 acre of indirect impacts is not included in the Project disturbance area) and 13.25 acres of impacts to other areas (existing roadways and toe of dumps and tailings), both areas unsuitable for PPC (23.94 acres total), leaving 59.66 acres of disturbance to potential PPC habitat.

Six PPC are known to be within the disturbance areas of the Project. Table 2 of the BA provides a summary of disturbance by Project component, as described in the following subsections.

**South Pima Dump Component** – This component includes repair and new construction of stormwater control improvements around four facilities at the Mission Complex: South Pima Dump, TSF-6, TSF-7, and TSF-8. Construction and repair of stormwater control structures at the upstream end of this component (at South Pima Dump) will prevent contact between stormwater run-on and the dump, where stormwater currently impounds at the western toe of the dump. After improvements are completed, the stormwater will continue more than 3 miles downstream before discharging from the Mission Complex. With increased flows expected due to the elimination of stormwater impoundment at South Pima Dump, improvements downstream are proposed to control stormwater flows and reduce the potential for flooding downstream residential communities.

### ***South Pima Dump***

At South Pima Dump, the main control structure will be repair and construction of a berm along the toe of the west and south slopes of the dump to segregate dump runoff from run-on originating upstream of the property, with most of the existing channel. As a result, after construction, stormwater run-on that currently largely impounds along the west toe of South Pima Dump will be redirected around the South Pima Dump and report downstream. At the southeast corner of the dump a control berm will be constructed on upland between the run-on channel and Helmet Peak Road, to prevent channel breakout flows from flooding the roadway.

The repaired and constructed berm along the toe of South Pima Dump will also contain runoff from the slope of the dump; where it will be directed to the southeast corner of South Pima Dump, then north along the toe of the dump in an existing containment channel, terminating in an existing containment pond at the northeast corner of the dump.

The disturbance area for the above improvements at South Pima Dump is expected to be 5.02 acres for the berm at the toe of the dump, and 2.87 acres for the containment berm between the run-on channel and Helmet Peak Road. The entire disturbance area for repair and construction of the berm along the toe of the dump is already highly disturbed and not suitable for PPC. The area of the berm construction to contain stormwater that breaks out from the run-on channel includes disturbance of 2.81 acres of potential PPC habitat and direct impacts to three known PPC.

### ***TSF-6***

Unimpacted stormwater run-on in the channel near the toe of South Pima Dump will continue east across a section of undeveloped Applicant-owned lands in natural channels toward TSF-6, where additional control structures will be installed to accommodate increased flows resulting from the upstream improvements. A stilling pool is proposed at the southwest corner of TSF-6, where a non-engineered basin currently exists. The stilling pool will be larger than the current basin and will be excavated as needed to further increase capacity. Pool inlets receiving stormwater flows from natural channels will remain in the same locations as the existing inlets. Improvements will also be made immediately downstream from the stilling pool outlet, to contain stormwater run-on flows as they discharge from the pool. The outlet improvements will include excavation of the existing channel as needed, with the banks remaining native soil. Approximately 800 feet downstream from the stilling pool outlet, between TSF-6 and Helmet Peak Road, additional bank protection will be required for approximately 800 feet. This protection will consist of a Reno mattress on the north bank. The disturbance area for the above improvements at South Pima Dump is expected to be 16.45 acres for the stilling pool and outlet modifications, and 0.84 for the bank protection downstream. The impacts to potential PPC habitat include 7.99 acres at the stilling pool and 0.53 acres for the bank protection. One PPC will be impacted at the stilling pool site.

***TSF-7***

Continuing downstream on this channel, only excavation of sediment will be required for approximately 4,800 feet. At the end of the 4,800 feet (near the east end of TSF-7), more improvements will be made. Where the stormwater run-on currently flows in a single active channel that discharges from the Applicant's lands to a constructed channel through the Rancho Resort residential community, two additional channels and discharge points will be created.

The currently active stormwater flow channel, which will become the northern of three channels, curves north at the end of TSF-7 and back east again to discharge into the Rancho Resort channel. The main stormwater flows will continue to use this channel. Gabions will be placed at the discharge point into the Rancho Resort channel to control erosion and prevent migration of the channel, but work within the rest of that channel will be limited to sediment excavation as needed. The total disturbance area at this location is 0.67 acres, with impacts to potential PPC habitat including 0.53 acres, lateral to the existing wash for approximately a 200-foot length.

An overflow spillway with natural soil banks will be constructed in the curve of the active channel to reduce discharge volumes from the currently active (northern) channel into the Rancho Resort channel. Flows from the overflow spillway will discharge into the Rancho Resort channel approximately half the distance to Helmet Peak Road, over an existing weir on the west edge of the channel. This discharge point is upstream (south) from the northern channel discharge point. This channel has a total disturbance area of 3.81 acres, 3.61 acres of which is potential PPC habitat. No PPC will be impacted by this construction.

A berm will also be constructed along Helmet Peak Road, with a spillway where the currently active channel first begins to curve north from Helmet Peak Road. A channel will be constructed on the north side of the berm. The purpose of this feature is to contain stormwater flows that may overbank the natural flow channel as they turn north at the eastern edge of TSF-7, preventing flooding on Helmet Peak Road. The berm will be lined with riprap on the north side. The spillway will discharge into the Rancho Resort channel near the point where a box culvert from the south side of Helmet Peak Road currently discharges into the Rancho Resort channel. This channel has a total disturbance area of 8.52 acres, which includes 7.57 acres of potential PPC habitat. Two known PPC will be impacted by this construction.

***TSF-8***

South of Helmet Peak Road across from TSF-7, at the northwest corner of TSF-8, a stilling pool will be constructed to control flows to an existing channel between TSF-8 and Helmet Peak Road. This channel discharges from Applicant property into the constructed channel at Rancho Resort, described above, via an existing box culvert that passes under Helmet Peak Road. This stilling pool will receive stormwater run-on flows originating west of Mission Complex from a series of side-by-side existing culverts under a TSF-8 access road. The primary intent of the stilling pool is to meter flows and prevent overwhelming the Rancho Resort channel. The channel downstream from the stilling pool will require only maintenance excavation of sediments. The total disturbance area for the stilling pool will be 4.71 acres, which includes 2.09 acres of potential PPC habitat. No known PPC will be directly impacted by this construction.

**Ike Dump Component** – The proposed controls at Ike Dump use rock riprap on the eastern bank of the existing channel along the northern approximately 300 feet of the dump to direct flows to their natural path to the northeast. This is intended to prevent flows from breaking out of the natural channel and into the run-on channel along the east toe of the dump. Maintenance, consisting of sediment removal as needed, will be implemented on the rest of the channel south to Mission Road,

which will not require permit coverage. The total impact area for this component is 0.40 acre, including 0.01 acre of potentially suitable PPC habitat. No PPC will be impacted by this construction.

**San Xavier North Component** – Approximately 1.5 miles of berm will be re-established near the toe of the west side of the dump to keep runoff from the dump segregated from stormwater run-on originating southwest of the dump. Stormwater runoff will be contained between the berm and the dump, where it will infiltrate and/or evaporate. Stormwater run-on will not come into contact with dump rock and will continue to discharge downstream, north and east of the dump, as it currently does. A new channel for stormwater run-on will be excavated on the west side of the re-established berm. The total disturbance area for this component is 40.31 acres, 34.52 of which are on lands potentially suitable for PPC. No known PPC will be impacted by this construction.

### **Conservation Measures**

A formal endangered species consultation between the EPA and the Service for an earlier configuration of stormwater improvements for the Mission Mine resulted in issuance of a Biological Opinion (Consultation #2-21-03-F-0014). As part of that consultation, EPA, the Applicant, and the TON proposed the following measures to minimize potential adverse effects to the PPC and its habitat. The Corps is proposing essentially the same conservation measures for current Project impacts as part of the current proposed action:

- 1) Stormwater controls will be designed in such a way as to avoid individual PPC and areas of PPC concentration to the extent practicable while complying with the Stormwater Pollution Prevention Plan (SWPPP).
- 2) The release of channelized run-on stormwater at SWPPP-designated outfalls will be directed into existing ephemeral drainages rather than as sheetwash dispersed over the general area. No PPC or suitable PPC habitat on the Mission Complex, or adjoining areas beyond the footprint of the Mission Complex, will be adversely affected by discharge of stormwater or invasion of exotic plants as a result of excess water, erosion, or deposition of excessive amounts of silt or other materials.
- 3) The Tohono O’odham Nation has jurisdiction over PPC on their lands. No PPC were found within the Project disturbance area during a survey conducted in 2012, but the disposition of any PPC that would be directly impacted on Tohono O’odham lands would be determined by Tohono O’odham San Xavier natural resources staff and the Applicant before removal.
- 4) The proposed action will result in the permanent removal of approximately 59.7 acres of PPC habitat. The Applicant established an 877.2-acre conservation easement (see Figure 17 of the BA) pursuant to conditions of a 1998 Biological Opinion for a new tailings facility at the Mission Complex (Consultation #2-21-97-028). The Applicant will expand its 877.2-acre conservation area by 59.7 acres of PPC habitat, to 936.9 acres, to compensate for the loss of PPC habitat, and provide PPC conservation therein through conservation easement.

The Applicant will provide for appropriate management of the easement by removal of grazing; fencing the area from public access and to ensure removal of grazing; posted no trespassing/no offroad, which will be enforced by Applicant security patrols; and locked gates for further control of public access, but allowing for access of appropriate personnel to the microwave tower and relay station. The location of the additional acreage will be within the Mission Complex, but not necessarily adjacent to the existing conservation area. The location will be coordinated with the Service and will be within existing PPC habitat.

5) The six PPC that will be impacted on private lands within the Mission Complex will be transplanted to the Applicant's PPC conservation area.

## STATUS OF THE SPECIES

Recent investigations of taxonomy and geographical distribution focused in part on assessing the validity of the taxon (see Baker 2004, Baker 2005, and Schmalzel *et al.* 2004). Although there is evidence for a general pattern of clinal variation across the range of the species (Schmalzel *et al.* 2004), this does not preclude the recognition of taxonomic varieties within *C. sheeri* (= *C. robustispina*). Baker (2005) found that there are distinct geographical gaps between the distribution of this subspecies and the other subspecies, which occur in eastern Arizona, New Mexico, and Texas, and that the subspecies are morphologically coherent within their respective taxa (Baker 2004). His geographical and morphological work supports the idea that the sub-specific groups within *C. robustispina* are indeed discrete, and merit separate taxonomic status as subspecies (U.S. Fish and Wildlife Service 2007).

We have determined that PPC that are too isolated from each other may not be effectively pollinated. For example, the major pollinator of PPC is thought to be *Diadasia rinconis*, a ground-nesting, solitary, native bee. McDonald (2005) found that PPC plants need to be within approximately 600 m (1,969 ft) of each other in order to facilitate effective pollination. Based on this information and other information related to similar cacti and pollinators, we have determined that PPC plants that are located at distances greater than 900 meters from one another become isolated with regard to meeting their life history requirements. The species is an obligate outcrosser (not self-pollinating), so it is important for plants to be within a certain distance to exchange pollen with each other. Also, the study found that pollination was more effective when other species of native cacti are near areas that support PPC. The native bees pollinate a variety of cacti species and the sole presence of PPC may not be enough to attract pollinators.

The PPC occurs south of Tucson, in Pima and Santa Cruz counties, Arizona, as well as in adjacent northern Sonora, Mexico. In Arizona, it is distributed at very low densities throughout both the Altar and Santa Cruz valleys, and in low-lying areas connecting the two valleys. This cactus generally grows on slopes of less than 10 percent and along the tops (upland areas) of alluvial bajadas. The plant is found at elevations between 2,360 feet (ft) and 4,700 ft (Phillips *et al.* 1981, Benson 1982, Ecosphere Environmental Services Inc. 1992), in vegetation characterized as either or a combination of Arizona upland of the Sonoran desertscrub community and semi-desert grasslands (Brown 1982, Johnson 2004). Paredes-Aguilar *et al.* (2000) reports the subspecies from oak woodlands in Sonora. Several attempts have been made to delineate habitat within the range of PPC (McPherson 2002, RECON Environmental Inc. 2006, U.S. Fish and Wildlife Service unpublished analysis) with limited success. As such, we are still unable to determine exact ecological characters to help us predict locations of PPC or precisely delineate PPC habitat (U.S. Fish and Wildlife Service 2007), except perhaps in localized areas (U.S. Fish and Wildlife Service 2005). We appreciate the discussion in the BA regarding the extent of potential habitat within the range of the PPC, but the existing uncertainty regarding habitat characteristics and the lack of a range-wide scientific PPC habitat evaluation result in only being able to discuss these attributes in a general manner.

As a consequence of its general habitat requirements, considerable habitat for this species appears to exist in Pima and Santa Cruz counties, much of which is unoccupied. PPC occurs at low densities, widely scattered, sometimes in clumps, across the valley bottoms and bajadas. The species can be difficult to detect, especially in dense grass cover. For this reason, systematic surveys are expensive and have not been conducted extensively throughout the range of the PPC. As a result, location information

has been gathered opportunistically, either through small systematic surveys, usually associated with specific development projects, or larger surveys that are typically only conducted in areas that seem highly suited for the species. Furthermore, our knowledge of the distribution and status of this species is gathered primarily through the section 7 process; and we only see projects that require a Federal permit or have Federal funding. There are many projects that occur within the range of PPC that do not undergo section 7 consultation, and we have no information regarding the status or loss of plants or habitat associated with those projects. For these reasons, it is difficult to address abundance and population trends for this species. We do not find that the best available information allows for very specific PPC population estimates such as was presented in the BA. The approach and methodology used to make the PPC population estimates in the BA limit their reliability and utility as we analyze the effects of the proposed action on the conservation and recovery of this species.

The Arizona Game and Fish Department maintains the Heritage Data Management System (HDMS), a database identifying elements of concern in Arizona and consolidating information about their distribution and status throughout the state. This database has 5,553 PPC records, 5,449 PPC of which have coordinates. Some of the records are quite old, and we have not confirmed whether the plants are still alive. We also cannot determine which plants may be the result of multiple surveys in a given area. Of the known individuals (5,553), approximately 1,340 PPC plants are documented in the database as extirpated as of 2003. There have been additional losses since 2003, but that information is still being compiled in the database. The database is dynamic, based on periodic entry of new information, as time and staffing allows.

As such, the numbers used from one biological opinion to the next may vary and should be viewed as a snapshot in time at any given moment. We have not tracked loss of habitat because a limited number of biological assessments actually quantify habitat for PPC.

We do know the number and fate of PPC that have been detected during surveys for projects that have undergone section 7 consultation. Through 2014, section 7 consultations on development projects (e.g., residential and commercial development, mining, infrastructure improvement) considered 2,939 PPC plants found on approximately 15,771 acres within the range of the PPC. Of the total number of plants, 2,170 PPC (74 percent) were destroyed, removed, or transplanted as a result of development, mining, and infrastructure projects. In terms of PPC habitat, some of the 15,771 acres likely did not provide PPC habitat, but that amount is difficult to quantify because PPC habitat was not consistently delineated in every consultation. Of the 15,771 acres, however, we are aware that 15,106 acres (96 percent) have been either permanently or temporarily impacted. Some of these acres may still provide natural open space, but we have not been informed of any measures (e.g., conservation easements) that have been completed to ensure these areas will remain open. Through section 7 consultation on non-development-related projects (e.g., fire management plans, grazing, buffelgrass control), we are aware of an additional 781 plants within an unknown number of acres; we do not know the number of acres because these types of projects are often surveyed for PPC inconsistently, if at all. Across the entire PPC range, it is difficult to quantify the total number of PPC lost and the rate and amount of habitat loss for three reasons: 1) we review only a small portion of projects within the range of PPC (only those that have Federal involvement and are subject to section 7 consultation), 2) development that takes place without any jurisdictional oversight is not tracked within Pima and Santa Cruz counties, and 3) many areas within the range of the PPC have not been surveyed; therefore, we do not know how many plants exist or how much habitat is presently available.

Some additional information related to the survival of PPC comes from six demographic plots that were established in 2002 in the Altar Valley. The results from the first year (2002-2003) indicate that the populations were stable; out of a total of over 300 PPC measured, only 10 died, and two PPC seedlings

were found (Routson *et al.* 2004). The plots were not monitored in 2004, but were visited again starting in May 2005. In the two years between September 2003 and September 2005, 35 individuals, or 13.4 percent, of the original population had died and no new seedlings were found (Baker 2006). Baker (2006) suggests that recruitment likely occurs in punctuated events in response to quality and timing of precipitation, and possibly temperature, but there is little evidence until such events occur. He goes on to say that further observations need to be made to determine the rate at which the population is declining, because, based on an overall rate of die-off of 13.4 percent every two years, few individuals will be alive at this site after 15 years. As this monitoring program continues, critical questions regarding the life cycle of this species will be answered.

Threats to PPC continue to include habitat loss and fragmentation, competition with non-native species, and inadequate regulatory mechanisms to protect this species. We believe residential and commercial development, and its infrastructure, is by far the greatest threat to PPC and its habitat. However, we have only a limited ability to track the cumulative amount of development within the range of PPC. What is known with certainty is that development pressure continues in Pima and Santa Cruz counties.

Invasive grass species may be a threat to the habitat of PPC. Habitat in the southern portion of the Altar Valley is now dominated by Lehmann lovegrass (*Eragrostis lehmanniana*). According to Gori and Enquist (2003), Boer lovegrass (*Eragrostis chloromelas*) and Lehmann lovegrass are now common and dominant on 1,470,000 acres in southeastern Arizona. They believe that these two grass species will continue to invade native grasslands to the north and east, as well as south into Mexico. These grasses have a completely different fire regime than the native grasses, tending to form dense stands that promote higher intensity fires more frequently. Disturbance (like fire) tends to promote the spread of these non-natives (Ruyle *et al.* 1988, Anable *et al.* 1992). Roller and Halvorson (1997) hypothesized that fire-induced mortality of PPC increases with Lehmann lovegrass density. Buffelgrass (*Pennisetum ciliare*) has become locally dominant in vacant areas in the City of Tucson and along roadsides, notably in the rights-of-way along Interstate 10 and State Route 86. Some portions of PPC habitat along these major roadways are already being converted to dense stands of buffelgrass, which can lead to recurring grassland fires and the destruction of native desert vegetation (Buffelgrass Working Group 2007).

The effects of climate change (i.e., decreased precipitation and water resources) are a threat to the long-term survival and distribution of native plant species, including the PPC. For example, temperatures rose in the twentieth century and warming is predicted to continue over the twenty-first century. Although climate models are less certain about predicted trends in precipitation, the southwestern United States is expected to become warmer and drier. In addition, precipitation is expected to decrease in the southwestern United States, and many semi-arid regions will suffer a decrease in water resources from climate change as a result of less annual mean precipitation and reduced length of snow season and snow depth. Approximately half of the precipitation within the range of the PPC typically falls in the summer months; however, the impacts of climate change on summer precipitation are not well understood. Drought conditions in the southwestern United States have increased over time and may have contributed to loss of PPC populations through heat stress, drought stress, and related insect attack, as well as a reduction in germination and seedling success since the species was originally listed in 1993, and possibly historically. Climate change trends are likely to continue, and the impacts on species will likely be complicated by interactions with other factors (e.g., interactions with non-native species and other habitat-disturbing activities).

The Arizona Native Plant Law can delay vegetation clearing on private property for the salvage of specific plant species within a 30-day period. Although the Arizona Native Plant Law prohibits the 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. Even if PPC are salvaged from a site, transplanted individuals only contribute to a population if they survive and are close enough (within 900 m [(2,970 ft)]) to other PPC to be part of a breeding population from the perspective of pollinator travel distances and the likelihood of effective pollination. Transplanted PPC have variable survival rates, with moderate to low levels of survival documented. Past efforts to transplant individual PPC to other locations have had limited success. For example, on two separate projects in Green Valley, the mortality rate for transplanted PPC after two years was 24 percent and 66 percent, respectively (SWCA, Inc. 2001, WestLand Resources, Inc. 2004). One project southwest of Corona de Tucson involved transplanting PPC into areas containing *in situ* plants. Over the course of three years, 48 percent of the transplanted individuals and 24 percent of the *in situ* individuals died (WestLand Resources, Inc. 2008). There is also the unquantifiable loss of the existing PPC seed bank associated with the loss of suitable habitat. Furthermore, once individuals are transplanted from a site, PPC is considered to be extirpated from that site, as those individuals functioning in that habitat are moved elsewhere.

Pima County regulates the loss of native plant material associated with ground-disturbing activities through their Native Plant Protection Ordinance (NPPO) (Pima County 1998). The NPPO requires inventory of the site and protection and mitigation of certain plant species slated for destruction by the following method: the designation of a minimum of 30 percent of on-site, permanently protected open space with preservation in place or transplanting of certain native plant species from the site. There are various tables that determine the mitigation ratio for different native plant species (e.g. saguaros, ironwood trees, PPC) with the result that mitigation may occur at a 1:1 or 2:1 replacement ratio. Mitigation requirements are met through the development of preservation plans. The inadvertent consequence of this ordinance is that it has created a “market” for PPC. Any developer who cannot avoid this species or move it to another protected area must replace it. Most local nurseries do not grow PPC (and cannot grow them legally unless seed was collected before the listing). As a result, some environmental consultants are collecting PPC seed from existing sites (which can be done with a permit from the Arizona Department of Agriculture and the permission of the private landowner), germinating seed, and placing PPC plants grown from seed back on these sites. There have been no long-term studies of transplant projects, thus the conservation benefit of these actions is unknown. Moreover, growing and planting PPC does not address the loss of PPC habitat that necessitated the action of transplanting cacti in the first place.

Other specific threats that have been previously documented (U.S. Fish and Wildlife Service 1993), such as overgrazing, illegal collection, prescribed fire, and mining, have not yet been analyzed to determine the extent of effects to this species. However, partial information exists. Overgrazing by livestock, illegal collection, and fire-related interactions involving exotic Lehmann lovegrass and buffelgrass may negatively affect PPC populations. Mining has resulted in the loss of hundreds, if not thousands, of acres of potential habitat throughout the range of the plant. We appreciate the additional discussion in the BA related to the potential effects of mining on PPC and find that the potential future effects of mining are uncertain.

The protection of PPC habitat and individuals is complicated by the varying land ownership within the range of this species in Arizona. An estimated 10 percent of the potential habitat for PPC 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 plant’s range or in scattered parcels. The largest contiguous parcel of federally-owned habitat is the Buenos Aires National Wildlife Refuge, located at the southwestern edge of the plant’s range at higher elevations and with lower plant densities. No significant populations of PPC are known from Sonora or elsewhere in Mexico (Baker 2005).

There have been some notable conservation developments for this species. As of 2010, there are two conservation banks for PPC, one on a private ranch in the Altar Valley (Palo Alto Ranch Conservation Bank) and another owned by Pima County that includes areas in both the Altar Valley and south of Green Valley. In the Palo Alto Ranch Conservation Bank to date, a total of 700 acres have been conserved through the execution of conservation easements. In Pima County's Bank, a total of 530 acres are under a conservation easement at this time (the County offsets its own projects within this bank). Additionally, three large blocks of land totaling another 1,078 acres have been set aside or are under conservation easements through previous section 7 consultations (see consultations 02-21-99-F-273, 02-21-01-F-101, and 02-21-03-F-0406). While not formal conservation banks, these areas, currently totaling 1,739.6 acres, are set aside and managed specifically for PPC as large blocks of land, and likely contribute to recovery of the taxon for this reason; therefore, we consider these acres conserved. Another 647 acres of land have been set aside as natural open space within the developments reviewed through section 7 consultation between 1995 and 2010. However, these are often small areas within residential backyards (not in a common area) that are difficult to manage and usually isolated within the larger development, and often include areas that do not provide PPC habitat (e.g., washes). Some conservation may occur onsite because of these open space designations, but long-term data on conservation within developed areas are lacking; the value of these areas to PPC recovery over the long-term is likely not great.

In summary, PPC conservation efforts are currently hampered by a lack of information on the species. Specifically, we have not been able to determine exact ecological characters to help us predict locations of PPC or precisely delineate its habitat, and considerable area within the PPC range has not been surveyed. Further, there are still significant gaps in our knowledge of the life history of PPC; for instance, we have yet to observe a good year for seed germination. From researcher observations and motion sensing cameras, we have learned that ants, Harris' antelope squirrels, and jackrabbits act as seed dispersal agents. Demographic plots have been only recently established, and information is just now beginning to be reported with regard to describing population dynamics for PPC in the Altar Valley.

Development and associated loss of habitat remain important and continuing threats to this taxon. However, the expanding threat of non-native grasses and resulting altered fire regimes are a serious concern for the long-term viability of the species, as is ongoing drought. The full impact of drought and climate change on PPC has yet to be studied, but it is likely that, if recruitment occurs in punctuated events based on precipitation and temperature (Baker 2006), PPC will be negatively affected by these forces. Already we have seen a nearly 25% loss of individuals across six study sites in the Altar Valley between 2010 and 2011; these deaths were attributed largely to drought and associated predation by native insects and rodents (Baker 2011). Conservation efforts that focus on habitat acquisition and protection, like those proposed by Pima County and the City of Tucson, are important steps in securing the long-term viability of this taxon. Regulatory mechanisms, such as the native plant protection ordinances, provide conservation direction for PPC habitat protection within subdivisions, and may serve to reduce PPC habitat fragmentation within areas of projected urban growth.

## **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 Federal actions in the action area that have undergone formal or early section 7 consultation, and 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.

### **Description of the Action Area**

The action area for this project is defined as those areas directly affected by the proposed action, as well as any indirect effects that may occur as a result of runoff or changes in drainage patterns that are the result of the proposed action. Figure 2 of the BA shows the extent of the proposed stormwater control structures. These areas are generally limited to narrow bands of proposed disturbance lying along the periphery of existing mine features such as dumps and tailings piles. As described earlier, the total area of proposed disturbance is 83.60 acres, distributed across the Mission Complex as indicated in Figure 2 of the BA. This area of potential disturbance plus small areas of potential PPC habitat affected by discharge from these features are considered the action area for this project. The action area is characterized primarily by existing mine features of the Mission Complex. There are smaller areas of undisturbed natural open space. Adjacent to the Mission Complex are residential developments and associated road infrastructure and drainage features, as well as additional undeveloped, natural open space. Land ownership includes private lands, lands administered by the Arizona State Land Department and Bureau of Land Management, as well as tribal lands of the TON to the north (see Figure 3 of the BA).

#### **A. Status of the Species within the Action Area**

Information provided during the 2002 section 7 consultation with EPA included the results of PPC surveys for the Mission Complex. The area surveyed in 2002 was larger than the area of current proposed action, but it provides general insights into the number and density of PPC in the general vicinity of the currently proposed action.

The survey located 306 live PPC and 61 dead PPC within the survey area of 1,388 acres dictated by the maximum combined areas of stormwater controls and mine expansion (Sage Environmental 2002), representing a PPC density of 0.22 plants per acre that is within the normal range for the region (Mills 1991). The survey crew located 16 PPC that were either uprooted or trampled by cattle, and noted that some areas with high densities of PPC were impacted by heavy cattle grazing. Of all of the PPC located, 41% were in flower or had fruit, 45% had produced viable pups (offsets), and 27% had both pups and flowers or fruits. An unspecified number of plants were found in bottomland areas and along stream channels, usually considered unsuitable habitat for PPC, and suggesting a tolerance for disturbance (Sage 2002).

PPC have recolonized areas within the Mission complex that had been disturbed. During surveys conducted by Dames and Moore (1997) PPC were located in the bottoms of two stormwater detention basins, constructed in 1969. Sage (2002) also found PPC within roadways, on top of a stormwater control dike, and along stream channels. This indicates that not all areas that are disturbed become unsuitable for PPC.

An earlier Service biological opinion was issued for impacts to PPC on July 27, 1998, (2-21-97-F-328) for the construction and operation of tailing impoundment No. 4 at Mission. Construction of the impoundment directly affected 309 individual PPC. Conservation measures associated with the action resulted in the establishment of an 877-acre conservation easement. This site was used for transplantation of affected PPC. Survival rates are unknown. Additional acres will be added to these conservation lands as part of the currently proposed action.

With regard to the currently proposed action, WestLand conducted two surveys for PPC on approximately 364 acres of Applicant lands between 2010 and 2012 (WestLand 2010, 2012). The surveys covered the entire Project Area and were completed to provide sufficient data to describe and understand the density and distribution of PPC within the Project Area. WestLand found 65 live PPC during the two survey efforts. There were 65 live PPC found during a 357-acre survey effort covering most of the Project Area in 2010, with 3 at San Xavier North, 3 at Ike Dump, 47 near South Pima Dump, and 12 near TSF-6 and TSF-7 (WestLand 2010). No PPC were found in November 2012 during a survey of approximately 7 acres next to TSF-6 (WestLand 2012). Each survey included land outside of the Project Area.

Of the 65 PPC found during the surveys, only six were found within the Project Area—including none at San Xavier North or Ike Dump, three around South Pima Dump, one around TSF-6, and two around TSF-7. Approximately half of all the PPC found were in a block of land on the east side of South Pima Dump, where an alternative location for a stilling pool was contemplated but eliminated from the plans in part because of the high density of PPC in the area.

#### B. Factors Affecting Species Environment within the Action Area

Pima pineapple cacti within the action area are protected from most of the threats faced by this species throughout its range. Threats such as urban development and recreational off-road vehicle use are limited because the action area is primarily lands owned by Asarco and these types of activities are limited because of the mining actions and access control on these lands. The primary threats to PPC in the action area are related to ongoing mining activities and are the subject of this BO.

There is some potential for actions related to roadway infrastructure and utility construction that is not part of the mining operations to occur within the action area. Local municipalities and the Arizona Department of Transportation may establish rights-of-way across the action area. These actions would contribute to the loss of individual PPC, as well PPC habitat loss and fragmentation.

Ongoing urbanization and residential development adjacent to the Mission Complex is likely to continue at some level. Such activities can affect the conservation and recovery of PPC within the action area if such actions increase PPC habitat loss and fragmentation. The conservation and recovery of this species is dependent on maintaining large blocks of unfragmented habitat that are supported by appropriate habitat connectivity. These habitat configurations are necessary for this species to provide for seed dispersal, the maintenance of a seed bank, and the ongoing occurrence of pollinators and other plant species that support the pollinators of PPC.

### **EFFECTS OF THE ACTION**

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

The proposed stormwater run-on and run-off controls construction and maintenance would disturb a maximum of 83.60 acres of land within the action area. Not all of these acres provide potential PPC habitat. It is estimated that there will be 59.66 acres of PPC habitat impacted by the proposed action. The remaining acres, although disturbed during construction, will be available for PPC recolonization after construction. Accordingly, the proposed action would result in the permanent loss of 59.66 acres of habitat and the removal of up to 6 PPC.

To compensate for the permanent loss of PPC habitat, Asarco has agreed to add 59.66 additional acres to its existing 877-acre conservation easement. In addition, PPC on Mission fee lands that will be affected by the proposed action will be transplanted to the conservation easement. Although transplant success of PPC is low, there may be a few plants that survive. Asarco will coordinate with the Service to determine appropriate areas where the additional acreage will be set aside for the conservation of PPC. Setting aside additional acreage of occupied PPC habitat, with a similar density and occurrence of PPC, will result in additional conservation benefits for the species. A 1:1 ratio for replacement is adequate as the average density for cactus associated with the proposed action is at the low end of the range of densities for this region (based on previous and current surveys). PPC will not be able to survive in the long-term in small, fragmented areas surrounded by urban development. Large, contiguous blocks of habitat need to be managed for their natural values. All of the proposed conservation actions included in the biological assessment and this BO are necessary to offset impacts to PPC and its habitat.

## **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.

Cumulative impacts from private actions include potential future mining operations at Mission and Phelps Dodge Sierrita mines, future development activities at the Caterpillar Proving Grounds, urban development in areas around south Tucson, Green Valley, Nogales, Rio Rico, and along the Santa Cruz River. While some of these activities are likely to have a Federal nexus, some will not. Some consideration for the conservation of PPC may be afforded through Pima County's development processes as described in the BA. However, without any protective measures under the Act or through Pima County, the only protection available is through the Arizona Native Plant Law, which provides only for salvage for scientific and educational purposes. Regardless of the process or the outcome of salvaged PPC transplants, PPC habitat will continue to be lost, cumulatively impacting the potential for the survival and recovery of this species.

## **CONCLUSION**

After reviewing the current status of the Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed stormwater control structures, and the cumulative effects, it is our biological opinion that the Mission Complex stormwater controls project, as proposed, is not likely to jeopardize the continued existence of the pineapple cactus. No critical habitat has been designated for this species; therefore, none will be affected. This conclusion is based on the full implementation of the project as described in the Description of the Proposed Action section of this document, particularly the conservation measures that were incorporated into the project design and proposed action. Specifically:

- A very small number of individual PPC (6) will be directly or indirectly affected by the proposed action. The affected PPC will be transplanted within the conservation easement lands.
- The loss of occupied PPC habitat is offset by the conservation in perpetuity of an additional 59.7 acres of PPC habitat being placed in the existing conservation easement established under an earlier BO for the conservation of PPC.

### **INCIDENTAL TAKE STATEMENT**

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally-listed 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. Neither incidental take nor recovery permits are needed from the Service for implementation of the proposed action.

#### **Disposition of Dead or Injured Listed Species (Lesser long-nosed bat)**

Upon locating a dead, injured, or sick listed species, initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

### **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.

- 1) We recommend that the Corps work with Asarco and FWS to expand the size of the PPC conservation area at the Mission complex to improve core habitat areas and habitat connectivity.
- 2) We recommend that Corps work with Asarco and FWS to monitor the success of the PPC transplant efforts associated with this and other projects.
- 3) We recommend that Corps work with Asarco to address invasive species issues within the Mission Complex PPC conservation areas.
- 4) We recommend that Corps, in cooperation with FWS, develop long-term conservation strategies for PPC and incorporate those strategies into the CWA 404 permitting process.

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

**REINITIATION NOTICE**

This concludes formal consultation on the action(s) outlined in the reinitiation 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 retained (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 not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Our office appreciates the Corps' efforts to identify and minimize effects to listed species from this project. For further information please contact Scott Richardson (520) 670-6150 (x242) or Jean Calhoun (520) 670-6150 (x223). Please refer to the consultation number 02EAAZ00-2014-F-0456 in future correspondence concerning this project.

Sincerely,

*/ s / Scott Richardson for*  
Steven L. Spangle  
Field Supervisor

cc (hard copy):

Field Supervisor, Fish and Wildlife Service, Phoenix, AZ (2)  
Jean Calhoun, Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ  
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cc (electronic copy):

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Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ (Attn: John Windes)  
Westland Resources, Tucson, AZ (Attn: Brian Lindenlaub)

**LITERATURE CITED**

- Baker, M. 2004. Phenetic analysis of *Coryphantha*, section *Robustispina* (Cactaceae), part 1: stem characters. Final report submitted to U.S. Fish and Wildlife Service under contract with the Arizona Board of Regents, University of Arizona, Tucson. 21 pp.
- Baker, M. 2005. Geographic distribution and DNA analysis of *Coryphantha robustispina* ssp. *robustispina*, part 1: geographic distribution. Final report submitted to the Department of Agriculture on 7 July 2005. 7 pp. + appendices.
- Baker, M. 2006. 2005 demographic study of *Coryphantha robustispina* ssp. *robustispina*. Status report prepared for Bureau of Reclamation. 17 pp.
- Baker, M. 2011. A demographic study of *Coryphantha robustispina* ssp. *robustispina* – report to BOR. Phoenix Area Office. 51 pp.
- Benson, L. 1982. The Cacti of the United States and Canada. Stanford University Press, Stanford, CA. Page 820.
- Brown, D.E., ed. 1982. Biotic Communities of the American Southwest---United States and Mexico. Desert Plants 4:1-342.
- Buffelgrass Working Group. 2007. Buffelgrass invasion in the Sonoran Desert: Imminent risks and unavoidable mitigation. 4 pp. <http://www.buffelgrass.org/pdf/invasion.pdf>, accessed May 19, 2009.
- Ecosphere Environmental Services Inc. 1992. Final Report: A survey for threatened and endangered plant species at three proposed reservoir sites and associated pipelines. Bureau of Reclamation contract 0-CS-32-1950. Farmington, NM. 69 pp.
- Gori, D. F. and C. A. F. Enquist. 2003. An assessment of the spatial extent and condition of grasslands in Central and Southern Arizona, Southwestern New Mexico and Northern Mexico. Prepared by the Nature Conservancy, Arizona Chapter. 28 pp.
- Johnson, M. B. 2004. Cacti, other succulents, and unusual xerophytes of southern Arizona. Boyce Thompson Southwestern Arboretum, Superior, AZ. 96 pp.
- Lenart, M. 2007. *Global Warming in the Southwest: Projections, Observations and Impacts*. Tucson: The Climate Assessment Project for the Southwest (CLIMAS) Institute for the Study of Planet Earth, the University of Arizona.
- McDonald, C. J. 2005. Conservation of the rare Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*): recruitment after fires and pollination in the Altar Valley of southern Arizona. Master of Science Thesis, School of Natural Resource, The University of Arizona. 82 pp.
- McPherson, G. R. 2002. Relationship of ecological variables in the field with the presence of Pima pineapple cactus. Report to USFWS under agreement 1448-20181-01-J818. 4 pp.
- Mills, G.S. 1991. Miscellaneous notes on (*Coryphantha scheeri* var. *robustispina*). Unpublished

report. U.S. Fish and Wildlife Service, Arizona Ecological Services Office, Phoenix, Arizona.

Paredes-Aguilar, R., T. R. Van Devender, and R. S. Felger. 2000. Cactáceas de Sonora, México: Su diversidad, uso, y conservación. Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora (IMADES), Hermosillo, Sonora y Arizona-Sonora Desert Museum, Tucson, AZ. 143 pp.

Phillips, A. M. III, B. G. Phillips, and N. Brian. 1981. Status report for *Coryphantha scheeri* var. *robustispina*. Unpublished Report. U.S. Fish and Wildlife Service, Office of Endangered Species, Albuquerque, NM.

RECON Environmental, Inc. 2006. Draft Pima County Multi-Species Conservation Plan, Pima County, Arizona and Attachments.

Roller, P. S. and W. L. Halvorson. 1997. Fire and Pima pineapple cactus (*Coryphantha scheeri* Kuntze var. *robustispina* Schott) in southern Arizona. In Proceedings of Fire Effects on Rare and Endangered Species and Habitats Conference, Coeur d'Alene, Idaho. Pp. 267-274.

Routson, R., M. Dimmitt, and R. C. Brusca. 2004. A demographic study of *Coryphantha scheeri* var. *robustispina*. Final report to USFWS. NFWF contract # 2000-0015. 18 pp.

Sage Landscape Architecture and Environmental. 2002. Pima pineapple cactus survey of the ASARCO Mission Complex, Pima County, Arizona: 2002 survey results. 10 p.

Schmalzel, R. J., R. T. Nixon, A. L. Best, and J. A. Tress. 2004. Morphometric variation in *Coryphantha robustispina* (Cactaceae). Systematic Botany 29:553-568.

SWCA, Inc. 2001. September 12, 2001 Technical Memorandum regarding the PPC mitigation program at Las Campanas.

U.S. Fish and Wildlife Service. 1993. Determination of endangered status for the plant PPC (*Coryphantha scheeri* var. *robustispina*). Federal Register 58(158):49875-49880.

U.S. Fish and Wildlife Service. 2005. Biological Opinion on the Buenos Aires National Wildlife Refuge Fire Management Plan for the 2005-2008 Burn Seasons. AESO 02-21-05-F-0243. Arizona Ecological Services Office, Phoenix, Arizona. May 20, 2005. 56pp.

U.S. Fish and Wildlife Service. 2007a. 5-year review for Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*). Arizona Ecological Services Office, Phoenix, Arizona. 17 pp. Available at: [http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/PimaPineappleCactus/PPC\\_5yrReview.pdf](http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/PimaPineappleCactus/PPC_5yrReview.pdf)

U.S. Fish and Wildlife Service (FWS). 2007b. Lesser long-nosed bat 5-year review: summary and evaluation. Available at: <http://www.fws.gov/southwest/es/arizona/Lesser.htm>. Accessed June 30, 2011.

WestLand Resources, Inc. 2004. January 26, 2004, Technical Memorandum regarding the transplanted PPC at the Madera Highland Reserve.

WestLand Resources, Inc. 2008. May 22, 2008, Technical Memorandum regarding the survival of transplanted Pima pineapple cactus on the Sycamore Highland Property.

Westland Resources, Inc. 2010. Pima pineapple cactus survey: Mission Mine complex proposed stormwaters controls project. Technical report. 17 pp.

Westland Resources, Inc. 2012. Pima pineapple cactus survey on 7 acres at ASARCO's Mission Mine tailings storage facility 6. Technical report. 8 pp.

## APPENDIX A.

### Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuena*)

#### Environmental Baseline

This species is known from grasslands, arid scrublands, and oak woodlands below 5500 ft. in elevation. In Arizona, these bats arrive in mid- April, roosting in caves, abandoned mine shafts and tunnels. Young are typically born in maternity colonies in mid-May. Females and young remain in maternity roosts and forage on primarily saguaros below about 3500 ft. until approximately mid-July. At this time, the range expands and bats are found up to about 5500 ft. in areas of semi-desert grassland and lower oak woodland, foraging primarily on agaves. These bats typically leave southern Arizona by late September to early October. While there are small caves and some mine shafts in the Sierrita Mountains in the general vicinity of the project, no roost sites or maternity colonies are known to be within the action area for the proposed stormwater controls.

The primary threats to the lesser long-nosed bat are roost site loss or disturbance and impacts to forage availability (FWS 2007b). Other threats that have contributed to the current endangered status of the species include roost disturbance and deterioration, border activities, recreation, vandalism, fire, vampire bat control, mine closures, and forage availability. The effects of climate change (i.e., decreased precipitation and water resources) are a threat to many species, including the lesser long-nosed bat (Lenart 2007). For example, temperatures rose in the twentieth century and warming is predicted to continue over the twenty-first century. Although climate models are less certain about predicted trends in precipitation, the southwestern United States is expected to become warmer and drier. In addition, precipitation is expected to decrease in the southwestern United States, and many semi-arid regions will suffer a decrease in water resources from climate change as a result of less annual mean precipitation and reduced length of snow season and snow depth. Approximately half of the precipitation within the range of the lesser long-nosed bat typically falls in the summer months; however, the impacts of climate change on summer precipitation are not well understood. Drought conditions in the southwestern United States have increased over time and may have contributed to loss of lesser long-nosed bat populations since the species was originally listed in 1988, and possibly historically. Climate change trends are likely to continue, and the impacts on species will likely be complicated by interactions with other factors (e.g., interactions with habitat-disturbing activities and impacts to forage resources).

Lesser long-nosed bats are likely to forage within the general vicinity of the Mission Complex, using species of agave and columnar cacti, as well as hummingbird feeders. *Agave palmeri* in the action area typically occurs in relatively small numbers in the foothills portion of the Sierrita Mountains. Saguaro cacti are not numerous within the action area.

#### Conclusion

The Service concurs with the Corps' determination that the action may affect, but is not likely to adversely affect lesser long-nosed bat, based upon the following:

- There are no known roost sites within the action area; therefore, the effects to roosts will be discountable.
- There are no significant occurrences of saguaro cacti or agaves within the action area, therefore the effects to lesser long-nosed bat forage resources will be insignificant.