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AESO/SE
02EAAZ00-2014-F-0077

November 14, 2014

Mr. David B. Kessler
Federal Aviation Administration
P.O. Box 92007
Los Angeles, California 90009-2007

Dear Mr. Kessler:

This biological opinion responds to your September 5, 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 September 8, 2014. At issue are impacts resulting from the proposed relocation of the East Hughes Access Road located south of the Tucson International Airport in the City of Tucson, 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 yerbabuenae*). Our concurrence is provided in Appendix A of this biological opinion.

As indicated in the biological assessment (BA), the Sonoran desert tortoise (*Gopherus morafkai*) is a candidate species under the Act. As such, it receives no regulatory protection under the Act and you are not required to consult on this species under the Act for this project. We will not discuss this species further in this biological opinion (BO). However, we are supportive of any actions that the project proponents can take to further the conservation of this species within the project area. We recommend complete implementation of the proposed Sonoran desert tortoise conservation measures outlined in the BA (see page 28 of the BA).

This BO is based on information provided in your September 5, 2014, correspondence, including SWCA's September 2014 Biological Assessment (BA) of the proposed action. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, roadway construction, 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

- August 21, 2013 – The Service met with Pima County staff to discuss the proposed project and potentially affected listed species.
- November 27, 2013 – A draft BA was submitted to the Service for review and comment.
- January 16, 2014 – The Service provided comments on the draft BA in the form of a technical assistance letter.
- September 5, 2014 – The Federal Aviation Administration (FAA) requested formal consultation with the Service on the effects of East Hughes Access Road Relocation Project, and provided a BA and background information related to the proposed action.
- October 15, 2014 – The Service provided the draft BO to the Corps for their review.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Tucson Airport Authority's (TAA) and the Pima County Department of Transportation's (PCDOT) purpose of this project is to relocate the existing East Hughes Access Road to comply with the safety arc imposed by the United States Air Force (USAF) for USAF Plant 44 adjacent to the road that is leased by Raytheon Missile Systems (Raytheon) and to implement that part of the Tucson International Airport's (TUS) Airport Layout Plan (2014). The TAA's and PCDOT's need for this project is for East Hughes Access Road to comply with USAF safety arc for USAF Plant 44 facilities leased by Raytheon. The FAA's statutory mission is to ensure the safe and efficient use of navigable airspace in the United States. The FAA must ensure that the Proposed Action does not impair the safety of aircraft and airport operations at the TUS. The Proposed Action would improve transportation access to and at TUS, and would support the safe and efficient use of navigable airspace in the United States.

The TAA and the PCDOT are proposing to relocate the existing paved, two-lane, undivided section of East Hughes Access Road immediately south of TUS from just east of South Old Nogales Highway to South Alvernon Way (see Figures 1 and 2 of the BA). The proposed project would construct a new two-lane section of East Hughes Access Road approximately 2,500 feet south of the existing alignment, for a total length of approximately 3.9 miles, within a 150- to 170-foot-wide roadway corridor. The proposed project is estimated to permanently impact 106 acres of which 79.57 acres would be for new Right of Way (ROW) acquisition, 7.55 acres for drainage easements, 4.93 acres for potential material management areas, and 13.75 acres for potential impacts within existing ROW consisting of pavement removal and clearing and grubbing areas. The project would shift current traffic[1] from the existing two-lane alignment to the new location with two lanes. Traffic volumes are not anticipated to significantly increase on the relocated roadway, so Pima County has determined that maintaining the relocated roadway with two lanes is adequate to handle traffic volumes. The project would change the project area from undeveloped land to a two-lane roadway (one lane in each direction). It is anticipated that construction and reclamation actions will take approximately 12 months.

[1] Average daily traffic is currently estimated at 14,600 vehicles per day.

The proposed project also includes the following construction activities (see Figure 3 of the BA for the specific locations of each of these activities):

1. relocation of existing two-lane undivided roadway and tie-back into East Hughes Access Road and the extension of South Alvernon Way;
2. two 11-foot lanes with 10-foot shoulders on either side of the roadway (6 feet paved and 4 feet graded) (Figure 4);
3. construction of an approximately 0.4-mile-long entry road to USAF Plant 44 (i.e., South Hughes Access Road);
4. tie-back of new South Hughes Access Road into existing South Hughes Access Road
(i.e., entry road to USAF Plant 44);
5. stripe obliteration and restriping of South Hughes Access Road on USAF property (i.e., entry road to USAF Plant 44;
6. removal of pavement at tie-backs on the west and east ends to prevent access from the relocated East Hughes Access Road to the existing East Hughes Access Road;
7. construction of turn lanes at the intersections of the relocated East Hughes Access Road with South Hughes Access Road, South Country Club Road, and South Alvernon Way;
8. new traffic signal and low-voltage, directional lighting at the new intersection of East Hughes Access Road and South Hughes Access Road;
9. new flashing traffic signal and low-voltage, directional lighting at the new intersection of East Hughes Access Road and South Alvernon Way;
10. relocation of the T-intersection of East Hughes Access Road and South Country Club Road 2,500 feet south of the existing location;
11. relocation of the driveway on South Alvernon Way for the access road to existing businesses 160 feet southeast of the existing driveway location;
12. construction of drainage improvements at 17 locations (Appendix D includes locations of drainage improvements, typical cross section, plan and profile, and detail graphic);
13. removal of 4.1 acres of pavement—0.9 acre of existing East Hughes Access Road and South Alvernon Way and 3.2 acres of existing wildcat roads;
14. potential use of approximately 5 acres for material management areas outside new ROW that the contractor may use for the storage of equipment and materials during construction;[2] and
15. relocation of overhead utilities (i.e., Tucson Electric Power, CenturyLink, and Comcast); and
16. to construct the relocated roadway, Pima County will acquire and establish the road ROW and drainage easements. Of the 79.57 acres of new ROW needed, Pima County will purchase at fair market value 51.12 acres from TAA and 4.49 acres from COT, and establish 23.96 acres of ROW from Pima County owned property.

[2] Material management areas are ones that the contractor may use for the storage of equipment during construction. The three material management areas each have different land ownership: Pima County, the TAA, and the COT. The material management areas were chosen in soil types that do not provide habitat for PPC within the project area (or within disturbed areas where no PPC were found) and would have minimal impact to saguaros. Although these areas have been identified, it is possible that they will not need to be used because the new ROW is expected to be able to accommodate all the necessary equipment and materials.

Of the 7.55 acres of drainage easements, Pima County will purchase 6.04 acres from TAA at fair market value and dedicate 1.51 acres from Pima County owned property for construction of the relocated roadway.

Project planning would restrict disturbances to within the project area. Impacts to existing vegetation would be minimized in the following ways: project plans would clearly depict project limits, and special provisions would note that contractor must stay within the project limits; initial staking and marking during pre-construction survey to clearly define project limits (i.e., ROW and easement boundaries) in the field and installation of strategically placed preservation fencing around sensitive vegetation (e.g., saguaros, PPC, and xeroriparian habitat in and near ephemeral drainages) prior to commencing construction activities would distinguish areas for construction from areas for preservation; and maintenance of existing traffic would be limited to the east and west connection points of the project, so the contractor would have more flexible use of the ROW since it does not have to be shared with traffic. To minimize erosion and sedimentation, and hence stormwater pollution, during and after construction activities, a stormwater pollution prevention plan (SWPPP) will be prepared and implemented.

Conservation Measures

The following non-species-specific conservation measures have been incorporated into the project design.

Pima County Responsibilities

- Protected native plants within the project will be impacted by this project; therefore, Pima County will send the notification to the Arizona Department of Agriculture at least 60 calendar days prior to the start of construction.
- Pima County shall prepare a SWPPP that meets the requirements of the current Arizona Pollutant Discharge Elimination System general permit for Discharge from Construction Activities to Waters of the U.S. (WUS).

Pima County Design Responsibilities

- All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity.
- The new lighting that will be installed at the new East Hughes Access Road and South Alvernon Way intersection and the new East Hughes Access Road and South Hughes Access Road will be low-voltage, directional lighting.
- Culverts have been designed consistent with the recommendations to improve wildlife connectivity in the Arizona Game and Fish Department's (AGFD's) study of crossing structure designs that facilitate wildlife movements (AGFD 2011) (see Appendix D of the BA).

Contractor Responsibilities

- The contractor shall identify and treat noxious and invasive species infestations (e.g., buffelgrass) prior to construction consistent with PCDOT's Special Provision 201-3.04, *Noxious and Invasive Vegetation.*

- To prevent the introduction of invasive species seeds, all earthmoving and hauling equipment shall be washed at the contractor's storage facility prior to entering the construction site.
- To prevent invasive species seeds from leaving the site, the contractor shall inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.

- All disturbed soils that will not be landscaped or otherwise permanently stabilized by construction will be seeded using species native to the project vicinity. This will include seeding of approximately 68 acres of disturbed areas with two seed mixes for the first application and approximately 17 acres for the second application,[3] including areas where pavement removal of existing roads would occur.
- The contractor shall follow the PCDOT's standard specifications for dust suppression during construction (Section 207) and shall obtain an air quality permit for dust from the Pima County Department of Environmental Quality.
- The contractor shall certify that the SWPPP prepared by Pima County meets the requirements of the currently Arizona Pollutant Discharge Elimination System general permit for Discharge from Construction Activities to WUS.

Pima County proposes the following conservation measures to minimize the effects of the proposed project on lesser long-nosed bats:

- Protect in place (including constructing fencing at 11 locations within or along the ROW to minimize or avoid impacts to saguaros), salvage and transplant, or replace all saguaros from the project area to within the adjacent ROW.
- Salvage or transplant affected saguaros on-site at 1:1 ratio, monitor all transplanted saguaros for 10 years, and if any transplanted saguaros die within the 10-year monitoring period, replace with 4- to 6-foot-tall saguaros at 1:1 ratio.
- Construct temporary fencing at 10 culvert locations where xeroriparian vegetation is associated with potentially jurisdictional WUS to protect and maintain maximum coverage of xeroriparian habitat and reduce impacts to sensitive species such as lesser long-nosed bats.

Pima County proposes the following conservation measures to minimize the effects of the proposed project on PPC:

- Protect in place as many PPC and as much habitat as possible during construction, including constructing fencing at locations within or along the ROW to minimize or avoid impacts to individuals. Additional fencing will be installed within the ROW and drainage easements to protect additional PPC, as needed.
- Pima County proposes the following conservation measures to compensate for the effects of the proposed project on PPC:
    - Purchase 70 acres of mitigation credits for PPC at Pima County's Madera Highlands/Elephant Head properties mitigation bank.[4]

[3] Second seeding application will occur close to the conclusion of the project in areas that have not been previously seeded and/or in areas where the first seeding application was not successful.

[4] In March 2006, Pima County Natural Resources, Parks and Recreation completed an agreement with USFWS to establish a new PPC conservation bank on two properties. These properties are known as Madera Highlands and Elephant Head and total 528.7

- Salvage and transplant all PPC that cannot be avoided from the project area to within the adjacent ROW and, based on information indicating limited success of transplant efforts on other projects, promote project-specific research into viability of transplanting PPC.

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

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acres, of which 494.0 acres were available for future mitigation credits for county-owned projects affecting PPC. Currently there are over 460 one-acre credits available for use, and although the acre credits are not allocated by location, but rather total credits available for the established bank, the two locations of the two properties are within Pima County. The Madera Highlands site is located 15.5 miles to the south of the unincorporated Three Points area on Highway 286, near milepost 27 at Altar Wash and is approximately 31 miles southwest of the project limits. The Elephant Head site is located 4.5 miles to the east of Interstate 19 near milepost 33 in the unincorporated Canoa Ranch area and is approximately 22 miles south of the project limits.

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 relatively 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, drought and climate change, 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 drought and 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 by the Service 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.

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 approximately 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 analysis is based on 1) the project area as described above; and 2) areas outside the project area that may be affected by noise, dust, light pollution, and other construction and post-construction activities. The action areas for the lesser long-nosed bat and the PPC are defined by a 1-mile buffer around the project area based on the anticipated effects of the proposed project and the occurrence of these two species in the vicinity of the Proposed Action. Temporally, the potential on-site and off-site impacts resulting from the Proposed

Action encompass all the activities associated with construction and post-construction seeding, and the temporal analysis period includes 12 months of project construction.

The Proposed Action is located along and south of the existing East Hughes Access Road between South Old Nogales Highway and South Alvernon Way within the city of Tucson and unincorporated Pima County (see Figures 1 and 2 of the BA). The lands within and adjacent to the project area are owned by the TAA, the COT, the USAF, and Pima County. Acquisition of ROW and drainage easements for land not currently owned by Pima County would be required from the TAA (this land is obligated under FAA grant assurances and subject to a land release and ALP update approval) and the COT. The existing alignment of East Hughes Access Road is located on a series of ROW easements or leases granted by the TAA, the USAF leased property to Raytheon, and the COT. After East Hughes Access Road is relocated, portions of the existing road that are no longer needed would be abandoned or exchanged for like value, and the rights would be restored to original grantors (TAA, USAF, and COT). Land held by the COT is subject to the TAA master lease and would not be removed from the TUS ALP (2014). A small portion of the proposed action is within the existing Pima County roadway easement on lands owned by the USAF and the COT, and portions of these easements would remain. Adjacent land uses include residential and commercial development, TUS, and open, undeveloped lands.

The action area is located within the Arizona Upland subdivision of the Sonoran Desertscrub biotic community, as defined by Brown (1994). Xeroriparian vegetation along and within the ephemeral washes is dominated by velvet mesquite (Prosopis velutina) and yellow palo verde (Parkinsonia microphylla) in the overstory and whitethorn acacia (Acacia constricta), wolfberry (Lycium sp.), and graythorn (Ziziphus obtusifolia) in the midstory. Vegetation associated with upland areas is relatively undisturbed and is dominated by creosote bush (Larrea tridentata var. tridentata). Other plant species that occur include saguaro (Carnegiea gigantea), ocotillo (Fouquieria splendens), cholla (Cylindropuntia spp.), barrel cactus (Ferocactus wislizeni), desert zinnia (Zinnia acerosa), desert marigold (Baileya multiradiata), paper flower (Psilostrophe cooperi), globemallow (Sphaeralcea sp.), galleta grass (Pleuraphis sp.), bush muhly (Muhlenbergia porteri), deergrass (M. rigens), and buffelgrass[5] (Pennisetum ciliare). No aquatic habitats (e.g., wetlands, springs, stock tanks, etc.) or broadleaf deciduous riparian vegetation communities occur in the project area.

A. Status of the Species within the Action Area

In April and November 2013, SWCA conducted a pedestrian survey for PPC within the 350-acre survey area surrounding (and including) the project area (300 acres were surveyed in April, and an additional 50 acres were surveyed in November) in accordance with the survey protocol recommended by USFWS. The survey included an area larger than the project footprint in order to evaluate indirect effects and any additional direct effects that may result from unforeseen construction requirements. Survey coverage was accomplished using a modification of the PPC survey techniques in which surveyors spaced approximately 6 m apart made one pass over

[5] This invasive grass species is especially concentrated in the southern portion of TAA property in the vicinity of the proposed project. TAA's buffelgrass eradication plan includes recent surveys (2012 and 2013) and treatments (2013) with herbicide. TAA is scheduled to treat buffelgrass on TAA property (including the areas of the existing and proposed East Hughes Access Roads) in summer 2014 and 2015 (personal communication from E. Roudebush, TAA, to D. Papajohn, PCDOT, February 2014).

suitable areas within the survey area surrounding the project area. Thirty PPC were detected during these surveys (and while conducting other surveys in the project area [i.e., native plant and Sonoran desert tortoise]), of which 9 are within the project area and 21 were in the additional area surveyed outside of the project area (see Appendix G of the BA for data and maps).

The project area lies within the current distribution (USFWS 2008b) and elevational range of PPC (USFWS 2005), there are reported occurrences of this species within 3 miles of the project area (AZHGIS 2013), and individuals were detected during the survey of the project area. Further, the project area contains the following plant species associated with PPC: mesquite, creosote bush, cholla, and barrel cactus. Finally, the soils and slopes in the project are typical of those found in PPC habitat, and the project area is in the Arizona Upland subdivision of the Sonoran Desertscrub biotic community, as defined by Brown (1994). Within the project area, PPC is found growing in two soil types: Sahuarita soils, Mohave Soils, and urban land with 1% to 5% slopes; and Stagecoach-Sahuarita Association with 1% to 8% slopes. There are approximately 250 acres of these soils types (for this analysis, we consider these soils and associated vegetation communities to be suitable PPC habitat) within the survey area that was surveyed for this species and approximately 70 acres of PPC habitat (based on the definition above) are found within the 106-acre project area (see Appendix G of the BA for maps).

B. Factors Affecting Species Environment within the Action Area

PPC within the action area are protected from some of the threats faced by this species in other portions of its range. Threats such as urban development and recreational off-road vehicle use are limited because the action area is primarily lands owned by TAA and these types of activities are limited because of the restrictions and access control related to airport activities in the vicinity of these lands. There is an area within the action area (borrow pit/sand and gravel pit) that has been previously disturbed as a result of materials extraction. Some PPC were found along the periphery of this disturbed area. Therefore, the primary threats to PPC in the action area are related to future materials extraction or construction of facilities related to airport activities.

Ongoing urbanization and residential development adjacent to project area and within the action area are 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 relocation of the East Hughes Access Road and associated drainage facilities will permanently disturb 106 acres of land within the action area. Not all of these acres provide potential PPC habitat. It is estimated that there will be 70 acres of PPC habitat impacted by the proposed action. Accordingly, direct effects from the proposed action will be the loss of approximately 70 acres of PPC habitat and the removal of nine of the 30 PPC found within the area of the project surveyed for PPC.

To compensate for the permanent loss of PPC habitat and the impacts to at least nine individual PPC, Pima County has agreed to purchase 70 acres of credits from the County's existing Madera Highlands/Elephant Head PPC conservation bank. In addition, individual PPC that fall within the construction footprint (according to the BA, there are nine PPC within the construction footprint) will be transplanted to areas within the adjacent ROW for this project. Although the documented transplant success of PPC is low, these results may not be representative because of the small sample size of transplant efforts. Pima County has agreed to monitor and report the results of this transplant effort. Documentation of the success of this transplant effort will increase our understanding of the effectiveness of salvaging and transplanting PPC as a conservation tool, and will potentially result in additional conservation benefits for the species.

Indirect effects of the Proposed Action include the potential to affect PPC from changed or excess drainage from the roadway, as well as the potential for increased presence of non-native, invasive plant species. Pima County has located drainage structures away from areas that support PPC. In addition, disturbed areas will be reseeded and/or landscaped in an effort to reduce erosion and stabilize soils in the vicinity of existing and transplanted PPC. Pima County has also committed to identify and treat areas of invasive species infestations prior to construction. This will reduce the potential for reestablishment of these species following construction. During construction, all equipment will be washed before entering the construction area, and all materials (soil, vegetation, etc.) will be removed from the equipment before leaving the construction area. Following construction, Pima County will conduct ongoing efforts to identify, remove, and eradicate non-native species infestations.

No interdependent or interrelated effects were identified for this project because the project has independent utility related to improved access and transportation circulation, as wells as bringing the roadway into compliance related to the required buffers associated with Raytheon.

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. The Service will continue to work with Pima County to address this need through planning and project implementation of future projects. All of the proposed conservation actions included in the BA for this project 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.

Federal lands adjacent to the project area include those owned by the United States Air Force (USAF) Plant 44 (leased by Raytheon) and TAA-owned lands that are obligated to the FAA. Cumulative effects include changes in land use and development patterns. The proposed project is a roadway relocation project that may alter land uses and development patterns of adjacent properties to aerospace uses by providing better access to these properties and could result in cumulative effects on the PCC similar to the indirect effects described above. Changes to roadway traffic levels may result should development occur on adjacent properties; however, any future projects to address roadway capacity would require separate environmental review actions. Any development of adjacent properties on TAA land would also be subject to separate environmental evaluations and Section 7 consultation, if required. The relocation of East Hughes Access Road would allow the USAF and Raytheon to continue the current operations at Plant 44 without needing a waiver for proximity to the roadway. Pima County and the TAA are not aware of any additional future developments in the action area.

CONCLUSION

After reviewing the current status of the PPC, 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 East Hughes Access Road relocation project, as proposed, is not likely to jeopardize the continued existence of the Pima pineapple cactus. No critical habitat has been designated for this species; therefore, none will be affected. 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 relatively small number of individual PPC (9) will be directly or indirectly affected by the proposed action. The affected PPC will be transplanted within the adjacent ROW and will continue to contribute to the population at some level. Measures are included in the Proposed Action that will reduce potential indirect effects related to drainage and non-native invasive species.
- The loss of occupied PPC habitat is offset by the conservation in perpetuity of 70 acres of PPC habitat being acquired in the County's existing PPC Conservation Bank. This will contribute to the conservation of core blocks of PPC habitat within its range.

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. However, 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. While implementation is not required, the Service is providing the following recommendations to assist the FAA in its obligation to conserve federally-listed species, when the FAA has an opportunity to do so.

1) We recommend that, when TAA and Pima County work to conserve PPC on lands in the vicinity of TUS, and if appropriate, survey and monitoring efforts be implemented to locate and identify PPC on lands each agency controls.

2) Since success of transplanting PPC is not well documented, we recommend FAA work with Pima County and the Service to monitor the success of the PPC transplant efforts associated with this project and when possible, other projects in the area for a period of five (5) years following the opening of the roadway for use by the public. Monitoring of the individual transplanted PPC would be accomplished using appropriate procedures to document positive and negative changes in the transplanted PPC from year to year. We also recommend monitoring of those individual PPC not transplanted within the ROW for the roadway project during this same five year period to gain a better understanding of any indirect effects on PPC by changes in localized surface water flow from storm events, and changes, if any, resulting from proximity to the new road or other associated ground disturbances. We recommend FAA provide an annual report on this monitoring effort to this office.

3) We recommend that the TAA and Pima County continue to address invasive species issues within TAA lands, and the proposed relocated East Hughes Access Road, respectively.

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 FAA's 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-0077 in future correspondence concerning this project.

Sincerely,

For

Steven L. Spangle
Field Supervisor

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

cc (electronic copy):
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ (pep@azgfd.gov)
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ (Attn: John Windes)
SWCA, Tucson, AZ (Attn: Angela Barclay)
Pima County Department of Transportation, Tucson, AZ (Attn: Karla Wise)

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APPENDIX A.

Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*)

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.

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).

There are no known roost sites in the vicinity of the Proposed Action. The closest known roosts occur in the Santa Rita Mountains, specifically on the northwestern and western slopes of this mountain range. Lesser long-nosed bats are known to travel long distances each night to forage; up to 40 miles one way. The Proposed Action falls within the foraging distance of roosts in the Santa Rita, Rincon, and Santa Catalina mountains. Therefore, there is the potential for lesser long-nosed bats to forage within the general vicinity of the Proposed Action. Foraging lesser long-nosed bats would potentially forage on various species of agave and columnar cacti, as well as hummingbird feeders within the action area.

Conclusion

The Service concurs with the FAA's determination that the Proposed 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 from this project will be discountable.
- The Proposed Action includes measures to avoid and minimize effects to lesser long-nosed bat forage resources (saguaros). By implementing these measures, there should be no net loss of forage resources within the action area. Therefore, the effects to lesser long-nosed bat forage resources will be insignificant.
- Lighting associated with the project will be low-voltage, directional lighting. Effects to foraging lesser long-nosed bats from the proposed lighting will be insignificant.