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In Reply Refer To:

September 4, 2008

AESO/SE
22410-2008-F-0373

Mr. John Santo
Acting Program Manager, SBI*net*
U.S. Department of Homeland Security
SBI*net* Program Management Office
U.S. Customs and Border Protection
1300 Pennsylvania Ave NW
Washington, D.C. 20229

RE: Biological Opinion on Secure Border Initiative (SBI*net*) Tucson West Tower Project, Ajo, Tucson, Casa Grande, Nogales, and Sonoita Stations Area of Operation, U.S. Border Patrol, Tucson Sector, Arizona

Dear Mr. Santo:

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request was dated June 19, 2008, and received by us on June 23, 2008. Effects determinations were clarified for a number of species in a June 26, 2008, electronic mail from Glenn Bixler, Department of Homeland Security (DHS). At issue are impacts that may result from the proposed SBI*net* Tucson West Tower Project (proposed action) located in Maricopa, Pinal, Pima, Cochise, and Santa Cruz counties, Arizona. The proposed action may affect the Chiricahua leopard frog (*Lithobates chiricahuensis*), Mexican spotted owl (*Strix occidentalis lucida*) and critical habitat, jaguar (*Panthera onca*), lesser long-nosed bat (*Leptonycteris yerbabuenae*), and Pima pineapple cactus (*Coryphantha scheeri* var *robustispina*).

Your agency requested our concurrence that the proposed action may affect, but is not likely to adversely affect, Gila topminnow (*Poeciliopsis occidentalis occidentalis*), Sonora chub (*Gila ditaenia*) and critical habitat, Sonoran tiger salamander (*Ambystoma mavortium stebbinsi*), masked bobwhite (*Colinus virginianus ridgewayi*), ocelot (*Leopardus pardalis*), and Huachuca water umbel (*Lilaeopsis schaffneriana recurva*) and critical habitat. Our concurrences for these species are provided in Appendix A. You also requested consultation on the western yellow-billed cuckoo (*Coccyzus americana*), a candidate for Federal listing. We do not consult on actions that may affect species that are not proposed or listed under the Act. We will, however, provide technical assistance on this species if requested.

This biological opinion is based on information provided in: (1) the June 19, 2008 biological assessment (BA); (2) the June 4, 2008 draft environmental assessment (EA); (3) the January 2008 Harris Environmental biological evaluation for Tucson West; (4) the 2008 Harris Environmental biological evaluation of Tucson East provided by DHS on June 5, 2008; (5) answers from Gulf South Research Corporation (GSRC) in response to specific questions between June 13 and July 3, 2008; (6) telephone conversations and electronic mail messages with DHS and consultants between July 7, 2008 and September 3, 2008; (7) a June 26, 2008, electronic mail message from Glenn Bixler, DHS; (8) telephone conversations and electronic mail messages with Coronado National Memorial, Buenos Aires National Wildlife Refuge (BANWR), Bureau of Land Management, and Coronado National Forest between June 5 and August 26, 2008; and (9) other sources of published and unpublished information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern, tower construction, operation, and maintenance and effects or those activities, or on other subjects considered in this opinion. A complete Administrative Record of this consultation is on file at this office.

Consultation History

May 20, 2008:	We received pre-draft BA via electronic mail.
May 28, 2008:	We participated in an interagency meeting to discuss this consultation.
June 4, 2008:	We received a draft EA.
June 13, 2008:	We sent comments on pre-draft BA to GSRC and DHS via electronic mail.
June 20, 2008:	We sent draft versions of a: (1) project description with request for additional information; (2) best management practices (BMPs); (3) effects table; and (4) mitigation table to GSRC and DHS via electronic mail for review.
June 23, 2008:	We received request for formal consultation and draft BA.
June 25, 2008:	We discussed BMPs, mitigation, and effects determination, with DHS and consultants via conference call.
June 26, 2008:	We received an electronic mail from Glenn Bixler clarifying the effects determinations.
June 30, 2008*:*	We received additional information on project description from consultants.
July 2, 2008*:*	We received Conservation Best Management Practices input and revised maps from consultants.

July 11, 2008: We sent draft biological opinion for agency review.

July 7, 2008 to September 3, 2008: We participated in several conference calls and exchanged electronic mail messages to resolve outstanding concerns and information needs regarding your project. During these calls we agreed to a number of Conservation Best Management Practices that are now incorporated into the "Description of the Proposed Action" of this biological opinion.

BIOLOGICAL OPINION

Description of the Proposed Action

The SBI*net* Tucson West Project includes the use of technology-based solutions to decrease illegal cross-border activities and deter and prevent illegal entries in the U.S. Border Patrol (USBP) Tucson Sector. This proposed action supports USBP's mission by strengthening national security between ports of entry (POEs) to prevent illegal entry of terrorists, terrorist weapons, contraband, and illegal entry into the U.S. These technologies will be an integral part of what is referred to as the Common Operating Picture (COP) of the border environment. The COP will provide connectivity with various U.S. Customs and Border Protection (CBP) components, and inter-operability with other Federal, state, and local partners outside of CBP.

The Proposed Action is to construct or retrofit, operate, and maintain 56 communication and sensor towers; construct 29 new road segments and repair 19 roads; use mobile surveillance systems; and deploy unattended ground sensors (UGS) (Appendices B-D). Twelve of the 56 towers are existing towers that will be upgraded. All but one of the new towers are less than 200 feet (ft) tall. One tower, powered by wind energy, will include a wind turbine. Additionally, construction of up to three tower sites will require helicopter deployment. Twenty-five of the existing roads leading to 36 tower sites, where data are available, are currently not accessible by 2-wheel drive vehicles. Thirty-six of the 45 new tower sites will require road repair or construction of new road segments. A total of 71,663 ft or 13.57 miles (mi) of road will be repaired or newly constructed. Tower installation will require ground disturbance of 9.97 acres at 44 new sites. A total of 107.97 acres will be temporarily or permanently disturbed by road repairs, new road construction, and tower installation at the new sites. The proposed action will be implemented in a phased-in approach, with completion of tower construction by the end of 2009.

The SBI*net* Tucson West Project represents a stand-alone system of sensors and communication technology and would not dictate the future placement of towers in adjacent areas. The tower locations within the proposed action do not limit or constrain the future deployment strategy or the future deployment asset locations in the Cabeza Prieta National Wildlife Refuge or any other adjacent project area. Future tower projects, however, may communicate information to towers currently being proposed for construction. Once each of the independent SBI*net* projects is complete and operational, the entire border region would be integrated into a single COP.

Location

The core area of proposed tower sites are generally located in south-central Arizona near the U.S./Mexico international border from the Baboquivari to the Huachuca Mountains (Figure 1). Additional sites are located near Ajo, Phoenix, Tucson, and Interstate Route 10 (I-10) between Tucson and Benson. The core action area extends north from the U.S./Mexico international border along the central ridge of the Baboquivari Mountains; east across the Altar Valley, Sierrita Mountains, Santa Cruz River, and Santa Rita Mountains, continuing eastward through the Patagonia Mountains, through the Canelo Hills and Huachuca Mountains, and south near the San Pedro River at the U.S./Mexico international border. No towers will be placed in federally designated wilderness areas.

The following additional tower sites are disjunct from the core action area. Seven towers follow the I-10 corridor between Tucson and Casa Grande. One tower is north of Interstate Route 8 (I-8), west of Casa Grande (TCA-AJO-193). The western portion of the action area includes a relay tower site north of Organ Pipe Cactus National Monument (OPCNM) (TCA-AJO-305).

Construction

Towers

Construction of 56 towers is included in the proposed action (Figure 1). Please refer to the BA for detailed maps of tower locations and access routes (CBP 2008a). Twelve of the 56 involve upgrading existing towers (seven existing USBP towers, four existing commercial towers, and one tower located at the new Ajo USBP Station (Table 1). The remaining 11 upgraded towers will only receive retrofits or upgrades to current tower communication hardware arrays.

Table 1. Existing or proposed towers planned for upgrades.

Tower ID	USBP Station	Status
TCA-AJO-193	Ajo	Commercial
TCA-AJO-198	Ajo	Commercial
TCA-AJO-305	Ajo	USBP
TCA-CAG-101	Casa Grande	USBP
TCA-CAG-197	Casa Grande	Commercial
TCA-TUS-103	Tucson	USBP
TCA-TUS-108	Tucson	USBP
TCA-TUS-192	Tucson	Commercial
TCA-NGL-112	Nogales	USBP
TCA-NGL-113	Nogales	USBP
TCA-SON-115	Sonoita	USBP
TCA-SON-117	Sonoita	USBP

The 56 proposed towers will include communication and/or sensor technology. Appendices B through D provide a summary of all tower and road metrics and other descriptors. A total of 9.97 acres of habitat will be temporarily or permanently disturbed for tower placement. Towers will typically range in height from 80 ft to 199 ft, although one tower is over 200 ft tall. Components will be mounted on each tower, from approximately 20 to 200 ft above ground level

(AGL), depending on local terrain. The exact number and type of components will depend on the number and types of cameras used, the area to be monitored, and other design variables. Additionally, one or more solid parabolic antennas will be mounted on platform railings or on a separate antenna mount (not to exceed 13 ft) on each tower. Communication and sensor equipment will be installed at a height that will ensure satisfactory views and provide clear pathways for transmission of information to relay stations and USBP stations, but will not extend above the tower height. Towers generally require line of sight (LOS) to ensure clear microwave transmission signals from tower to tower. Of the 44 new towers, three tower designs are proposed and include: self standing tower (SST) (9 or 10 towers), rapidly deployed tower (RDT) (33 or 34 towers), and Ravens Butte (RB) (1 tower). Design specifications and figures are provided in the EA (CBP 2008b). The RB tower is skid-mounted and allows helicopter deployment. Of the 44 new towers, 9 will be powered through the commercially available power grid, 34 will be powered by generator/solar hybrids, and the one tower deployed by helicopter will be powered by solar and wind turbine technology.

Federal Aviation Administration (FAA) permits and required lighting are necessary for all towers that exceed 200 ft. Currently, one proposed tower (TCA-SON-213), near Huachuca City, will be over 200 ft high. Lighting will be installed in accordance with FAA regulations, standards, and guidelines for the lighting of tower structures found in 14 CFR Section 77 and FAA Advisory Circulars AC 150/5345-43f and AC 70/7460-1K. For towers less than 200 ft in height, a night vision friendly strobe light will be placed at the top of each tower. When tower and tower facility lighting is necessary to meet FAA regulations or CBP operational needs, such as infrared lighting, U.S. Fish and Wildlife Service (2000) *Interim Guidance on Siting, Construction, Operation, and Decommissioning of Communication Towers* will be implemented to reduce night-time atmospheric lighting and the potential adverse affect of night-time lighting to migratory birds and bats. Tower facility lighting is not currently planned, but could be deemed necessary to meet CBP facility security requirements. If the tower sites are lighted for CBP security purposes, then lighting will use low sodium bulbs, will not illuminate the area outside the permanent footprint of the tower site, and will be activated by motion detectors.

At a maximum, construction of the tower site will result in ground disturbance within a 100-foot by 100-foot footprint centered on the tower location (see BA for design). All staging of equipment, if necessary, will occur within this footprint. The permanent tower site footprint will be no less than 50 ft by 50 ft, but could include the entire 100-foot by 100-foot enclosed area to minimize fire hazards. The towers will be installed on concrete foundations. The foundations for the SST towers consist of concrete piers. Each tower site will include a 10-foot by 12-foot equipment shelter. The tower and its associated equipment shelter and will be enclosed in a chainlink fence with 3 strands of barbed wire at the top.

The three main equipment and materials storage areas are located:

- at an existing 1-acre industrial warehouse facility in south Tucson near I-10, and would facilitate the construction of the proposed towers;
- at an existing 2.5-acre maintenance facility on the BANWR (for storage only) and;
- at an existing 1-acre warehouse facility in northeastern Ajo near State Route 85.

The mobile surveillance system consists of USBP vehicles retrofitted with technologies to allow USBP agents to acquire/send information via the new fixed communication and sensor towers. Numerous UGS will be deployed throughout the action area and could be repositioned in response to illegal activity. Vehicles will not travel off authorized roads for deployment of UGS. Each UGS will be hand carried to the desired location. Hand tools will be used to bury UGS. Deployment of each UGS will require a maximum of 16 square feet (ft^2) of surface disturbance.

Surveys for threatened and endangered species and flagging of construction areas will begin July 1, 2008. Construction activities will begin July 15 and conclude by September 30, 2008. The construction time for each proposed tower site is expected to be approximately 60 days and, in general, will occur during daylight hours; however, it is possible due to construction schedule constraints that some night-time construction could occur.

For most towers, equipment and materials will be transported to the site using heavy diesel trucks such as tractor trailers and dump trucks using the existing designated construction access roads and new access roads (see below for details on the roads).

Up to three towers will require helicopter deployment. Tower TCA-NGL-109, northwest of the Pajarita Wilderness on the Nogales Ranger District of the Coronado National Forest, will require helicopter deployment. Two other towers (TCA-TUS-040, TCA-TUS-042), west of the Pajarita Wilderness on the Nogales Ranger District of the Coronado National Forest, are being considered for helicopter deployment because extensive road improvements would be required. Helicopters used will be a Sikorsky 61, Sikorsky 58, or both. Helicopter deployment will require up to 62 trips per tower to deliver materials and equipment and to remove any unused materials and equipment. Two trips per construction day per tower for a maximum of 60 days will be required to deliver and remove personnel. Some nighttime construction may be required. There will also be two helicopter trips per tower, every two to three weeks for tower maintenance for the three towers. Helicopters will not land at the sites, and removal or trimming of vegetation will not be required. Monitors will be transported to the site with other personnel and equipment or will walk to the site from the nearest accessible road.

Roads

Twenty-four of the existing roads leading to 35 tower sites where data are available are currently not accessible by 2-wheel drive vehicles (Appendix C). Most of these roads and some of the 2-wheel drive accessible roads will require repair or construction of new road segments. Thirty-five of the 44 new tower sites will require repair or construction of new road segments.

Twenty-eight new roads, totaling 6,529 ft in length totaling 14.39 acres will be constructed as a part of the Action (Appendix C). The new roads will be constructed to provide a 12-foot wide driving surface with 2-foot shoulders on each side. New roads will be surfaced with *in-situ* materials. Twenty-three new roads require cut and fill, 4 new roads require excavation but no fill, and 5 new roads require v-ditches on one side of the road (see Table 2). Cut-and-fill will be required for some new roads and could extend as much as 22 ft on either side of new roads (yielding a permanent impact corridor of 56 ft wide). V-ditches range in width from 2 to 10 ft wide (yielding a permanent impact corridor that is up to 26 ft wide). Temporary impact

corridors may be greater than 56 ft wide for roads that require cut and fill and greater than 26-ft wide for roads that require V-ditches because of the additional impact of the construction equipment. Where possible, construction equipment will stay within the area to be impacted by cut-and-fill or V-ditches.

Table 2. Cut and fill operations and v-ditches required for new roads for each tower.

Tower ID	New Road Needed?	Cut & Fill on New Road	V-ditch on New Road?
TCA-CAG-102	N	NA	NA
TCA-CAG-195	N	NA	NA
TCA-TUS-032	N	NA	NA
TCA-TUS-035	Y	Cut but no fill	N
TCA-TUS-036	N	NA	NA
TCA-TUS-038	Y	N	N
TCA-TUS-040	Y	Y	N
TCA-TUS-041	Y	Y	N
TCA-TUS-042	Y	N	N
TCA-TUS-085	Y	Cut but no fill	N
TCA-TUS-181	Y	Y	N
TCA-TUS-185	Y	Y	N
TCA-TUS-187	Y	Y	N
TCA-TUS-287	Y	Y	Y (8 to 9 ft) (3:1 slope)
TCA-TUS-290	Y	Y	N
TCA-TUS-291	Y	Y	Y (6 to 10 ft) (3:1 slope)
TCA-TUS-298	Y	Y	N
TCA-TUS-299	N	NA	NA
TCA-TUS-300	N	NA	NA
TCA-TUS-306	N	NA	NA
TCA-TUS-307	N	NA	NA
TCA-NGL-043	Y	Y	N
TCA-NGL-044	Y	Y	N
TCA-NGL-045	Y	Y	Y (8 ft) (3:1 slope)
TCA-NGL-046	Y	Y	N
TCA-NGL-047	N	NA	NA
TCA-NGL-048	N	NA	NA
TCA-NGL-049	Y	Y	N
TCA-NGL-050	Y	Y	N
TCA-NGL-052	Y	Y	N
TCA-NGL-054	Y	Y	N
TCA-NGL-109	N	NA	NA
TCA-NGL-210	Y	Cut but no fill	Y (4 ft) (2:1 slope)
TCA-NGL-211	Y	Y	N
TCA-NGL-285	Y	Cut but no fill	N
TCA-SON-055	Y	Y	N
TCA-SON-056	N	NA	NA
TCA-SON-057	N	NA	NA
TCA-SON-058	Y	Y	Y (2 to 5 ft) (3:1 to 6:1 slope)

Tower ID	New Road Needed?	Cut & Fill on New Road	V-ditch on New Road?
TCA-SON-059	Y	Y	N
TCA-SON-060	N	NA	NA
TCA-SON-061	Y	Y	N
TCA-SON-062	N	NA	NA
TCA-SON-213	Y	Y	N

Nineteen roads, totaling 65,134 ft in length and 23.89 acres, will be repaired as part of the proposed action. Appendix C lists lengths of road repairs associated with each specific tower. Repair of existing approach and access roads will be required to move construction equipment, materials, and personnel to and from the proposed tower sites. Repair is only needed to allow passage of heavy construction equipment. *In-situ* materials will be used to surface repaired road segments. All road repairs will be temporary in that they will not include cut and fill, installation of drainage structures, additional aggregate, or stabilizers. All repaired road segments will be graded to a maximum width of 12 ft, which may be greater than the width of the existing road. Therefore the permanent impact corridors will be up to 12 ft wide for repaired roads, although temporary impact corridors may be greater than 12 ft wide. A map for each tower site, depicting improved and new road segments, is included in Appendix 2 of the EA (CBP 2008b)

Road construction will begin with site preparation, which includes necessary grading, contouring, and vegetation removal. Road construction will be accomplished using heavier diesel earthmoving equipment. Noise associated with road construction will be similar to tower construction noise, described above. Appendix 2 of the EA includes a map for each tower site depicting improved and new road segments.

Mobile Surveillance Systems

The mobile surveillance system consists of USBP vehicles retrofitted with technologies to allow USBP agents to acquire/send information via the new fixed communication and sensor towers. These mobile surveillance systems will be deployed on existing roads and moved periodically in response to shifts in IA traffic.

Unattended Ground Sensors

UGS will be deployed throughout the action area in areas of known, suspected, or anticipated IA traffic and repositioned in response to shifts in illegal activity. Deployment of UGS will require a maximum footprint of 16 ft^2 of surface disturbance using hand tools at each site. However, the actual disturbed area will typically be much less as the buried components are very small. Due to the need for cryptic placement of UGS, disturbance will be minimal and generally will not be detectable by humans or wildlife. Deployment is likely to occur near trails or roads and all off-road deployment sites will be accessed by foot.

Maintenance

Towers, Mobile Surveillance System, Unattended Ground Sensors

Maintenance for tower sites will include refueling of propane generators, as well as changing oil, oil filters, and spark plugs. Maintenance will be required at two to three week intervals at those tower sites without access to a commercial power grid. Tower sites connected to commercial power will require maintenance less than six times a year. Each generator will be in an enclosure and will have a spill containment basin with a volume five times that of the total engine fluids. Tower site maintenance will require travel to each of the proposed tower sites by vehicle, via the newly constructed and repaired roads or by helicopter where there is no road access. Appendix B presents power type for each new tower.

A wind turbine will be used in-lieu of a liquid propane fired generator at tower site TCA-NGL-109. This tower site is located on a mountain peak with no existing vehicle access.

No maintenance of mobile surveillance systems or UGS is needed. No other maintenance will occur as part of this proposed action.

Roads

Maintenance of roads was not specifically proposed as part of this action; however; we assume that some periodic maintenance will be required to allow access for site maintenance.

Operation

Towers, Mobile Surveillance System, Unattended Ground Sensors

Ten of the 45 new towers will be operated from the commercial grid. All power lines will be installed either overhead or in buried cables from the main trunk line to the tower site shelter and on an elevated cable tray to the tower. If commercial power is used, the installation of overhead or buried lines will be placed within surveyed road construction buffer areas. When commercial power is not readily available, solar cells are used as the primary power source. In both cases, a liquid propane-fueled generator will be located on site as a back up power source in the event that power from the primary source is interrupted. Liquid propane tanks will be mounted on concrete pads which will be pre-formed, delivered to each site, and anchored every six ft. Each generator will be in an enclosure and will have a spill containment basin with a volume five times that of the total engine fluids.

A wind turbine will be used in-lieu of a liquid propane generator at proposed tower site TCA-NGL-109. The turbine will be approximately 10 ft in height, including props, and will be mounted at a height of approximately 30 ft resulting in an overall tower height of approximately 40 ft. The turbine is located on Coronado National Forest near the Pajarita Wilderness on a flat mountain top occupied by grasses and yuccas. The Southwest Windpower Air-X Turbine speed ranges from 500 rpm at winds of 8 mph to 1800 rpm at winds of 29 mph. Electronic torque control brakes engage above 1800 rpm to prevent overspeed.

Thirty-four of the 44 new towers will have hybrid solar/propane generators, which are expected to operate twice per day, for between one hour and three hours for each start. This is to bulk charge system batteries. Run times will be shorter on sunny days, when the solar array system will provide more of the system operating power. Generator run times for systems connected to the power grid will be limited to one hour twice a month for system conditioning, plus off-grid operation schedules if grid power is interrupted.

The mobile surveillance system and UGS will be monitored electronically, which will provide data necessary to track illegal activities. The mobile surveillance system will allow USBP agents to acquire/send information acquired from those systems through the new fixed communication and sensor towers. These mobile surveillance systems will be deployed on existing roads and moved periodically in response to shifts in IA traffic. UGS will be operated throughout the action area in areas of known, suspected, or anticipated IA traffic and repositioned in response to shifts in illegal activity.

Noise

Sources of noise associated with the proposed action include construction activities and equipment, helicopter deployment from construction and maintenance of three towers, and generators that are used for operation of the towers. Depending on the source, it is estimated that noise associated with the proposed action will travel up to 15,000 ft before it attenuates to 55 A-weighted decibels (dBA) (*i.e.*, estimated for background levels). The distance each noise source associated with the proposed action will attenuate to 55 dBA is presented in Table 3. The noise buffer around tower sites and access roads defines the maximum extent of direct effects (Figure 2).

Table 3. Range of noise effects resulting from proposed action.

Activity	Noise Source	Location	Distance to Attenuate to 55dBA (feet)
Tower site construction; approach road repairs, access road construction	Heavy Construction Equipment	New tower sites and all roads	1000
Tower operation	Generator	All tower sites	165
Helicopter deployment	Helicopter	TCA-NGL-109, TCA-TUS-040, TCA-TUS-042	15,000

It is estimated that temporary or short-term noise levels resulting from use of heavy equipment and generators will not exceed 53 dBA at 1,000 ft beyond the source. However, the range of potential adverse noise effects associated with heavy equipment and generators would be 500 ft, at which distance noise levels would attenuate to less than 65 dBA. It is assumed that noise will be generated from construction activities for the entire duration of construction. Typical construction noise levels will decrease as the distance increases from the source. It is estimated that at approximately 50 ft from certain construction activities the noise level will be

approximately 85 dBA, at approximately 300 ft the noise level will be approximately 70 dBA. No pile driving will be used for construction. An additional temporary source of noise will be associated with construction vehicle traffic.

Each tower will be equipped with a back-up generator which will be operated on a routine basis to ensure operability. Noise associated with the generators is expected to be a long-term intermittent noise and will attenuate to below 55dBA in 165 ft. Generators for towers that are not connected to the commercial grid are expected to operate twice per day, for one to three hours for each start. Run times will be shorter on sunny days. Generators for systems connected to the power grid will be limited to one hour, twice per month for system conditioning, and during commercial power interruptions.

The loudest noise is from helicopter operations associated with construction and maintenance of three towers. Helicopter noise will be a long-term intermittent noise that will attenuate to below 55dBA in 15,000 ft. During construction there will be 62 helicopter trips per tower to carry equipment and two trips per day per tower for 60 days, from July 15 to September 30, 2008, to carry personnel to the three remote towers. There will also be two helicopter trips per tower, every two to three weeks for tower maintenance for the three towers.

Description of the Proposed Conservation Best Management Practices

General Conservation Best Management Practices

The following Conservation Best Management Practices, developed as BMPs, will be implemented by CBP or its contractor to avoid or minimize impacts associated with the proposed action. These include Conservation Best Management Practices for species with "no effect" or "not likely to adversely affect" determinations. The following Conservation Best Management Practices are intended to minimize adverse affects, but if they do not meet their intended goal, or if they are not implemented, then reinitiation or additional mitigation may be needed.

Project Planning/Design - Communication and Wind Towers

The following measures were adapted from our *Interim Guidance on Siting, Construction, Operation, and Decommissioning of Communication Towers* (U.S. Fish and Wildlife Service 2000), *Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Tu*rbines (U.S. Fish and Wildlife Service 2003a) and the Arizona Game and Fish Department's (AGFD) *Wind Energy Development Guidelines* (AGFD 2006).

1. CBP will minimize bird perching and nesting opportunities for new towers.

2. CBP will not site towers in or near wetlands, other known bird concentration areas (*e.g.,* state or Federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. If this is not an option, mitigation will be required.

3. Where CBP will be constructing taller (>199 ft AGL) towers requiring lights for aviation safety, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA will be used (FAA 2000). Unless otherwise required by the FAA, CBP will use only white (preferable) or red strobe lights at night, and these will be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. CBP will not use solid red or pulsating red warning lights at night as they appear to attract night-migrating birds at a much higher rate than white strobe lights.

4. CBP will not use guy wires for support to reduce the probability of bird and bat collisions.

5. CBP will use security lighting for on-ground facilities and equipment that is down-shielded to keep light within the boundaries of the site.

6. CBP will site, design, and construct towers and appendant facilities to avoid or minimize habitat loss within and adjacent to the tower "footprint." CBP will minimize road access and fencing to reduce or prevent habitat fragmentation and disturbance, and to reduce above-ground obstacles to birds in flight.

7. When ridges, canyons, cliffs, and fissures are within the project vicinity, CBP will offset wind turbines at least 50 meters (m) from the geologic features. If turbine placement cannot be offset, CBP will mitigate effects. Ridges, steep slopes, valleys, canyons, cliffs, and fissures are usually areas of concentrated wildlife, generally birds and bats.

8. Unless site-specific key species behavioral observations indicate more optimal tower and blade dimensions, CBP will place turbines inside the site perimeter fence with lower blade reaches at least 10 ft above ground and upper blade reaches no more than 40 ft high.

9. CBP will use the minimum wind turbine blade rpm and will consider reducing the blade rpm during spring and fall bird migration, and nights. If the minimum turbine blade rpm cannot be used, CBP will mitigate effects.

10. CBP will paint the ends of the wind turbine blades to minimize motion smear.

11. Where feasible, CBP will place electric power lines underground or on the surface as insulated, shielded wire to avoid electrocution of birds and bats. CBP will use recommendations of the APLIC (1994, 1996) for any required above-ground lines, transformers, or conductors. CBP will use raptor protective devices on above ground wires.

12. When upgrading or retrofitting turbines, CBP will follow the above guidelines as closely as possible. If studies indicate high mortality at specific turbines, CBP will relocate or retrofit turbines.

13. CBP will control noxious weeds using approved herbicides.

14. If rodent populations on the perimeter of the facility are to be controlled, CBP will not use rodenticides.

15. CBP will develop a Fire Management Plan as part of tower construction and in coordination with the landowner and/or land management agency.

16. CBP will develop and fund implementation of a long-term monitoring plan to document and assess tower related mortality of lesser long-nosed bats. This monitoring plan, to be approved by FWS, will be funded by the third quarter of fiscal year 2009. It will include systematic lesser long-nosed bat searches and use of radar, GPS, infrared, thermal imagery, and/or acoustical monitoring equipment to assess and verify bat movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems. Information gained from implementation of this monitoring plan will be used to develop tower retrofits to reduce lesser long-nosed bat mortality, if collisions are documented.

17. Once CBP has determined that towers are no longer needed, CBP will remove them within 12 months of cessation of use. CBP will restore footprint of towers and associated facilities to natural habitat.

Project Planning/Design - General

1. Biological Surveys. For each project, CBP will either assume presence of a federally-listed species based on suitable habitat or known presence, and implement appropriate measures or will, as part of project design and planning, perform pre-construction surveys according to established standardized protocols.

2. CBP will develop (in coordination with FWS) a training plan regarding Trust Resources for construction personnel. At a minimum, the program will include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, sensitivity of the species to human activities, legal protection afforded these species, penalties for violations of Federal and State laws, reporting requirements, and project features designed to reduce the impacts to these species and promote continued successful occupation of the project area environs.

3. Included in this program will be color photos of the listed species, which will be shown to the employees. CBP will provide maps of federally listed species habitats. Following the education program, the photos will be posted in the contractor and resident engineer office, where they will remain through the duration of the project. The selected construction manager will be responsible for ensuring that employees are aware of the listed species.

4. CBP will use disturbed areas or areas that will be used later in the construction period for staging, parking, and equipment storage.

5. CBP will give particular importance to proper design and locating roads such that the potential for road bed erosion into federally listed species habitat will be avoided or minimized.

6. CBP will give particular importance to proper design and locating roads such that the potential for entrapment of surface flows within the roadbed due to grading will be avoided or minimized. Depth of any pits created will be minimized so animals do not become trapped.

7. CBP will give particular importance to proper design and locating roads such that the widening of existing or created roadbeds beyond the design parameters due to improper maintenance and use will be avoided or minimized.

8. CBP will give particular importance to proper design and locating roads such that excessive use of unimproved roads that results in their deterioration such that it affects the surrounding federally listed species habitat areas will be monitored, corrective maintenance provided, and documented in the Project Report.

9. CBP will give particular importance to proper design and locating roads such that the fewest roads needed for proposed actions will be constructed to proper standards. In concurrence with the landowners and/or land management agency, once CBP determines that access roads constructed as part of this proposed action are no longer needed for the purpose of this project, CBP will close and restore access roads to natural surface and topography using appropriate techniques. The Global Positioning System (GPS) coordinates of roads that are thus closed will be recorded and integrated into the CBP Geographic Information System (GIS) database. A record of acreage or miles of roads taken out of use, restored, and revegetated will be maintained.

10. CBP will implement a strategy, to offset its agencies' use of groundwater for construction and maintenance of towers, on a gallon-for-gallon basis, within the Sierra Vista sub-watershed. This strategy will include, but is not limited to, the Upper San Pedro Partnership and/or its member agencies.

11. CBP will develop and implement a storm water management plan (SWMP). Erosion control measures and appropriate BMPs, as required and promulgated through the SWMP and engineering designs, will be implemented before, during, and after soil disturbing activities. Areas with highly erodible soils will be given special consideration when preparing the SWMP to ensure incorporation of various erosion control techniques such as straw bales, silt fencing, aggregate materials, wetting compounds, and rehabilitation, where possible, to decrease erosion.

12. CBP will prepare a site restoration plan, to be approved by FWS. This site restoration plan will be funded in the third quarter of fiscal year 2009 and will provide an achievement goal to be met by the restoration activity. If seeding with native plants is identified as appropriate, seeding will take place at the proper season, and with seeds from nearby stocks if available. It is understood that some sites cannot be restored, and the project planning documents will acknowledge this.

13. Rehabilitation conducted by CBP will include re-vegetating or the distribution of organic and geological materials (i.e., boulders and rocks) over the disturbed area to reduce erosion while allowing the area to naturally vegetate. Native seeds or plants, which are compatible with the enhancement of protected species, will be used to revegetate staging areas and other temporarily disturbed areas. Native seed mix will be reviewed by a qualified botanist as part of project planning. In addition, organic material will be collected and stockpiled during construction to be used for erosion control after construction while the areas naturally re-vegetate. Materials used for on-site erosion control will be free of non-native plant seeds and other plant parts to limit potential for infestation. Because natural materials cannot be certified as completely weed-free, CBP will follow up with the use of such materials by monitoring the rehabilitated site.

14. CBP will document any establishment of non-native plants and will implement appropriate control measures.

15. CBP will ensure that all construction will follow DHS management directive 5100 for waste management.

16. A CBP-approved spill protection plan will be developed and implemented at construction and maintenance sites to ensure that any toxic substances are properly handled and that escape into the environment is prevented. Agency standard protocols will be used. Drip pans underneath equipment, containment zones used when refueling vehicles or equipment, and other measures are to be included.

17. CBP will incorporate BMPs relating to project area delineation, water sources, waste management, and site restoration into project planning and implementation for road construction and maintenance. CBP will also incorporate this information into the CBP BA.

18. CBP security lighting at facilities will be designed to minimize light pollution beyond the designated security zone while achieving light levels needed for operational purposes. Because directed lighting for security zones can extend ambient light levels well over 900 ft away from the source, the effects of lighting extend beyond the immediate area. Security lights will not shine onto habitat areas at a level greater than 1.5 foot-candles. All lights will be shielded from the top to prevent uplighting.

Construction/Maintenance - General

General Conservation Best Management Practices from the above *Project Planning/Design-General* section that also apply to construction and maintenance are not repeated below.

1. CBP will clearly demarcate the perimeter of all areas to be disturbed during construction or maintenance activities using flagging or temporary construction fence, and no disturbance outside that perimeter will be authorized.

2. CBP will provide a designated biological monitor on site during the work activities for all construction and maintenance projects in federally listed species habitats. The biological monitor will be in charge of implementing and documenting construction-related BMPs as designed for the project to reduce the potential for adverse effects to the species or their habitats. CBP will use the reports from the biological monitor will be used for development of the post-construction report. The designated biological monitor will notify the construction manager of any activities that may harm or harass an individual of a federally listed species. Upon such notification, the construction manager will temporarily suspend all subject activities and notify the Contracting Officer, the Administrative Contracting Officer, and the Contracting Officer's Representative of the suspense so that the key personnel may be notified, apprised of the situation, and the potential conflict resolved.

3. Where, based on species location maps and/or results of surveys, individuals of a federally listed species could be present on or near the project site, CBP will have a designated, qualified biological monitor (a person having experience with the species involved and if the task requires handling or species surveys, appropriate Federal and state permits) to be present during the activity to protect individuals of the species from harm. Duties of the biological monitor will include ensuring that activities stay within designated project areas, evaluating the response of individuals that come near the project site, and implementing the appropriate BMP. See previous BMP above for biological monitoring procedures. For some species, there may only be a seasonal need for the biological monitor to be present. This category includes at least the following species for those roads and towers near occupied habitat: Mexican spotted owl, Chiricahua leopard frog, lesser long-nosed bat.

4. Where a project could be located within one mile of occupied species habitats but the individuals of the species are not likely to move into the project area, a biological monitor is not needed during construction. However, the construction manager will be aware of the species location and ensure that BMPs designed to minimize habitat impacts are implemented and maintained as planned. This category includes the following species: all aquatic species.

5. If an individual of a federally listed species is found in the designated project area and is in danger of being harmed (e.g. in path of vehicles or foot traffic), work will cease in the area of the species until either a qualified biological monitor can safely remove the individual, or it moves away on its own.

6. Individual animals found in the project area in danger of being harmed will be relocated by a CBP biologist to a nearby safe location in accordance with accepted species handling protocols in Federal and state permits. This includes Chiricahua leopard frogs and Sonoran tiger salamanders.

7. CBP will confine vehicular traffic associated with construction activities to established roads (with the exception of new roads being constructed).

8. CBP's road maintenance shall avoid making wind rows with the soils once grading activities are completed, and any excess soils will be used on-site to raise and shape the tower site and/or road surface.

9. New roads created or improved by CBP will be located such that the potential for road bed erosion into federally listed species habitat will be avoided or minimized.

10. CBP will avoid removal of riparian vegetation within 100 ft of aquatic habitats to provide a buffer area to protect the habitat from sedimentation.

11. CBP will avoid or minimize the potential for entrapment of surface flows within the roadbed due to grading. CBP will minimize the depth of any pits created so animals do not become trapped.

12. CBP will monitor, provide corrective maintenance, and document excessive use of unimproved roads that results in their deterioration such that it affects the surrounding federally listed species habitat in the CBP Project Report.

13. CBP will construct and maintain the fewest roads needed, using proper standards.

14. Within the designated disturbance area, CBP will minimize the area to be disturbed by limiting deliveries of materials and equipment to only those needed for effective project implementation.

15. Within the designated disturbance area, CBP will limit grading or topsoil removal to areas where this activity is needed to provide the ground conditions for construction or maintenance activities. Minimizing disturbance to soils will enhance the ability to restore the disturbed area after the project is complete. In Pima pineapple cactus habitat, removal of topsoil is a permanent impact.

16. Within the designated disturbance area, CBP will limit removal of trees and brush in federally listed species habitats to the smallest amount needed to meet the objectives of the project. This type of clearing will likely be a permanent impact on habitat.

17. For placement of in-ground monitoring or sensor arrays, CBP will limit ground disturbance to existing disturbed areas, and use of hand tools will be used. CBP will avoid cacti and agave during the placement of in-ground monitoring. No cacti or agaves will be removed. Vehicles carrying UGS will stay on authorized roads. UGS will be hand carried to deployment location.

18. The width of all roads that are created or maintained by CBP will be measured and recorded using GPS coordinates and integrated into the CBP GIS database. Maintenance actions will not increase the width of the 12 foot road bed or the amount of disturbed area beyond the 12-foot road bed.

19. CBP will obtain materials such as gravel or topsoil from existing developed or previously used sources, not from undisturbed areas adjacent to the project area.

20. CBP will use water for construction from wells at the discretion of the landowner (depending on water rights). If local groundwater pumping is an adverse effect to aquatic, marsh, or riparian dwelling federally listed species, treated water from outside the immediate area will be utilized.

21. CBP will not use surface water from aquatic or marsh habitats for construction purposes if that site supports aquatic federally listed species or if it contains non-native invasive species or disease vectors and there is any opportunity to contaminate a federally listed species habitat through use of the water at the project site.

22. CBP will not use surface water from untreated sources, including water used for irrigation purposes, for construction or maintenance projects located within one mile of aquatic habitat for federally listed aquatic species. Groundwater or surface water from a treated municipal source will be used when close to such habitats. This is to prevent the transfer of invasive animals or disease pathogens between habitats if water on the construction site was to reach the federally listed species habitats.

23. CBP water tankers that convey untreated surface water will not discard unused water within two miles of any aquatic or marsh habitat.

24. CBP storage tanks containing untreated water will be of a size that if a rainfall event were to occur, the tank (assuming open), will not be overtopped and cause a release of water into the adjacent drainages. Water storage on the project area will be in on-ground containers located on upland areas not in washes.

25. CBP pumps, hoses, tanks and other water storage devices will be cleaned and disinfected with a 10% bleach solution at an appropriate facility and before use at another site (this water is not to enter any surface water area). If a new water source is used that is not from a treated or groundwater source, the equipment will require additional cleaning. This is important to kill any residual disease organisms or early life stages of invasive species that may affect local populations of federally listed species.

26. Transmission of disease vectors and invasive non-native aquatic species can occur if vehicles cross infected or infested streams or other waters and water or mud remains on the vehicle. If these vehicles subsequently cross or enter uninfected or noninfested waters, the disease or invasive species may be introduced to the new area. Between the Baboquivari Mountains and Interstate Route 19 (I-19), where the frog fungal skin disease, chytridomycosis (or "Bd"), is known to occur in Chiricahua leopard frog populations, CBP will take necessary precautions to minimize the likelihood of spreading "Bd". In this area, CBP and its contractors will avoid contact with wetted areas. However, if vehicles or other equipment use will occur in wetted areas west of I-19 (including ponds, impoundments, or ephemeral or permanent streams) that equipment will be a) cleaned of mud and debris and then sprayed with a 10% bleach, 70% ethanol, or 1% quaternary ammonium solution, or b) allowed to dry completely,

before moving to another wetted area (see Appendix G of the Chiricahua Leopard Frog Recovery Plan for protocols) (U.S. Fish and Wildlife Service 2007b). Treatments as just described, will not be required for travel along Ruby Road or paved routes through the action area, as these routes are heavily traveled by the public and cleaning/sterilization of project vehicles will do little to prevent movement of disease via vehicular travel.

27. Where handling of hazardous and regulated materials does occur, CBP will collect and store all fuels, waste oils and solvents in clearly labeled tanks or drums within a secondary containment system that consists of an impervious floor and bermed sidewalls capable of containing the volume of the largest container stored therein.

28. CBP will contain nonhazardous waste materials and other discarded materials, such as construction waste until removed from the construction and maintenance sites. This will assist in keeping the project area and surroundings free of litter and reduce the amount of disturbed area needed for waste storage.

29. To eliminate attracting predators of protected animals, CBP will dispose of all food related trash items such as wrappers, cans, bottles, and food scraps in closed containers and remove them daily from the project site.

30. Waste water is water used for project purposes that is contaminated with construction materials or from cleaning equipment and thus carries oils or other toxic materials or other contaminants as defined in state regulations. CBP will store waste water in closed containers on site until removed for disposal. Concrete wash water will not be dumped on the ground, but is to be collected and moved offsite for disposal. This wash water is toxic to aquatic life.

31. CBP will minimize the number of vehicles traveling to and from the project site and the number of trips per day to reduce the likelihood of disturbing animals in the area or injuring an animal on the road.

32. CBP construction speed limits will not exceed 35 mph on major unpaved roads (graded with ditches on both sides) and 25 mph on all other unpaved roads. Night time travel speeds will not exceed 25 mph, and may be less based on visibility and other safety considerations. Construction at night will be minimized.

33. If CBP construction or maintenance activities continue at night, all lights will be shielded to direct light only onto the work site and the area necessary to ensure the safety of the workers, the minimum foot-candles needed will be used, and the number of lights will be minimized. Any light extending beyond the construction or maintenance area will be no greater than 1.5 foot candles.

34. CBP will minimize noise levels for day or night construction and maintenance. All generators will be in baffle boxes (a sound-resistant box that is placed over or around a

generator), have an attached muffler, or use other noise-abatement methods in accordance with industry standards.

35. CBP will use materials free of non-native plant seeds and other plant parts to limit potential for infestation for on-site erosion control in uninfested native habitats. Since natural materials cannot be certified as completely weed-free, if such materials are used, there will be follow-up monitoring to document establishment of non-native plants and appropriate control measures will be implemented for a period of time to be determined in the site restoration plan.

36. CBP fill material brought in from outside the project area will be identified as to source location and will be weed free.

37. CBP will remove invasive plants that appear on the tower sites, along sections of repaired and new road. Removal will be done in ways that eliminate the entire plant and remove all plant parts to a disposal area. Herbicides can be used according to label directions if they are not toxic to federally listed species that may be in the area. Training to identify non-native invasive plants will be provided for CBP personnel or contractors as necessary.

Post-Construction – General

General Conservation Best Management Practices from the above *Project Planning/Design-General* and *Construction/Maintenance – General* sections that also apply to post-construction are not repeated below.

1. Project Reports. For construction and maintenance projects that involve land-disturbing activities (e.g., fences, towers, stations, facilities), CBP will provide a report to the FWS within three months of project completion detailing the BMPs that were implemented, how well the BMPs worked, ways that BMPs could be improved for either protection of species and habitats or implementation efficiency, and any federally listed species observed at or near the project site. Implementation of the restoration plan and any follow-up monitoring will be included. CBP will provide a form-based report generated from documentation requirements of the Act for each specific project to ensure compliance. This report will be part of the project management plan.

2. During follow-up monitoring, CBP will remove non-native invasive plants found on the site. Removal will be done in ways that eliminate the entire plant and remove all plant parts to a disposal area. All chemical applications on refuges must be in coordination with refuge manager to ensure accurate reporting. Herbicides can be used according to label directions. The monitoring period will be defined in the site restoration plan. Training to identify non-native invasive plants will be provided for CBP contractor personnel or contractors, as necessary. Lehman lovegrass (*Eragrostis lehmanniana*), and bufflegrass (*Pennisetum ciliare*) are particularly important to control for promoting cactus, including Pima pineapple cactus, and agave re-establishment.

3. CBP will conduct follow-up monitoring for those projects that use natural materials. The purpose is to document establishment of non-native plants, appropriate control measures implemented, and results of implementation.

4. CBP will close roads no longer needed after construction and will restore them to natural surface and topography using appropriate techniques. The GPS coordinates of roads that are thus closed will be recorded and integrated into the Office of Border Patrol (OBP) GIS database. A record of acreage or miles of roads taken out of use, restored, and revegetated will be maintained and included in Project Reports.

5. Where improved or new roads may increase use of sensitive areas, CBP will prevent access through gating, physical barriers, etc. in coordination with landowners and/or management agencies.

6. General Mitigation. CBP will close and/or restore unauthorized roads at a ratio of 1:1 (1 mile of road closed and/or restored for every 1 mile of road created or repaired) to help offset the anticipated increase in public use of a) repaired or new roads and b) nearby habitat as a result of the proposed action,. Roads closures must benefit listed species, be approved by the landowners, be on unauthorized roads receiving use, and be designed properly to prevent access. See species-specific mitigation where this Conservation Best Management Practice applies. CBP, FWS, and the Forest Service will evaluate the potential increase in public use of repaired and new roads through the Forest Service's Travel Management program and BANWR management planning by the third quarter of fiscal year 2009. Most Forest Service roads to be repaired are classified as Level 2 roads, which are defined as 4WD roads. CBP will quantify a) the post-construction number of miles of new and repaired roads, b) area of new and repaired roads, and c) area of cut and fill. CBP will fund a road closure/restoration plan in coordination with landowners and/or land management agencies by the third quarter of fiscal year 2009. CBP will assist the Forest Service in implementing its Travel Management Plan.

    a. For every mile of new or repaired road, CBP will close and/or restore the same length of unauthorized road through gating, physical barriers, discing, revegetating, etc. the same length of road.

    b. For every new or improved cut and fill area, CBP will restore the same amount of square footage converted to length of road.

7. CBP will prepare monitoring and mitigation plans as described in the Species-Specific Conservation Best Management Practices below. CBP and FWS will evaluate effectiveness of monitoring and mitigation methods annually. If monitoring and mitigation methods or implementation are ineffective in reaching desired goals, CBP and FWS will work together to alter methods or implementation.

<u>Species-Specific Conservation Best Management Practices</u>

In addition to the General Conservation Best Management Practices outlined above, the following measures will be implemented to avoid, minimize, or off-set impacts associated with

the proposed project on the federally-listed species. General Conservation Best Management Practices apply, but are not repeated, below.

Chiricahua Leopard Frog - Project Planning

1. CBP will design roads to minimize animal collisions and fragmentation of federally listed populations. Exclusion fencing may be appropriate where road kill is likely or to direct species to underpasses or other passageways. Coordination with landowners and/or land management agencies will be necessary.

2. CBP will investigate alternate routes to the TCA-TUS-040 tower site that do not pass by Upper Turner Tank or other occupied frog localities in the area. If such routes exist and are reasonable and appropriate to use, then the current proposed route that skirts Upper Turner Tank will not be used. If no alternate route is feasible or reasonable, then CBP will, prior to commencement of construction activities, erect a temporary frog barrier fence on the road shoulder between the access road and Upper Turner Tank, and extending 300 ft above and below the tank. Specifications for this fence will follow those described on page I-11 of U.S. Fish and Wildlife Service (2007b), or such design as discussed with and agreed upon by FWS. The barrier will be temporary, and will be removed after all construction on TCA-TUS-040 and its associated access routes is completed. Although road mortality is anticipated after removal of the fence due to maintenance access and public use of the road, removal of the barrier is necessary to maintain connectivity between the Upper Turner Tank and Turner Tank populations.

3. If new routes, or maintenance or improvement of existing routes will facilitate public movement towards, or access to, suitable breeding sites and such facilitation cannot be avoided, CBP will close them to the public and will post signs at nearby suitable breeding sites with pertinent regulations that protect the frog. Route closures and signs will be negotiated with landowners and/or land management agencies. CBP will monitor the effects to the frog's terrestrial and aquatic habitat. CBP will post and maintain a sign for the life of the proposed action at Upper Turner Tank that informs the public that fishing and stocking of non-native species at Upper Turner Tank is prohibited. CBP will coordinate with FWS on the text and design of the sign.

4. See # 26 under *Construction/Maintenance – General* above for measures to reduce transmission of disease vectors and invasive non-native aquatic species.

5. CBP will design all new roads to minimize the risk of erosion or adverse effects to aquatic habitats of the frog. Routes that cross seasonally or perennially flowing streams will be avoided. If not avoidable, crossings will be designed to minimize effects to streams through use of culverts or other design features that protect natural substrates and flows. New routes or improvement of routes leading to or near stock tanks and cienegas

that provide suitable breeding habitat for frogs will be avoided, or they will be closed for administrative use only.

Chiricahua Leopard Frog - Construction/Maintenance

1. Individual animals found in the project area and in danger of being harmed (e.g., in the path of vehicles or foot traffic) will be relocated by a biologist to a nearby safe location in accordance with FWS Endangered Species Permit requirements.

2. No handling, storage, or disposal of hazardous and regulated materials will occur within 0.3 mi of habitats potentially occupied by Chiricahua leopard frog.

3. Effects Monitoring. CBP will monitor Upper Turner and Summit Tanks for sedimentation and erosion from road use and repair during construction (TCA-TUS-40, TCA-NGL-045). Tank and road repair will be conducted in coordination with FWS and landowner and/or land management agencies, if sedimentation or related effects are detected. CBP will use standardized methods for monitoring sedimentation.

4. Effects Monitoring. The on-site biological monitor will periodically check for mortality at and near Upper Turner Tank during construction activities. Results will be reported to FWS in a written report no later than 90 days after completion of construction at tower TCA-TUS-040.

Chiricahua Leopard Frog - Post Construction

CBP will fund a fencing, monitoring, and mitigation plan in the third quarter of fiscal year 2009 that will be reviewed and approved by landowners and/or land management agencies and FWS. This plan will include methods and a schedule for fencing, bullfrog control, monitoring; the process for repair of fence, tank, and roads; and content and schedule for annual reports. The results of annual monitoring will be reported to FWS annually in a written report due March 1. CBP will develop an MOU with the landowners and/or land management agencies to implement mitigation. CBP will complete the plan, in coordination with landowners and/or management agencies and FWS, in fiscal year 2010. Implementation of this plan will begin once approved by FWS and the land management agencies. Mitigation will be completed within five years of completion of tower construction. CBP will complete an annual report that summarize the implementation of all of the proposed actions, any incidental take that occurred, monitoring results, an analysis of the effectiveness of the Conservation Best Management Practices, and work plan for the following year.

1. Effects Monitoring. See # 3 above. CBP will monitor Upper Turner and Summit tanks for sedimentation and erosion for three years following construction.

2. Effects Monitoring. CBP will monitor Upper Turner Tank for dead and dying frogs that may be killed by Bd or other amphibian diseases for three years following

construction and once a year in February.

3. CBP will remove the fence barrier after all construction on TCA-TUS-040 is completed to maintain connectivity between the Upper Turner Tank and Turner Tank populations.

4. Mitigation. CBP will control non-native species, especially bullfrogs, at five aquatic sites west of I-19 for three years following construction to help offset the anticipated increase in access to occupied habitat in coordination with FWS and landowners and/or land management agencies. The primary threat to Chiricahua leopard frogs in this area is predation by introduced American bullfrogs, which have well-established populations at Peña Blanca Lake, Ruby Lake, Arivaca Lake, and several other permanent waters. CBP will focus mitigation efforts from Peña Blanca Lake west to Sycamore Canyon, where non-native control will benefit Chiricahua leopard frog populations. Where consistent with livestock operations, CBP will selectively fence ponds vulnerable to bullfrog invasion to exclude bullfrogs while allowing leopard frogs to leave the ponds. Where needed, a portion of each pond will be fenced to exclude livestock and allow for development of frog habitat. Monitor fenced habitat and take corrective actions if fences are breached and bullfrogs reinvade. CBP will coordinate a meeting with FWS, landowners, and/or land management agencies within two months of the date of this biological opinion to determine where fencing and bullfrog control are needed.

5. Mitigation. CBP will install pipe-rail wildlife-friendly fence and cattle guards to reduce public vehicle and cattle trespass in southwestern and northeastern corners of BANWR where frog habitat is likely to be impacted, as per refuge recommendations. CBP will monitor fence and repair fence if needed in cooperation with BANWR. CBP will fund a fencing plan in the third quarter of fiscal year 2009 in cooperation with BANWR that includes design plans, installation schedule, monitoring plan, and a repair schedule.

Sonora Tiger Salamander - Project Planning

1. CBP will design all new roads to minimize the risk of erosion or adverse effects to aquatic habitats of the salamander. Routes that cross seasonally or perennially flowing streams will be avoided. If not avoidable, crossings will be designed to minimize effects to streams through use of culverts or other design features that protect natural substrates and flows. New routes or improvement of routes leading to or near stock tanks that provide suitable breeding habitat for salamanders will be avoided, or they will be closed for administrative use only.

Sonora Tiger Salamander - During Construction/Maintenance

1. Individual animals found in the project area and in danger of being harmed (e.g., in the path of vehicles or foot traffic) will be relocated by a biologist to a nearby safe location in accordance with FWS Endangered Species Permit requirements.

2. No construction or maintenance activities will occur within 0.1 mi of Sonora tiger salamander occupied habitat.

3. Any use or storage of chemicals or fuels at construction sites or staging areas will be kept well away from suitable salamander sites. No storage of such chemicals or fuels will occur within 0.3 mi of salamander sites.

4. No pumping of water from suitable breeding sites will occur for road maintenance, dust control, mixing concrete or other purposes. No transfer of water or mud among aquatic sites will occur.

Sonora Tiger Salamander – Post-Construction

1. Site restoration is not anticipated, but if impacts to salamander habitat occur, CBP will work with the landowner and/or land management agency to plan and implement restoration.

2. CBP will implement other conservation measures for pesticides in and near salamander habitats (see White 2004).

Mexican Spotted Owl - Project Planning/Documentation

1. Roads, fences, security zones, surveillance sites, staging areas including tower sites, and other facilities that will require land clearing and will have associated noise and artificial light components will be at least 0.25 mile from any known protected activity center (PAC) or CBP will mitigate (See *Post-Construction* below). Firebreaks, fuels reduction, or other improved access for fire suppression will be incorporated, as appropriate in the placement of facilities. Facilities will not be located between nests and important forage areas such that movement between the two is compromised, or CBP will mitigate impacts.

2. CBP will avoid new roads in the vicinity of PACs and other important habitat areas to reduce effects of human activity near PACs or CBP will mitigate impacts (See *Post-Construction* below). Existing roads used by CBP to access new or existing facilities may need to be closed to other access to protect important owl habitat.

Mexican Spotted Owl - During Construction/Maintenance

1. Effects Monitoring. CBP will monitor:
   a) construction activities for towers, new roads, and road improvements, between March 1 and August 31, which are closer than 0.25 mile to an owl PAC. Construction activities will be monitored by a qualified biologist provided by CBP.
   b) Mexican spotted owl PACs where towers and increased human use may potentially affect owls and other areas where tower sites are within or less than 0.25 miles from a PAC. CBP will develop an MOU with the landowners and/or land management agencies

to conduct spotted owl monitoring. FWS will provide these PAC locations to CBP. Monitoring will be conducted by an experienced and federally-permitted spotted owl surveyor. All Mexican spotted owl disturbances will be documented in the CBP project reports. Corrective actions will be developed and implemented in coordination with FWS and landowner and/or land management agencies, if effects are detected. The following tower sites or associated new access are inside of a PAC:

- TCA-SON-062 (Joes Canyon PAC, Coronado National Memorial)
- TCA-TUS-192 (Ski Valley PAC, Santa Catalina Mountains)
- TCA-NGL-211 (Cottonwood Canyon PAC, Santa Rita Mountains

2. CBP may conduct maintenance activities for facilities at any time; however, for major work on roads or fences where significant amount of equipment will be required, the September to February period is preferred.

Mexican Spotted Owl – Post-Construction

CBP will fund a Mexican spotted owl monitoring and mitigation plan in the third quarter of fiscal year 2009 that will be reviewed and approved by landowners and/or land management agencies and U.S. Fish and Wildlife Service. This monitoring and mitigation plan will include, methods to determine effects, potential corrective actions to be taken (e.g. road closures, fencing, gating, site restoration), schedules for monitoring and mitigation, and schedule and content of annual reports. PACs subject to monitoring and mitigation are listed in the bullets above. This plan will be completed in coordination with the landowner and/or land management agencies. CBP will develop an MOU with the landowners and/or land management agencies to implement mitigation. CBP will complete the monitoring and mitigation plan, in coordination with landowners and/or management agencies and U.S. Fish and Wildlife Service, in fiscal year 2010. Implementation of this plan will begin once approved by U.S. Fish and Wildlife Service and the land management agencies and mitigation will be completed within three years from the date construction is completed and towers are fully operational. CBP will complete an annual report for a minimum of three years that summarizes the implementation of all of the proposed actions, monitoring results, mitigation progress, an analysis of the effectiveness of the Conservation Best Management Practices, and work plan for the following year.

1. Effects Monitoring. CBP will monitor affected Mexican spotted owl PACs (see list of affected PACs in the bulleted list on page 27) annually for three years (field seasons) from the date construction is completed and towers are fully operational. CBP will develop an MOU with the landowners and/or land management agencies to conduct spotted owl monitoring FWS will provide these PAC locations to CBP. Corrective actions should be developed and implemented in coordination with FWS and landowner and/or land management agencies, if effects are detected. Corrective actions may include road closures, fencing, gating, and/or site restoration. Monitoring will be conducted by an experienced and federally permitted spotted owl surveyor.

2. Mitigation. CBP will provide sufficient funds to close unauthorized roads and restore habitat near affected Mexican spotted owl PACs (from bulleted list on page 27) in conjunction with Forest Service travel management planning. For every road repaired or created within 0.25 miles of a Mexican spotted owl PAC, CBP will close and/or restore the same length of road. CBP will update maps showing where improved or new roads were completed. CBP will complete a road closure/restoration plan. Mitigation will be completed within three years of the completion of construction.

Masked Bobwhite - Construction/Maintenance

1. CBP may perform maintenance activities for facilities at any time; however, for major work on roads or fences where significant amount of equipment will be required in masked bobwhite habitat (BANWR), the November through July period is preferred.

Sonora Chub - Project Planning/Documentation

1. Pre-construction surveys are not required for the Sonora chub. The species has been reliably and repeatedly detected within the Sycamore Canyon and California Gulch watersheds and its presence need not be confirmed.

2. The minimum amount of vegetation will be cleared, and measures to control erosion off the construction site put into place. Roads, fences, and other facilities that will require land clearing, will be designed to avoid areas within 0.5 mi of Sycamore Canyon and California Gulch.

Jaguar - Project Planning/Documentation

1. CBP will design roads to minimize animal collisions and fragmentation of jaguar habitat.

Jaguar - Post Construction

CBP will complete a road closure/restoration plan for review and approval by landowners and/or land management agencies and FWS that a) identifies and maps new roads where barriers will be placed to prevent public access, b) identifies and maps unauthorized roads near potential jaguar movement corridors, c) specifies that FWS will use jaguar monitoring results to assist CBP in determining which unauthorized roads to close, d) specifies potential road closure methods, e) specifies potential restoration methods for closed roads, f) includes a schedule for closure, and g) includes a schedule and content of annual reporting. CBP will fund the road closure/restoration plan, in coordination with landowners and/or management agencies and FWS, in the third quarter of fiscal year 2009. Implementation of this plan will begin once approved by FWS and the land management agencies and will be completed within six years of completion of the Tucson West tower project. CBP will complete an annual report until all Conservation Best Management Practices for jaguars are completed. This report will summarize the implementation of the proposed actions, number of miles closed and/or restored, restoration methods, effectiveness of road closures and restoration, camera monitoring results, and work plan for the following year.

1. Monitoring. CBP will provide $312,000 to monitor the effects of the proposed tower project on the jaguar. CBP will transfer this funding to the Arizona Game and Fish Department (AGFD) in the third quarter of fiscal year 2009, if it is determined that AGFD is the appropriate recipient for this purpose; otherwise the funding will be transferred to the FWS. Funding will be used to monitor jaguar presence and movement along the border, and in additional mountain ranges and corridors within the action area. Funding will be used for camera traps, vehicles, supplies, and personnel. The results of this monitoring will be used to determine which unauthorized roads to close and to guide future project design.

2. Mitigation. CBP will prevent public access of new roads through gating, physical barriers, fencing, etc., in combination with appropriate signage and in coordination with the landowner and/or land management agencies. CBP will work with the land management agencies to determine the best method to prevent public access on new roads needing barriers. Blocking access will be achieved in a way that does not increase the probability that unauthorized roads will be created nearby.

3. Mitigation. CBP will close and/or restore unauthorized roads in or near jaguar movement corridors to help offset the increase in improved or new roads at a ratio of 2:1 (2 miles of road closed and/or restored for every 1 mile of road created or repaired). This will require post-construction quantification of (a) the number of miles of roads repaired and created, and (b) the area of new and repaired cut and fill. CBP will work with the land management agencies and FWS to identify unauthorized roads for closure and determine the method most likely to prevent future access. Some road closures will require discing and seeding (using native species), in addition to placement of barriers. Closures will be achieved in a way that does not increase the probability that unauthorized roads will be created nearby.

   Documenting jaguar presence is an extremely labor-intensive effort owing to the jaguar's large home range, avoidance of humans, and occupancy of remote areas. From1996 through 2007, four individual male jaguars were documented along the border in the U.S. from the Baboquivari Mountains in Arizona to the Animas Mountains in New Mexico: a) in the Peloncillo Mountains in New Mexico near the Arizona border in 1996 (Glenn 1996, Brown and López González 2001), b) in the Baboquivari Mountains of southern Arizona in 1996 (Childs 1998, Brown and López González 2001), c) in the Animas Mountains in Hidalgo County, New Mexico in 2006 (McCain and Childs 2008), and d) from 2001 to 2007, two of these four jaguars were photographed using infra-red camera traps in south-central Arizona, near the Mexico border. One of these jaguars was the male first observed and photographed in 1996 in the Baboquivari Mountains. This area represents a linear distance of approximately 140 miles. Only a small proportion of jaguar habitat is currently being monitored, representing only a small subsample of jaguar habitat in the United States. There are likely more than four jaguars in Arizona and New Mexico and increasing the number of cameras will increase the probability of detecting additional individuals.

The towers within the action area span approximately 80 linear miles of what is believed to be prime jaguar habitat in the United States. Within the past two years, illegal entrant use has increased substantially within the same remote canyons that jaguars are believed to be using in the action area (E. McCain, Borderlands Jaguar Detection Project, pers. comm. August 4, 2008). Information on jaguar movements suggests the animal using the area from the Baboquivari Mountains east into the Pajarito Mountains is avoiding areas of high human use, including areas of law enforcement presence and where infrastructure is being constructed. Implementation of this conservation measure will help to provide basic information on jaguar locations and movement within the project area and will help direct future conservation efforts toward the most important corridors used by this species. We may also learn whether or not jaguars cross where vehicle barriers are present. This conservation measure is consistent with the recommendations in the Jaguar Conservation Assessment (Johnson *et al.* 2007).

Ocelot - Project Planning/Documentation

See Jaguar above under *Project Planning.* Although no monitoring or mitigation will be conducted for ocelots, camera traps for jaguars may also document ocelots.

Lesser long-nosed Bat - Project Planning/Documentation

1. CBP roads, fences, security zones, surveillance sites, staging areas including tower sites, and other facilities that will require land clearing and have associated noise and high intensity artificial light components, will be located at least one mile from any known roost site or will be mitigated (see Post-Construction below). The location of the facility will not be located between roosts and known foraging sites such that access between the two is compromised.

2. CBP will avoid areas containing columnar cacti (saguaro, organ pipe) or agaves that provide the forage base for the bat or will mitigate effects (see *Post – Construction* below).

3. During construction or maintenance activities in or within one mile of bat maternity roosts or known summer roosts (or such distance that noise, light, or other effects reach the habitat), a construction monitor with authority to halt construction at any time the appropriate Conservation Best Management Practices are not being properly implemented as agreed to will be present on site.

Lesser long-nosed Bat - During Construction/Maintenance

1. Construction activities for towers, new roads, and road improvements that are within one mile of a bat roost and occur between May 1 and September 30 will be monitored by a qualified biologist. In some years, bats may arrive earlier and leave later in the year than the May to September time frame. For maternity roosts this will be March through August. For summer roosts, this will be July through October. Any occurrences and/or disturbances of lesser long-nosed bats will be documented and mitigated (see *Post – Construction* below).

2. CBP may perform maintenance activities for facilities at any time; however, for major work on roads or fences where significant amount of equipment will be required, the October to April period is the minimum period for avoidance.

3. CBP will salvage and transplant agaves if they are less than 18 inches in diameter and columnar cacti less than six feet tall. Agaves that have flower stalks will not be salvaged/transplanted. A minimum of 12-18 inches of agave and cacti roots will be salvaged. Prior to removal, CBP will mark the orientation on each cactus to be transplanted. CBP will transplant columnar cacti in the same orientation they were removed to increase probability of survival. CBP will relocate plants at least 75 feet from the construction limits. CBP will not plant agaves or columnar cacti in active wash channels. CBP will follow guidelines identified in the Salvage Plan for Coronado National Memorial, dated May 22, 2008 (Coronado National Memorial 2008) and guidelines for salvage and transplanting columnar cacti available at http://cals.arizona.edu/pubs/garden/az1376.pdf (University of Arizona 2008) and http://dbg.org/index.php/gardening/growingguides/ground/transplantingcactus (Desert Botanical Gardens 2008). Plants will be watered according to site conditions.

4. CBP will count agaves and columnar cacti removed for construction and will replace agaves and columnar cacti at a 2:1 ratio (for every plant removed, two will be replaced).

Lesser long-nosed Bat - Post Construction

CBP will prepare a lesser long-nosed bat monitoring and mitigation plan for review and approval by landowners and/or land management agencies and FWS that includes bat telemetry study plan, bat roosts to be surveyed, roosts to be monitored for effects, survey and monitoring schedule, roosts to be protected, method of roost protection, schedule for roost protection completion, tower site monitoring methods, potential corrective actions at tower or roost sites if effects are detected, number of agave and cacti salvaged and transplanted or to be mitigated, and annual report content and schedule. CBP will fund the plan, in coordination with landowners and/or management agencies and FWS, in the third quarter of fiscal year 2009. Implementation of this plan will begin once approved by FWS and the land management agencies and will be completed for a minimum of five years from the date all towers within the project area are fully operational or until negative effects from the proposed action are no longer detected. This annual report will summarize the implementation of all of the proposed actions; roost; and tower monitoring results; bat survey results; telemetry study results; salvage, transplant, and restoration results; corrective actions needed or taken (e.g. gating, signing, fencing); any incidental take that occurred; an analysis of the effectiveness of the Conservation Best Management Practices; and work plan for the following year.

1. Effects Monitoring – bat surveys. CBP will conduct annual bat surveys at bat roosts within one mile of tower sites for two years from the date towers are fully operational. CBP will compare results with previous years' surveys. If negative effects of the proposed action are documented, CBP will take corrective action

(e.g. gating, signing, fencing) and will continue to survey annually until negative effects are no longer detected. Tower TCA-SON-062 is less than a mile from a primary roost (State of Texas Mine) occupied by tens of thousands of bats. The Coronado National Memorial has collected years of pre-tower bat surveys using a standardized protocol. This same protocol will be used for future bat surveys at State of Texas Mine. Surveys will be conducted throughout the season by a lesser long-nosed bat expert.

2. Effects Monitoring – roosts. CBP will monitor roosts within one mile of tower sites for direct or indirect effects of the action for two years from the date towers are fully operational. CBP will install Hobo data loggers in lesser long-nosed bat roosts most prone to human use to detect changes in temperature, humidity, etc. CBP will take corrective actions in coordination with FWS and/or the landowners/land management agencies if such effects are detected. This may include road closures, gating, signing, fencing, etc.

3. Effects Monitoring – finding roosts and foraging areas of bats telemetered near tower sites in the Patagonia Mountains. CBP will conduct a telemetry study to locate bat roosts and foraging areas used by those bats found in the vicinity of towers. This study will be conducted for five years. If occupied mines or caves are found within a mile of towers, they will be monitored with Hobo data loggers. CBP will telemeter 15 bats per year in early August and will track bats through mid October. CBP will telemeter up to five bats at a time; transmitters have a two to three week lifespan. CBP will hire five field biologists to conduct the study. The Patagonia Mountains is covered with hundreds of abandoned mines that may be used by lesser long-nosed bats. Tracking bats telemetered near towers in the Patagonia Mountains will determine where these bats are foraging and roosting. If negative effects are found in foraging or roosting areas as a result of this proposed action, CBP will take corrective action. This may include road closures, gating, signing, fencing, etc.

4. Effects Monitoring - towers. CBP will conduct monitoring to document and assess tower related mortality of lesser long-nosed bats beginning once tower construction is completed and continuing for five years after the towers are fully operational.. Monitoring will include systematic lesser long-nosed bat searches and use of radar, GPS, infrared, thermal imagery, and/or acoustical monitoring equipment to assess and verify bat movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems. If lesser long-nosed bat mortality is documented at tower or wind turbine sites, CBP will a) immediately notify FWS in writing, b) work with FWS to develop site-specific measures to reduce that mortality, and c) continue monitoring beyond the five years until mortality is no longer occurring. Information gained from monitoring will be used to develop tower retrofits to reduce lesser long-nosed bat mortality, if collisions are documented. CBP will incorporate the bat mortality monitoring associated with the proposed action into an annual report for a minimum of five years.

5. Mitigation – increased access. Where improved or new roads may increase human use of bat roosts occupied or potentially occupied by lesser long-nosed bats, CBP will prevent access through gating, fencing, other physical barriers, etc. This includes the State of Texas mine roost, Patagonia Mountains abandoned mines, and other lesser long-nosed bat roosts. Close coordination with FWS and landowners and/or land management agencies will be necessary, as the design and season of installation is critical to ensure bat gates benefit lesser long-nosed bats.

6. Mitigation – foraging plant salvage and transplant. See *Lesser long-nosed Bat - During Construction/Maintenance* above, number 3). CBP will water transplanted agave and columnar cacti if needed and according to site conditions to ensure survival. CBP will monitor annually for survival for five years and will replace dead or dying plants.

7. Mitigation – foraging plant replacement. See *Lesser long-nosed Bat - During Construction/Maintenance* above, number 3). CBP will replace agaves and columnar cacti removed for construction at a 2:1 ratio. CBP will work with landowners and/or land management agencies to determine location for replacement plants. CBP will water plants according to site conditions to ensure survival. CBP will monitor annually for survival for five years and will replace dead or dying plants.

Huachuca Water Umbel - Project Planning/Documentation

1. Relocation of individuals of federally listed plants found in the project area is generally not a suitable activity. Relocation of aquatic species such as the water umbel is not appropriate. For particular actions, the FWS will determine if relocation of plants will be undertaken.

2. Because loss of habitat is a significant risk to the water umbel, CBP will not place roads, fences, structures, or other on-ground facilities within 0.5 mi of occupied or potentially suitable habitat.

3. Pre-construction surveys are not required as long as projects are located at least 0.5 mi from occupied habitat areas such that watershed effects will not reach the umbel habitat.

4. CBP road construction and maintenance will not improve or create new available access to umbel habitats.

Pima Pineapple Cactus - Project Planning/Documentation

1. Pre-construction Surveys. CBP will conduct surveys according to protocol (Roller 1996) by a qualified Pima pineapple cactus expert along new and improved road segments and tower sites where Harris Environmental did not survey. CBP will avoid impacts to Pima pineapple cactus to the extent practicable.

2. Salvage of Pima pineapple cactus has shown very limited success with transplanted individuals experiencing high first-year mortality. CBP will compensate for the loss of habitat through conservation banking on private land approved by FWS.

3. CBP road construction and maintenance will not improve or create new available access to cactus habitats.

4. CBP will maximize use of existing roads and trails in areas of suitable habitat for the cactus.

Pima Pineapple Cactus - During Construction/Maintenance in Cactus Habitat

1. CBP will map and quantify the amount of cactus habitat destroyed or compromised. Removal of topsoil is considered a permanent impact.

2. CBP maintenance activities in cactus habitat will not increase the existing disturbed areas.

Pima Pineapple Cactus - Post Construction

1. CBP will prepare a Pima pineapple cactus monitoring and mitigation plan for review and approval by landowners and/or land management agencies and FWS that includes a map of Pima pineapple cactus habitat to be monitored, a map of Pima pineapple cactus habitat destroyed or compromised, number of acres of Pima pineapple cactus habitat destroyed or compromised, pre-construction cactus survey results, method and schedule to monitor the amount of ongoing disturbance from public use and CBP activities, potential corrective actions such as road closures and fencing, amount of habitat to be mitigated, schedule for mitigation banking completion, and content and schedule of annual reports. CBP will fund the plan, in coordination with landowners and/or land management agencies and FWS, in the third quarter of fiscal year 2009. Implementation of this plan will begin once approved by FWS and the land management agencies and will be completed within three years from the date all towers within the project area are fully operational. CBP will complete an annual report for a minimum of three years that summarize the implementation of all of the proposed actions, monitoring results, mitigation banking, corrective actions taken, an analysis of the effectiveness of the Conservation Best Management Practices, and work plan for the following year. Effects Monitoring. CBP will fund monitoring in suitable cactus habitat within 50 feet of tower sites, repaired roads, and new roads annually for three years. CBP will take corrective action, in coordination with the landowners and/or land management agencies, if Pima pineapple cactus habitat is degraded as a result of the proposed action and increased public use. This includes control of non-native invasive species such as buffelgrass and Lehmann lovegrass.

2. Mitigation. CBP will compensate for habitat degradation or loss on a 1:1 basis in a conservation bank on private land approved by FWS within one year of construction of towers.

Description of the Action Area

The action area for the proposed action includes all areas directly and indirectly affected by the proposed action, including effects of actions that are interdependent and/or interrelated to the proposed action. The action area includes parts of Maricopa, Pinal, Pima, Cochise, and Santa Cruz counties (Figure 1). The core action area, where most of the proposed tower sites are located, is in south-central Arizona near the U.S./Mexico international border from the Baboquivari to the Huachuca Mountains. This area extends north from the U.S./Mexico international border along the central ridge of the Baboquivari Mountains; east across the Altar Valley, Sierrita Mountains, Santa Cruz River, and Santa Rita Mountains, continuing eastward through the Patagonia Mountains, through the Canelo Hills and Huachuca Mountains, and south near the San Pedro River at the U.S./Mexico international border. No towers will be placed in federally designated wilderness areas.

Additional towers sites, disjunct from the core area, are located near Ajo, Phoenix, Tucson, and I-10 between Tucson and Benson: seven towers follow the I-10 corridor between Tucson and Casa Grande; one tower is north of I-8, west of Casa Grande (TCA-AJO-193); one tower site is north of Organ Pipe Cactus National Monument (OPCNM) (TCA-AJO-305).

The direct effects of the SBI*net* Tucson West Project will result from construction, maintenance, and operation of the communication and sensor towers; construction of new roads and repairs to existing roads; operation of mobile surveillance systems, and deployment of UGS.

Indirect effects associated with reduced illegal activity and associated effects of USBP enforcement activity are likely to be realized within the Tucson Sector south of the proposed communication and sensor tower sites and north of the U.S./Mexico international border. Although the Tucson Sector boundary extends in all directions beyond the proposed communication and sensor tower sites, the range of beneficial effects will be limited by geographic barriers that curtail the USBP's ability to detect and successfully respond to IA activity. This area is determined by the location of sensor-equipped towers and other sensor equipment deployed as part of the proposed action. Indirect adverse effects resulting from shifts in IA activity could occur where tower sensor coverage is absent and/or where CBP agents are unsuccessful in capturing individuals. The location of these effects could occur anywhere within the action area, but are most likely in remote canyons and mountain ranges. The phased-in approach of this project will provide coverage for only a portion of the action area initially, leaving the rest of the action area vulnerable to the resultant shifting illegal traffic. Until the remaining towers are installed and operating effectively, illegal traffic in the uncovered parts of the action area is likely to increase. Once all towers are installed and operating, illegal traffic is likely to continue to shift to remote areas within the action area that towers and UGS cannot reach and/or where CBP agent capture attempts are unsuccessful. These areas are also some of the same canyons and mountain ranges used by listed species.

Shifting IA activity has already occurred in Arizona and California as a result of fence construction or increased CBP staffing. We provide the following examples;

Effectiveness of border operations elsewhere have driven IA activity and responding CBP agents into remote areas in Cabeza Prieta National Wildlife Refuge to the detriment of Sonoran pronghorn (U.S. Fish and Wildlife Service 2003b, C McCasland, CPNWR, pers. comm. 2006).

The Valley of the Ajo in Organ Pipe Cactus National Monument supports high quality Sonoran pronghorn habitat. Yet, no Sonoran pronghorn have been documented in this area within the past six years. The last radio-collared pronghorn documented in the Valley of the Ajo was in 2002. This coincides with an increase in CBP efforts in the area as a result of shifting IA traffic (T. Tibbitts, OPCNM, pers.comm. August 18, 2008). Agents patrolling and in pursuit of IAs using all-terrain vehicles off-road and low level helicopter flights are more disruptive to pronghorn than if they used horseback or vehicles on established roads. The establishment of the Bates Well, CBP camp near Growler Pass, contributes toward the disturbance by essentially blocking pronghorn access from west to east into the Valley of the Ajo.

On the Tohono O'odham Nation, the 1.5 mile segment along the U.S/Mexico international border identified as Sierra de la Nariz – DV-2, is bisected by an unauthorized road from Mexico into the United States. The unauthorized road is only a year old and is the direct result of IA traffic being funneled from fencing to the east and west. Because so much IA traffic is getting through, CBP now needs to construct a vehicle fence to block entry into the United States from this illegal road. (K. Howe, Tohono O'dham Nation, July 18, 2008).

On the Tohono O'odham Nation, the community around Menenger's Dam has reported smugglers driving around border barriers to cross into the United States. This community is experiencing more traffic than prior to fence construction (K. Howe, Tohono O'dham Nation, July 18, 2008).

Within the past two years, illegal entrant use has increased substantially within remote canyons that jaguars are believed to be using in the action area (E. McCain, Borderlands Jaguar Detection Project, pers. comm. August 4, 2008). Information on jaguar movements suggests the animal using the area from the Baboquivari Mountains east into the Pajarito Mountains is avoiding areas of high human use, including areas of law enforcement presence and where infrastructure is being constructed.

CBP El Centro Sector is using more horse patrols in the In-Ko-Pah Mountains because the increased CBP presence in the Imperial Sand Dunes area following CBP agent Aguilar's death is redirecting traffic farther west (E. Dreyfuss, BLM, pers. comm., July 28, 2008).

Since the beginning of construction of the 14-mile triple-fence east from the Pacific Ocean traffic has decreased in the areas where the triple fence is completed, shifting eastward. (K. Roblek, U.S. Fish and Wildlife Service, pers.comm., July 30, 2008)

CBP El Centro Sector is extending Normandy-style vehicle fence for the first three miles east of the Jacumba/In-Ko-Pah Mountains to alleviate IA funneling impacts into the mountains occupied by bighorn sheep and their critical habitat. On the west side, the Boulevard Sector is converting post-on-rail style fence to PV-1 style fence to exclude pedestrians. This is expected to funnel

illegal activities into the Jacumba/In-Ko-Pah Mountains from the west. (K. Roblek, U.S. Fish and Wildlife Service, pers. comm., July 30, 2008)

Indirect effects are also likely to occur as a result of improvements to 4WD roads, potentially increasing public use in habitat that will be accessible once damaged sections of road are repaired.

Biotic Communities

Vegetation communities within the action area include Sonoran Desertscrub (Arizona Upland and Lower Colorado subdivisions), Plains and Semidesert Grasslands, and Madrean Evergreen Woodland (Brown 1994, CBP 2008a). Table 4, below, displays the vegetation communities present at each tower site.

The Sonoran Desertscrub-Arizona Upland Subdivision occurs on the upper bajadas of mountains between Ajo and the Baboquivari Mountains. This vegetation community extends northward from the U.S./Mexico international border near Phoenix at its western extent and just north of the Baboquivari Mountains at its eastern extent. This community can also be found between the Baboquivari Mountains and Tucson and in a narrow band extending northwest from Tucson towards Needles, Arizona. Low and moderately dense cover of shrubs and large cacti with scattered small cactus, grasses, and herbs characterize this community. Common species include saguaro (*Carnegiea gigantea*), organ pipe (*Stenocereus thurberi*), paloverde (*Parkinsonia* spp.), several species of cholla (*Cylindropuntia* spp.), nipple cactus (*Mammilaria* spp.), and beehive cactus (*Coryphantha* spp.). Few of the plant species in this habitat are fire tolerant and bufflegrass (*Pennisetum ciliare*) has invaded many areas, especially near roads and ground disturbance.

The Lower Colorado River Subdivision of Sonoran Desert Scrub occurs on the lower bajadas and basin areas west of Ajo. This vegetation habitat is characterized by a low, sparse, and uniform cover of shrubs with few cacti, grasses, or herbs. The dominant plants are typically creosote bush (*Larrea tridentata*) and various species of bursage (*Ambrosia* spp.). Mesquite (*Prosopsis glandulosa*) and other desert shrubs are often found along wash margins. Species diversity is low.

The Plains Grasslands in the action area occur only in the San Rafael Valley and in the Sonoita/Elgin Valley and represent the southeasternmost extent of this community in the U.S. This community is characterized by a dense cover of grasses, including multiple gramma species (*Bouteloua spp*.), galleta grass (*Hilaria jamesii*), and plains lovegrass (*Eragrostis intermedia*), and herbs. Other plant groups, such as shrubs and cacti, are characteristically absent. Habitat within the action area has been previously disturbed by cattle grazing, fire suppression, roads, and invasive species.

The Semidesert Grassland occurs in a complex mosaic interspersed among other habitats throughout southeastern Arizona. This community is characterized by perennial bunch grasses and scattered shrubs and cacti within bare ground in the intervening spaces. Cattle grazing and fire suppression have significantly affected this community resulting in the replacement of bunch

grasses with low growing so grasses, leaf succulents, shrubs, and most notably by extensive stands of mesquite. Typical perennial grasses include several gramma grasses (*Bouteloua* spp.), three-awn (*Aristida* spp.), bush muhly (*Muhlenbergia porteri*), Arizona cottontop (*Trichachne californica*), and others. Lehmann lovegrass (*Eragrostis lehmanniania*) is among the invasive species most difficult to eradicate. Yuccas (*Yucca* spp.), beargrass (*Nolina* spp.), and agaves (*Agaves* spp.) are common where fire suppression occurs.

The Madrean Evergreen Woodland habitat occurs on mountain slopes throughout southeast Arizona. This community is characterized by a moderate cover of oaks (*Quercus* spp.), pines (*Pinus* spp.), and junipers (*Juniperus* spp.). At lower elevations within this vegetation type, the tree canopy is typically more open and savannah-like with grasses and cacti. Although many of the plant species are fire tolerant, cattle grazing and fire suppression have lead to conditions which favor stand replacing, catastrophic fires and large portions of this community have been significantly impacted in recent years.

Table 4: Vegetation community type for tower sites and associated roads

Tower Site Number	Vegetation Community (Brown and Lowe 1984, CBP 2008)
TCA-CAG-102 TCA-CAG-195	Arizona Upland Subdivision - Sonoran Desertscrub
TCA-SON-213	Chihuahuan Desertscrub
TCA-NGL-043 TCA-NGL-044 TCA-NGL-045 TCA-NGL-046 TCA-NGL-047 TCA-NGL-049 TCA-NGL-050 TCA-NGL-109 TCA-NGL-211 TCA-SON-055 TCA-SON-056 TCA-SON-060 TCA-SON-061 TCA-SON-062 TCA-TUS-036 TCA-TUS-038 TCA-TUS-041 TCA-TUS-042 TCA-TUS-185	Madrean Evergreen Woodland
TCA-SON-057 TCA-SON-058 TCA-SON-059	Plains and Great Basin Grassland
TCA-NGL-048 TCA-NGL-052 TCA-NGL-054 TCA-NGL-210 TCA-NGL-285 TCA-TUS-032 TCA-TUS-035 TCA-TUS-040 TCA-TUS-085 TCA-TUS-181 TCA-TUS-187 TCA-TUS-287 TCA-TUS-290 TCA-TUS-291 TCA-TUS-298 TCA-TUS-299 TCA-TUS-300 TCA-TUS-306 TCA-TUS-307	Semidesert Grassland

Climate

The action area lies within an arid region of the Southwest; however, because of extensive topographic relief and generally increasing precipitation from west to east, climate varies substantially by locality. For instance, Ajo lies in Sonoran Desert at elevation 537 m (1,760 ft) in the western portion of the action area. Mean annual precipitation at Ajo is 227 mm (8.9 inches) and annual average maximum and minimum temperatures are 29° C (84° F) and 15° C (59° F). In contrast, at the Santa Rita Experimental Range south of Tucson (elevation approximately 1,220 m [4,000 ft]), mean annual precipitation is 564 mm (22.2 inches) and annual average maximum and minimum temperatures are 24° C (76° F) and 11° C (52° F). At the highest elevations, Mount Wrightson (2,883 m [9453 ft]), and Miller Peak (2,887 m [9466 ft]), temperatures are considerably cooler and precipitation may exceed 760 mm (30 inches) (Wallmo 1955).

Precipitation is bimodal with a winter rainfall period from November through March, and a summer rainy season from July into September. The winter storms are characterized by slow steady, geographically widespread rainfall over a period of several days, whereas summer storms are typically torrential, of short duration, and localized. Winter rainfall is associated with the eastward passage of cyclonic storms from the Pacific Northwest, whereas the summer rains are typically convective thunderstorms fueled by moisture from the Pacific and the Gulf of California, and probably from the Gulf of Mexico to some extent (Benson and Darrow 1982, Ingram 2002).

CHIRICAHUA LEOPARD FROG

Status of the Species

The Chiricahua leopard frog (*Lithobates chiricahuensis*) was listed as a threatened species without critical habitat in a Federal Register notice dated June 13, 2002. Included was a special rule to exempt operation and maintenance of livestock tanks on non-Federal lands from the section 9 take prohibitions of the Act. The frog is distinguished from other members of the *Lithobates pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds in duration (Davidson 1996, Platz and Mecham 1979). Snout-vent lengths of adults range from approximately 2.1 to 5.4 inches (Stebbins 2003, Platz and Mecham 1979). The Ramsey Canyon leopard frog (*Lithobates* "*subaquavocalis*"), found on the eastern slopes of the Huachuca Mountains, Cochise County, Arizona, has recently been subsumed into *Lithobates chiricahuensis* (Crother 2008). However, the listing for *chiricahuensis* has not yet been revised, so for now these populations are not protected by the Act.

The Chiricahua leopard frog has been found in cienegas, pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 ft in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, the Sierra Madre Occidental of northern and central Chihuahua, and possibly as far south as northern Durango (Platz and Mecham 1984, Degenhardt *et al.* 1996, Sredl *et al.* 1997, Sredl and Jennings 2005). Reports of the species from the State of Aguascalientes (Diaz and Diaz 1997) are questionable. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Lithobates lemosespinali*) in the southern part of the range of the Chiricahua leopard frog. In New Mexico, of sites occupied by Chiricahua leopard frogs from 1994-1999, 67% were creeks or rivers, 17% were springs or spring runs, and 12% were stock tanks (Painter 2000). In Arizona, slightly more than half of all known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl *et al.* 1997). Sixty-three percent of populations extant in Arizona from 1993-1996 were found in stock tanks (Sredl and Saylor 1998).

Northern populations of the Chiricahua leopard frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Genetic analyses, including a 50-loci starch gel survey, morphometrics, and analyses of nuclear DNA supports describing the northern populations as a distinct species (Platz and Grudzien 1999). In another study, frogs from these two regions showed a 2.4% average divergence in mitochondrial DNA sequences (Goldberg *et al.* 2004). Multiple haplotypes within *chiricahuensis* were also identified using mitochondrial DNA analysis (Benedict and Quinn 1999), providing further evidence of genetically distinct demes or groups of related populations. Based on morphological similarities, Hillis and Wilcox (2005) suggest the northern populations may be referable to "*Rana*" (*Lithobates*) *fisheri* (Vegas Valley leopard frog), a taxon from the Las Vegas Valley, Nevada, considered to be extinct (Bradford 2002). However, *L. fisheri* in the Vegas Valley was disjunct from Mogollon Rim *chiricahuensis* populations by about 230 mi, thus if the two are closely-related or conspecific, it begs some interesting biogeographical questions.

Die-offs of Chiricahua leopard frogs were first noted in former habitats of the Tarahumara frog (*Lithobates tarahumarae*) in Arizona at Sycamore Canyon in the Pajarito Mountains (1974) and Gardner Canyon in the Santa Rita Mountains (1977-78) (Hale and May 1983). From 1983-1987, Clarkson and Rorabaugh (1989) found Chiricahua leopard frogs at only two of 36 Arizona localities that had supported the species in the 1960s and 1970s. Two new populations were reported. During subsequent extensive surveys from 1994-2001, the Chiricahua leopard frog was found at 87 sites in Arizona, including 21 northern localities and 66 southern localities. (Sredl *et al.* 1997, Rosen *et al.* 1996, U.S. Fish and Wildlife Service files). In New Mexico, the species was found at 41 sites from 1994 -1999; 31 of those were verified extant during 1998-1999 (Painter 2000). During May-August 2000, the Chiricahua leopard frog was found extant at only eight of 34 sites where the species occurred in New Mexico during 1994-1999 (C. Painter, pers. comm. 2000). The species has been extirpated from about 80-85% of its historical localities in Arizona and New Mexico. Nineteen and eight localities are known from northeastern Sonora and northern and west-central Chihuahua; respectively, however, the status of the species in Mexico is poorly understood.

Based on Painter (2000) and the latest information for Arizona, the species is still extant in most major drainages in Arizona and New Mexico where it occurred historically; with the exception of the Little Colorado River drainage in Arizona and possibly the Yaqui drainage in New Mexico. It has also not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following mountain ranges or valleys: Pinaleno Mountains, Peloncillo Mountains, and Sulphur Springs Valley. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. In many of these regions Chiricahua leopard frogs were not found for a decade or more despite repeated surveys. Recent surveys suggest the species may have recently disappeared from some major drainages in New Mexico (C. Painter and R. Jennings, pers. comm. 2004).

Threats to this species include predation by non-native organisms, especially bullfrogs, fish, and crayfish; disease; drought; floods; degradation and loss of habitat as a result of water diversions and groundwater pumping, poor livestock management, altered fire regimes due to fire suppression and livestock grazing, mining, development, and other human activities; disruption of metapopulation dynamics; increased chance of extirpation or extinction resulting from small numbers of populations and individuals; and environmental contamination.

Loss of Chiricahua leopard frog populations is part of a pattern of global amphibian decline, suggesting other regional or global causes of decline may be important as well (Carey *et al*. 2001). Witte *et al.* (2008) analyzed risk factors associated with disappearances of ranid frogs in Arizona and found that population loss was more common at higher elevations and in areas where other ranid population disappearances occurred. Disappearances were also more likely where introduced crayfish occur, but were less likely in areas close to a source population of frogs.

Numerous studies indicate that declines and extirpations of Chiricahua leopard frogs are at least in part caused by predation and possibly competition by non-native organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Lithobates catesbeianus*), tiger salamanders (*Ambystoma mavortium mavortium*), crayfish (*Orconectes virilis* and possibly others), and several other species of fish (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Fernandez and Bagnara 1995; Snyder *et al.* 1996; Rosen *et al.* 1996, 1994; Fernandez and Rosen 1996, 1998). For instance, in the Chiricahua region of southeastern Arizona, Rosen *et al.* (1996) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported Chiricahua leopard frogs. All waters except three that supported introduced vertebrate predators lacked Chiricahua leopard frogs. Sredl and Howland (1994) noted that Chiricahua leopard frogs were nearly always absent from sites supporting bullfrogs and non-native predatory fish. Rosen *et al.* (1996) suggested further study was needed to evaluate the effects of mosquitofish, trout, and catfish on frog presence.

An understanding of the dispersal abilities of Chiricahua leopard frogs is key to determining the likelihood that suitable habitats will be colonized from a nearby extant population of frogs. As a group, leopard frogs are surprisingly good at dispersal. In Michigan, young northern leopard frogs (*Lithobates pipiens*) commonly move up to 0.5 mile from their place of metamorphosis, and 3 young males established residency up to 8.4 mi from their place of metamorphosis (Dole 1971). Both adults and juveniles wander widely during wet weather (Dole 1971). In the Cypress Hills, southern Alberta, young-of-the year northern leopard frogs successfully dispersed to downstream ponds 3.4 mi from the source pond, upstream 0.6 mi, and overland 0.6 mi. At Cypress Hills, a young-of-the-year northern leopard frog moved 13 mi in one year (Seburn *et al.* 1997). The Rio Grande leopard frog (*Lithobates berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh 2005). After the first rains in the Yucatan Peninsula, leopard frogs have been collected a few miles from water (Campbell 1998). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

Dispersal of leopard frogs away from water in the arid Southwest may occur less commonly than in mesic environments in Alberta, Michigan, or the Yucatan Peninsula during the wet season. However, there is evidence of substantial movements even in Arizona. Movement may occur via active movement of frogs or passive movement of tadpoles along streamcourses. The maximum distance moved by a radio-telemetered Chiricahua leopard frog in New Mexico was 2.2 mi in one direction (R. Jennings, C. Painter, pers. comm. 2004). In 1974, Frost and Bagnara (1977) noted passive or active movement of Chiricahua and Plains (*Lithobates blairi*) leopard frogs for 5 mi or more along East Turkey Creek in the Chiricahua Mountains. In August, 1996, Rosen and Schwalbe (1998) found up to 25 young adult and subadult Chiricahua leopard frogs at a roadside puddle in the San Bernardino Valley, Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 mi away. Rosen *et al.* (1996) found small numbers of Chiricahua leopard frogs at two locations in Arizona that supported large populations of non-native predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were populations 1.2-4.3 mi distant. In the Dragoon Mountains, Arizona, Chiricahua leopard frogs bred at Halfmoon Tank, but frogs were occasionally found at Cochise Spring (0.8 mi down canyon in an ephemeral drainage from Halfmoon Tank) and in Stronghold Canyon (1.1 mi down canyon from Halfmoon Tank). There is no breeding habitat for Chiricahua leopard frogs at Cochise Spring or Stronghold Canyon, thus it appears observations of frogs at these sites represented immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of Chiricahua leopard frogs disappeared from Silver Creek stock tank after the tank dried up; but frogs then began to appear in Cave Creek, which is about 0.6 mi away, again, suggesting immigration. Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn *et al.* 1997). Displaced northern leopard frogs will home, and apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may be an important factor in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Recent evidence suggests a chytridiomycete skin fungi, Bd, is responsible for global declines of frogs, toads, and salamanders (Speare and Berger 2000, Longcore *et al.* 1999, Berger *et al.* 1998, Hale 2001). Decline or extinction of about 200 amphibian species worldwide has been linked to the disease (Skerratt *et al.* 2007). The proximal cause of extinctions of two species of Australian gastric brooding frogs and the golden toad (*Bufo periglenes*) in Costa Rica was likely Bd. Another species in Australia for which individuals were diagnosed with the disease may be extinct (Daszak 2000). Although the cause of death is uncertain, a thickening of the skin on the feet, hind legs and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols *et al.* 2001). In Arizona, Bd infections have been reported from several populations of Chiricahua leopard frogs in southeastern Arizona, as well as populations of several other frogs and toads (Morell 1999, Sredl and Caldwell 2000, Davidson *et al.* 2000, Hale 2001, Bradley *et al.* 2002, U.S. Fish and Wildlife Service 2007). In New Mexico, chytridiomycosis was identified in a declining population near Hurley, and patterns of decline at three other populations are consistent with chytridiomycosis (R. Jennings, pers. comm. 2000). Die-offs typically occur during the cooler months from October-February.

The role of the fungi in the population dynamics of the Chiricahua leopard frog is as yet undefined. Some populations go to extinction once animals become symptomatic; however, other Chiricahua leopard frog populations can exist with the disease for extended periods (U.S. Fish and Wildlife Service 2007). For instance, the frog has coexisted with Bd in Sycamore Canyon, Santa Cruz County, Arizona since at least 1972. However, even in the best of cases, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. Because of the interchange of individuals among subpopulations, metapopulations of frogs may be particularly susceptible. Rapid death of all or most frogs in stock tank populations in a metapopulation of Chiricahua leopard frogs in Grant County, New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora. However in both cases, symptoms of moribund frogs matched those of chytridiomycosis. The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for Bd in Arizona (Sycamore Canyon west of Nogales, 1972) roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona.

Epizootiological data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) suggest introduction of the disease into native populations and the disease subsequently becoming enzootic in some areas. Alternatively, the fungus may be a widespread organism that has emerged as a pathogen because of either higher virulence or an increased host susceptibility caused by other factors such as environmental changes (Berger *et al.* 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other factors that cause stress (Carey *et al.* 1999, 2001; Daszak 2000; Pounds and Crump 1994). Morehouse *et al.* (2003) found low genetic variability among 35 Bd strains from North America, Africa, and Australia, suggesting that the first hypothesis – that it is a recently emerged pathogen that has dispersed widely – is the correct hypothesis. If this is the case, its rapid colonization could be attributable to humans. Bd does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA),

and species recently introduced (*Rhinella marinus* in Australia and American bullfrog in the USA and Uruguay) have been found infected with Bd, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni *et al.* 2003). Recently, retrospective analysis revealed presence of chytridiomycosis in African clawed frogs (*Xenopus laevis*) dating to 1938 (Weldon *et al.* 2004). Further evidence showed the disease was a stable endemic in southern Africa for at least 23 years before any Bd-positive amphibian specimen was found outside of Africa. African clawed frogs were exported from Africa for use in human pregnancy testing beginning in the 1930s. Weldon *et al.* (2004) suggest that Africa is the origin of the disease and that international trade in African clawed frogs was the means of disease dissemination. Once introduced to the Southwest via escaped or released clawed frogs, the disease may have spread across the landscape by human introductions or natural movements of secondarily-infected American bullfrogs, tiger salamanders, and leopard frogs.

Free-ranging healthy bullfrogs with low-level chytriodiomycosis infections have been found in southern Arizona (Bradley *et al.* 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, Bd may be carried with them (Collins *et al.* 2003). Other native or non-native frogs may serve as disease vectors or reservoirs of infection, as well (Bradley *et al.* 2002). Bd could also be spread by tourists or fieldworkers sampling aquatic habitats (Halliday 1998). The fungus can exist in water or mud and thus could be spread by wet or muddy boots, vehicles, cattle, and other animals moving among aquatic sites, or during scientific sampling of fish, amphibians, or other aquatic organisms. The U.S. Fish and Wildlife Service and AGFD are employing preventative measures to ensure the disease is not spread by aquatic sampling.

In captivity, frogs can be cleared of chytridomycosis with the antifungal agents miconazole and itraconazole (Nichols and Lamirande 2003), but no methods currently exist to clear the disease from a habitat site and subsequently keep it free of disease. Based on observations over a number of years at Ramsey Canyon leopard frog and Tarahumara frog localities, there is some indication that the disease may not be able to persist in the environment for long without a suitable host. The disease organism also requires water or moist sites; however, a recent attempt to eliminate the disease from a Ramsey Canyon leopard frog site by drying it out failed. High temperatures during the summer may slow reproduction of Bd to a point at which the organism cannot cause disease (Bradley *et al.* 2002). Rollins-Smith *et al.* (2002) also showed that Bd spores are sensitive to antimicrobial peptides produced in ranid frog skin. The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte *et al.* 2000). Harris (*et al.* 2006) found that several species of bacteria on the skin of amphibians inhibit the growth of *Batrachochytrium dendrobatidis*. The authors suggested that inoculating susceptible species could potentially provide them with some resistance to the disease. There is additional evidence that frogs may develop resistance to the pathogen or the pathogen may have developed less virulent strains that do not drive the host species to extinction (Retallic *et al.* 2004). Mendelson III *et al.* (2006) suggest that natural agent control (such as anti-microbial peptides or cutaneous bacteria) or selecting for disease resistance may be possible as recovery strategies for some amphibians currently at risk due to the disease.

A recovery plan has been completed (U.S. Fish and Wildlife Service 2007), the goal of which is to improve the status of the species to the point that it no longer needs the protection of the Act. The recovery strategy calls for reducing threats to existing populations; maintaining, restoring, and creating habitat that will be managed in the long term; translocating frogs to establish, reestablish, or augment populations; building support for the recovery effort through outreach and education; monitoring; research needed to provide effective conservation and recovery; and application of research and monitoring through adaptive management. Recovery actions are recommended in each of eight recovery units (RUs) throughout the range of the species. Management areas are also identified within RUs where the potential for successful recovery actions is greatest.

Additional information about the Chiricahua leopard frog can be found in Painter (2000), Sredl *et al.* (1997), Jennings (1995), Degenhardt *et al.* (1996), Rosen *et al.* (1996, 1994), Sredl and Howland (1994), Platz and Mecham (1984, 1979), Sredl and Jennings (2005), and U.S. Fish and Wildlife Service (2007).

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that 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.

Status of the species within the action area

The action area is defined as the area within which effects to the listed species and its critical habitat (if any is designated) are likely to occur and is not limited to the actual footprint of the proposed action. The action area encompasses portions of Chiricahua leopard frog RUs 1 (Tumacacori-Atascosa-Pajarito) and 2 (Santa Rita-Huachucas-Ajos-Bavispe). There are leopard frogs in several canyons on the eastern slope of the Huachuca Mountains formerly assigned to "*Lithobates subaquavocalis*" that were recently included into *L. chiricahuensis* (Crother 2008). However, for the purposes of this consultation, those frogs will not be considered part of the listed entity, because we have yet to publish a correction notice in the Federal Register including these populations within *L. chiricahuensis*. As a result, the only Chiricahua leopard frogs known to be extant in the action area occur in RU 1 west of I-19 in the Pajarito/Atascosa/San Luis Mountains and in the Altar Valley and adjacent bajada of the Sierrita Mountains. In these areas, the frog occurs primarily in impoundments built for livestock, but they also occur in the streams in Sycamore and Atascosa canyons, and at Hank and Yank Spring in Sycamore Canyon. The farthest east currently extant population is at Summit Tank just south of Ruby Road and just west of the Summit Motorway (Forest Road 39A). However, Chiricahua (and Lowland) leopard frogs have been found periodically at Peña Blanca Spring in recent years, and can be expected there in the future. The frog is believed to be extant at five sites from Summit Tank to Sycamore Canyon. To the west, Chiricahua leopard frogs occur in cattle tanks in the Altar Valley (BANWR, found at 16 sites since 2006) and on the southwestern bajada of the Sierrita Mountains (two sites).

They occurred historically west into the Baboquivari Mountains, but the last populations there disappeared in 2002 during an extended drought.

The frog sites from Summit Tank or Peña Blanca Spring west to Sycamore Canyon likely make up a metapopulation in which frogs move among sites. Sycamore Canyon is apparently a large and relatively robust population that serves as a source of frogs for the region. A second metapopulation is comprised of frog sites at BANWR and in the San Luis Mountains, which is by far the most robust metapopulation known throughout the range of the species. The two populations in the Sierrita Mountains probably exchange individuals and constitute a third metapopulation. In total, the 23 frog localities in the action area represent 43% of all known extant, wild listed populations of *L. chiricahuensis* in Arizona, and 26% of all such populations in the U.S. As a result, any adverse effects to the species in this area can be very important to survival or recovery.

Within the three metapopulations, individual populations may wink out due to disease, predation, or drought; while other aquatic sites are colonized. As a result, over time and for the life of the proposed action, we expect the frog to occur at a number of sites within the three metapopulations, but sites occupied at any one time will vary. In dry periods, the frogs will likely retreat to the most permanent of waters, such as Sycamore Canyon. During wet cycles, the frogs will disperse and could occupy many more sites. However, dispersal of non-native predators (such as bullfrogs) also occurs during wet cycles, which tempers benefits associated with wetter periods.

Factors affecting the species within the action area

The primary threat to Chiricahua leopard frogs in this area is predation by introduced American bullfrogs, which have well-established populations at Peña Blanca Lake, Ruby Lake, Arivaca Lake, and several other permanent waters in RU 1. Crayfish and non-native predatory fishes also occur in the area, although they are currently limited in distribution. Bullfrogs invaded and became established in Sycamore Canyon in the early 2000s. A multi-year effort lead by herpetologists at the University of Arizona has nearly eliminated them from the canyon. The metapopulation at BANWR is under constant threat from bullfrogs, which again, through a multi-year effort by the same herpetologists at University of Arizona, have been held at bay and prevented from overrunning the Chiricahua leopard frog populations.

A secondary threat in RU 1 is chytridiomycosis. It has been present in Sycamore Canyon since 1972, which is the earliest date for the disease in the U.S. (U.S. Fish and Wildlife Service 2007). Although lowland leopard frogs and Tarahumara frogs have disappeared from Sycamore Canyon since the disease was first recorded, the Chiricahua leopard frog has persisted, despite periodic die-offs. Bd and ranavirus are also known from the Altar Valley. Occupied sites in RU 1 are relatively low in elevation and warm; conditions under which Chiricahua leopard frogs are most likely to survive with Bd (U.S. Fish and Wildlife Service 2007). The extent of disease in RU 1 is not well understood, but because of how metapopulations function, Bd and perhaps ranavirus are likely present in other populations west of I-19. Because populations on the bajada of the Sierrita Mountains are relatively isolated from those in the Altar Valley and the Pajarito/Atascosa/San Luis mountain complex, it is possible that amphibian diseases may not have reached that area.

Other activities in the action area include degradation of habitats due to mining (mostly historical) and associated contamination, recreation, illegal smuggling and associated law enforcement activities (particularly those activities that create new vehicle or foot routes of travel near or through frogs habitats), and livestock grazing activities. The latter has been the subject of previous consultation with the Coronado National Forest (2-21-98-F-399 and reinitiations). Recent drought and apparent climate change are contributing to habitat degradation within the range of this species in the action area. For instance, the montane woodlands at the higher elevations (Santa Rita, Santa Catalina, and Huachuca mountains) have all experienced drought and associated large-scale catastrophic wildfires in recent years that have severely altered habitat.

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 tha action, which will be added to the environmental baseline. Interrelated actions are those actions that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those actions 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 Chiricahua leopard frog is expected to be affected both directly and indirectly by the proposed action. Direct effects include direct impacts of construction, operation, and maintenance activities on the frog or its habitats, such as travel by vehicles and equipment across streams or on the edge of ponds where frogs occur, with resulting damage to frog habitats. In addition, there is some potential for Chiricahua leopard frogs to be killed on roadways used by construction, operation, or maintenance vehicles where such vehicles are traveling through or near occupied aquatic habitats. Chiricahua leopard frogs have been observed on Ruby Road during the summer rainy season (J. Rorabaugh, pers. obs.), which is when frogs frequently disperse overland or along drainages. Although no Chiricahua leopard frogs have been found dead on roads, Lowland and Rio Grande leopard frogs have both been found run over by vehicles on roads in the desert Southwest (J. Rorabaugh, pers. obs.). Road kills can be a significant source of mortality (Carr and Fahrig 2001) and serve as a barrier to movement (deMaynadier 2000) for other species of leopard frogs.

Indirect effects to Chiricahua leopard frogs and their habitats may also occur through the following means:

1. Construction or improvements of access roads, and placement of towers near currently or future occupied frog habitats such that erosion and sedimentation occurs into those habitats, or access is created for the public or others who may introduce non-native predators or disease, collect frogs, start fires, or otherwise degrade habitats.

2. Spreading of disease (Bd or ranavirus) via construction equipment or vehicles traveling from one aquatic site to the next. Bd and possibly other diseases can be spread from one site to the next via wet equipment or mud (Daszak 2000). For example, a construction vehicle traveling along a road and through a stream (such as where Peña Blanca Creek crosses Ruby Road) could potentially carry Bd in water or mud to the next wet drainage.

3. The physical presence of the towers will likely drive illegal traffic from exposed areas in line-of-site of a tower to more rugged terrain and canyon bottoms where they will be more difficult to detect. These more rugged areas and canyons would probably include Sycamore and Atascosa canyons as well as canyon bottoms with cattle tanks, all of which are more likely to support frogs and frog habitats than exposed hilltops or mesas. This traffic is likely to result in degradation of habitats due to creation of trails, and fire frequency is likely to increase due to people building warming and cooking fires.

4. Although the proposed action is anticipated to reduce the quantity of illegal traffic in the action area, it is also likely to redirect traffic into more remote and environmentally sensitive habitats in the action area. Data gathered from the towers will affect the types and location of agent patrols. Presumably, the towers will provide information about locations of illegal activities, such that the locations of interdictions will be increasingly driven by technology rather than what is found during routine patrols. It is reasonable to assume that patrols may decline, or may be directed into areas where towers do not provide good coverage. These would be the same as the areas described in 3) above, which are also likely to support habitats for Chiricahua leopard frogs. Thus, patrols are likely to have increased impacts to Chiricahua leopard frogs as an indirect effect of the proposed action. Indirect adverse effects resulting from shifts in IA activity could occur where tower sensor coverage is absent and/or where CBP agents are unsuccessful in capturing individuals. The phased-in approach of this project will provide coverage for only a portion of the action area initially, leaving the rest of the action area vulnerable to the resultant shifting illegal traffic. Until the remaining towers are installed and operating effectively, illegal traffic in the uncovered parts of the action area is likely to increase. Once all towers are installed and operating, illegal traffic is likely to continue to shift to remote areas within the action area that towers and UGS cannot reach and/or where CBP agent capture attempts are unsuccessful.

5. Nonnative plants often thrive in disturbed areas (Tellman 2002); hence, construction activities could encourage the spread and establishment of these plants. Many non-native plants, such as Lehmann lovegrass (*Eragrostis lehmanniana*), carry fire better and often burn hotter than the native plants (Bock and Bock 2002, Esque and Schwalbe 2002). As a result, the proposed action has the potential to increase fire frequency and intensity via spread of non-native plants. Fire can result in temporary watershed degradation and increased sedimentation and ash flow into Chiricahua leopard frog habitats. Sediments can fill in frog habitats (Wallace 2003) and ash flow can create toxic conditions (Spencer and Hauer 1991). However, the potential for these effects is much reduced or eliminated by the Conservation Best Management Practices (see Effects of Conservation Best Management Practices below).

6. Although there may be thousands of UGSs placed at unspecified locations in the action area, they will require a small disturbance footprint (up 16 ft^2 per UGS) and will be placed along existing access routes and not in wetted areas. The proposed mobile surveillance systems are placed in border patrol vehicles that travel along existing routes. Few or no impacts are anticipated from these project features.

Site-Specific Effects of Towers

Seven relay towers and 19 sensor/sensor + relay towers are located in the vicinity of Chiricahua leopard frog habitats to the west of I-19. Towers TCA-NGL-046, 047, 049, 050, and 112 all lie east of areas currently or historically occupied by Chiricahua leopard frogs and will not be further analyzed. Tower TCA-TUS-103, although located in the vicinity of two Chiricahua leopard frog populations on the bajada of the Sierrita Mountains, is proposed for the top of Keystone Peak in that mountain range and will be accessed via existing routes. Construction, operation, and maintenance of that tower are not expected to affect Chiricahua leopard frog populations. Elimination of these towers from analysis leaves towers in the Pajarito/Atascosa mountain range complex, San Luis Mountains, and Altar Valley that may affect frogs and their habitats.

Pajarito/Atascosa Mountains

TCA-NGL-045: The access route for this tower is along Summit Motorway (Forest Road 39A). Summit Tank, which is occupied by Chiricahua leopard frogs, is immediately west of the Summit Motorway, and just south of Ruby Road. There is a steep slope between the road and the tank. No improvements to the road are proposed in the vicinity of the tank, and as a result, use of the road is not expected to impact the habitat at the tank. During the monsoon season, when frogs are dispersing, there is a small possibility of frogs occurring on the Summit Motorway or Ruby Road, where they could be subject to project-related roadkill; however, the population at Summit Tank has not been robust in recent years, so the likelihood of roadkill is very low. Lookout Tank, another occupied locality, is approximately 0.5 mi west of Summit Motorway. No effects to the habitat at that locality are anticipated; however, there is a small probability that frogs dispersing from that tank could encounter and be adversely affected by construction or maintenance activities and vehicles.

TCA-NGL-044 and 043: These towers are in the vicinity of Sycamore Canyon, Hank and Yank Spring, and Yank Tank; all of which are occupied localities. Tower TCA-NGL-044 is just off of Ruby Road northwest of the turnoff into Yanks Tank and above a tributary to Sycamore Canyon. Tower TCA-NGL-043 is just west of Ruby Road on a hill or slope above another tributary to Sycamore Canyon. Both will require construction of short spur roads off of Ruby Road. Both could result in small amounts of erosion and sedimentation into tributaries of Sycamore Canyon. Sediment input into Sycamore Canyon has been a concern for Chiricahua leopard frogs due to watershed degradation. Pools where frogs occur in the canyon are vulnerable to loss when sediments fill them in. The tower projects could contribute to these processes, but their contributions will be small compared to the overall watershed contribution. As with TCA-NGL-045, there is some small chance that dispersing frogs may occur on access roads where they will be vulnerable to roadkill. The most likely place for this to occur is the bridge over Sycamore

Canyon on Ruby Road. Bd is present in Sycamore Canyon, so there is some likelihood that amphibian disease could be spread to other localities by water or mud on construction or maintenance vehicles.

San Luis Mountains, Western Pajarito Mountains

TCA-TUS-040: This tower site will be accessed via a complex of roads that leads from Mojonera Canyon east into Sierra Canyon, then south to Alamo and Bonita canyons, and then southeast to the tower site. Extensive road reconstruction is needed, which will make this area much more accessible to the public and make it easier for illegal traffic to travel these roads. Where the road crosses Alamo Wash, it jogs around Upper Turner Tank, which is occupied by Chiricahua leopard frogs. The portion of the road that skirts the southern side of the tank is proposed for reconstruction. There is a high likelihood that increased erosion and sedimentation will occur into the tank, causing degradation of habitat. This tank also often has a robust population of frogs, so there is a fair likelihood that frogs could be found on the road or in construction areas during the summer rainy season, where they could be subject to death or injury. The incidence of amphibian disease in the area has not been investigated, but because the access road crosses through several canyons, there is a possibility of transporting disease organisms among canyons and to Upper Turner Tank via water or mud on construction or maintenance vehicles. Turner Tank, also an occupied locality, exists downstream about 0.6 mi in Alamo Wash from Upper Turner Tank. The habitat there is unlikely to be significantly affected by construction, but there is a small likelihood that dispersing frogs traveling up Alamo Wash during summer rains may encounter and be adversely affected by construction or use of the road. Bonita and Mojonera tanks are also within a mile of the access roads and ephemeral drainages provide dispersal routes from those tanks to the access road. So, again, there is a small possibility that dispersing frogs from those tanks could encounter and be affected by reconstruction of the road or construction or maintenance vehicles using the road. Increased public access into the area will increase the likelihood of introductions of non-native species and disease transmission.

TCA-TUS-289, 299: The proposed access route for these towers runs within about 0.25 mi southwest of Garcia Tank, an occupied locality. However, no improvements to that road are proposed. There is a small probability that frogs could disperse from Garcia Tank and encounter construction or maintenance vehicles. Amphibian diseases could also be moved among drainages via water or mud on construction or maintenance vehicles.

Altar Valley

TCA-TUS-187: The route proposed to access this tank runs north from near Sulfrido Tank and past Hito Tank, both occupied localities. Rock Tank, another occupied locality, lies approximately 0.8 mi to the west of the access road. No improvements are proposed to the road; as a result, no impacts to adjacent tank habitats are anticipated. There is a small likelihood that frogs dispersing from these tanks could be found on the access road and be killed or injured by construction or maintenance vehicles. Amphibian diseases could also be moved among drainages via water or mud on construction or maintenance vehicles.

Effects of Conservation Best Management Practices

The Conservation Best Management Practices and mitigation measures that are part of the proposed action act to avoid or offset some adverse effects. For instance, there are several Conservation Best Management Practices that will act to limit habitat disturbance during construction, avoid impacts to aquatic habitats, and promote design and construction or improvement of routes in ways that will minimize or eliminate increased erosion and sedimentation problems. Through the Conservation Best Management Practices, CBP will disinfect vehicles and equipment operating off of Ruby Road and paved routes through the action area. This will, for instance, minimize or eliminate disease transmission associated with construction and maintenance vehicles along the route into tower TCA-TUS-040 (but does not halt disease transmission by non-project vehicles that will have greater access to the area because of the road improvements). Effects monitoring at Upper Turner and Summit tanks proposed as a mitigation measure, should detect any problems associated with road-related erosion or sedimentation. If such effects are detected, corrective action will be taken. Proposed biological monitors and moving frogs out of harms way will also reduce adverse effects, including direct effects to individual frogs. Proposed site restoration will offset habitat disturbance, and actions to minimize and control non-native plants will reduce or eliminate the likelihood that construction or maintenance activities will increase fire frequency due to non-native plant spread. Bullfrog control in the action area and pipe rail fences at BANWR will significantly offset proposed action impacts by tackling some of the important threats to the Chiricahua leopard frog in RU 1.

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.

Because of the extent of Federal lands managed by the Coronado National Forest or BANWR at or in the vicinity of the Chiricahua leopard frog populations potentially affected by the proposed action, most activities that may affect the frog are Federal activities and subject to additional section 7 consultation. Exceptions include private actions on small inholdings, such as around Sulfrido Tank. Activities that may result in cumulative effects include livestock grazing activities, small-scale development, and road construction on these private lands. In some cases, these activities may directly or indirectly affect frog habitats or individual frogs. Many illegal activities associated with cross-border smuggling and illegal immigration also occur in the action area. These activities result in creation of trails and routes that can degrade adjacent frogs habitats, individuals or vehicles traveling among aquatic sites may spread amphibian diseases, and persons involved in these illegal activities often build cooking or warming fires, some of which escape and become wildfires.

Conclusion

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that construction of towers and other features as proposed, is not likely to jeopardize the continued existence of the Chiricahua leopard frog. No critical habitat has been designated for this species, therefore, none will be affected. We present this conclusion for the following reasons:

1. Although the action area contains 23 or 43% of all known extant, wild listed populations of *L. chiricahuensis* in Arizona, and 26% of all such populations in the U.S., only 11 are anticipated to be affected by the action, no habitats will be rendered unsuitable, and no populations are anticipated to be lost as a result of the action.

2. Proposed Conservation Best Management Practices reduce or eliminate many of the adverse effects of the action.

3. Proposed mitigation measures offset many of the adverse effects of the action.

4. Few or no impacts are anticipated as a result of placement or operation of UGS.

5. Implementation of the proposed action will not preclude conservation of the species based on the scope and scale of effects discussed in the Effects of the Proposed Action section and the summary of reasons provided under Conclusions 1 through 4, above.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Best Management Practices that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take

We anticipate Chiricahua leopard frogs will be taken as a result of road reconstruction and use associated with tower TCA-TUS-040**.** The incidental take is expected to be in the following forms and amounts:

1. Up to two frogs per year killed on the access road near Upper Turner Tank by passing construction or maintenance vehicles, or by other vehicles that would not be driving on the road but for the proposed improvements to the road.

2. Up to half of the metamorphosed frogs in Upper Turner Tank due to an outbreak of Bd that is spread to the tank via construction or maintenance vehicles or by other vehicles that would not be driving on the road but for the proposed improvements to the road.

Effect of the Take

In this biological opinion, we determine that the level of anticipated take is not likely to result in jeopardy to the species for the reasons stated in the Conclusions section.

Reasonable and Prudent Measures
All Reasonable and Prudent Measures to minimize take of the Chiricahua leopard frog have been included in the proposed action as Conservation Best Management Practices.

Review requirement: If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of this opinion. CBP must immediately provide an explanation of the causes of the taking and review with us the need for possible modification of the proposed action and this opinion.

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 your agency participate in the implementation of the Chiricahua leopard frog recovery plan.

2. We recommend that your agency investigate the distribution of Bd and other amphibian diseases in the action area. Protocols for this investigation should be coordinated with our office and AGFD.

In order for the U.S. Fish and Wildlife Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

MEXICAN SPOTTED OWL

Status of the Species

The Mexican spotted owl was listed as a threatened species in 1993 (U.S. Fish and Wildlife Service 1993). The primary threats to the species were cited as even-aged timber harvest and stand-replacing wildfire, although grazing, recreation, and other land uses were also mentioned as possible factors influencing the Mexican spotted owl population. The U.S. Fish and Wildlife Service appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (U.S. Fish and Wildlife Service 1995).

A detailed account of the taxonomy, biology, and reproductive characteristics of the Mexican spotted owl is found in the Final Rule listing the Mexican spotted owl as a threatened species (U.S. Fish and Wildlife Service 1993) and in the Recovery Plan (U.S. Fish and Wildlife Service 1995). The information provided in those documents is included herein by reference. Although the Mexican spotted owl's entire range covers a broad area of the southwestern U.S. and Mexico, the Mexican spotted owl does not occur uniformly throughout its range. Instead, it occurs in disjunct localities that correspond to isolated forested mountain systems, canyons, and in some cases steep, rocky canyon lands. Surveys have revealed that the species has an affinity for older, uneven-aged forest, and the species is known to inhabit a physically diverse landscape in the southwestern U.S. and Mexico.

The U.S. range of the Mexican spotted owl has been divided into six RUs, as discussed in the Recovery Plan. The primary administrator of lands supporting the Mexican spotted owl in the U.S. is the Forest Service. Most owls have been found within Forest Service Region 3 (including 11 National Forests in Arizona and New Mexico). Forest Service Regions 2 and 4 (including two National Forests in Colorado and three in Utah) support fewer owls. According to the Recovery Plan, 91% of Mexican spotted owl known to exist in the U.S. between 1990 and 1993 occurred on lands administered by the Forest Service.

Historical and current anthropogenic uses of Mexican spotted owl habitat include both domestic and wild ungulate grazing, recreation, fuels reduction treatments, resource extraction (e.g., timber, oil, gas), and development. These activities have the potential to reduce the quality of Mexican spotted owl nesting, roosting, and foraging habitat, and may cause disturbance during the breeding season. Livestock and wild ungulate grazing is prevalent throughout Region 3 National Forest lands and is thought to have a negative effect on the availability of grass cover for prey species. Recreation impacts are increasing on all forests, especially in meadow and riparian areas. There is anecdotal information and research that indicates that owls in heavily used recreation areas are much more erratic in their movement patterns and behavior. Fuels reduction treatments, though critical to reducing the risk of severe wildfire, can have short-term adverse effects to Mexican spotted owls through habitat modification and disturbance. As the

population grows, especially in Arizona, small communities within and adjacent to National Forest System lands are being developed. This trend may have detrimental effects to Mexican spotted owls by further fragmenting habitat and increasing disturbance during the breeding season. West Nile Virus also has the potential to adversely impact the Mexican spotted owl. The virus has been documented in Arizona, New Mexico, and Colorado, and preliminary information suggests that owls may be highly vulnerable to this disease (Courtney *et al.* 2004). Unfortunately, due to the secretive nature of owls and the lack of intensive monitoring of banded birds, we will most likely not know when owls contract the disease or the extent of its impact to Mexican spotted owl range-wide.

Currently, high-intensity, stand-replacing fires are influencing ponderosa pine and mixed conifer forest types in Arizona and New Mexico. Uncharacteristic, severe, stand-replacing wildfire is probably the greatest threat to the Mexican spotted owl within the action area. As throughout the West, fire severity and size have been increasing within this geographic area.

A reliable estimate of the numbers of owls throughout its entire range is not currently available (U.S. Fish and Wildlife Service 1995) and the quality and quantity of information regarding numbers of Mexican spotted owls vary by source. U.S. Fish and Wildlife Service (1991) reported a total of 2,160 owls throughout the U.S. Fletcher (1990) calculated that 2,074 owls existed in Arizona and New Mexico. However, Ganey *et al.* (2000) estimates approximately 2,950 ± 1,067 standard error (SE) Mexican spotted owls in the Upper Gila Mountains RU alone. The Forest Service Region 3 most recently reported a total of approximately 1,025 PACs established on National Forest System lands in Arizona and New Mexico (B. Barrera, pers. comm. June 18, 2007). The Forest Service Region 3 data are the most current compiled information available to us; however, survey efforts in areas other than National Forest System lands have resulted in additional sites being located in all RUs.

Researchers studied Mexican spotted owl population dynamics on one study site in Arizona (n = 63 territories) and one study site in New Mexico (n = 47 territories) from 1991 through 2002. The Final Report, titled "Temporal and Spatial Variation in the Demographic Rates of Two Mexican Spotted Owl Populations," (*in press*) found that reproduction varied greatly over time, while survival varied little. The estimates of the population rate of change (Λ=Lamda) indicated that the Arizona population was stable (mean Λ from 1993 to 2000 = 0.995; 95% Confidence Interval = 0.836, 1.155) while the New Mexico population declined at an annual rate of about 6% (mean Λ from 1993 to 2000 = 0.937; 95% Confidence Interval = 0.895, 0.979). The study concludes that spotted owl populations could experience great (>20%) fluctuations in numbers from year to year due to the high annual variation in recruitment. However, due to the high annual variation in recruitment, the Mexican spotted owl is then likely very vulnerable to actions that impact adult survival (e.g., habitat alteration, drought, etc.) during years of low recruitment.

Since the owl was listed, we have completed or have in draft form a total of 191 formal consultations for the Mexican spotted owl. These formal consultations have identified incidences of anticipated incidental take of Mexican spotted owl in 390 PACs. The form of this incidental take is almost entirely harm or harassment, rather than direct mortality. These consultations have primarily dealt with actions proposed by Forest Service Region 3. However, in addition to actions proposed by Forest Service Region 3, we have also reviewed the impacts of

actions proposed by the Bureau of Indian Affairs, Department of Defense (including Air Force, Army, and Navy), Department of Energy, National Park Service, and Federal Highway Administration. These proposals have included timber sales, road construction, fire/ecosystem management projects (including prescribed natural and management ignited fires), livestock grazing, recreation activities, utility corridors, military and sightseeing overflights, and other activities. Only two of these projects (release of site-specific owl location information and existing forest plans) have resulted in biological opinions that the proposed action would likely jeopardize the continued existence of the Mexican spotted owl. The jeopardy opinion issued for existing Forest Plans on November 25, 1997 was rendered moot as a non-jeopardy/no adverse modification Biological Opinion was issued the same day.

Mexican spotted owl critical habitat

The final Mexican spotted owl critical habitat rule (U.S. Fish and Wildlife Service 2004) designated approximately 8.6 million acres of critical habitat in Arizona, Colorado, New Mexico, and Utah, mostly on Federal lands (U.S. Fish and Wildlife Service 2004). Within this larger area, critical habitat is limited to areas that meet the definition of protected and restricted habitat, as described in the Recovery Plan. Protected habitat includes all known owl sites and all areas within mixed conifer or pine-oak habitat with slopes greater than 40% where timber harvest has not occurred in the past 20 years. Restricted habitat includes mixed conifer forest, pine-oak forest, and riparian areas outside of protected habitat.

The primary constituent elements for proposed Mexican spotted owl critical habitat were determined from studies of their habitat requirements and information provided in the Recovery Plan (U.S. Fish and Wildlife Service 1995). Since owl habitat can include both canyon and forested areas, primary constituent elements were identified in both areas. The primary constituent elements which occur for the Mexican spotted owl within mixed-conifer, pine-oak, and riparian forest types that provide for one or more of the Mexican spotted owl's habitat needs for nesting, roosting, foraging, and dispersing are in areas defined by the following features for forest structure and prey species habitat:

Primary constituent elements related to forest structure include:

- A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30% to 45% of which are large trees with diameter-at-breast height (dbh) of 12 inches or more;

- A shade canopy created by the tree branches covering 40% or more of the ground; and,

- Large, dead trees (snags) with a dbh of at least 12 inches.

Primary constituent elements related to the maintenance of adequate prey species include:

High volumes of fallen trees and other woody debris;
- A wide range of tree and plant species, including hardwoods; and

- Adequate levels of residual plant cover to maintain fruits and seeds, and allow plant regeneration.

The forest habitat attributes listed above usually are present with increasing forest age, but their occurrence may vary by location, past forest management practices or natural disturbance events, forest-type productivity, and plant succession. These characteristics may also be observed in younger stands, especially when the stands contain remnant large trees or patches of large trees. Certain forest management practices may also enhance tree growth and mature stand characteristics where the older, larger trees are allowed to persist.

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that 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.

Status of the Species within the Action Area

The action area includes portions of the Basin and Range – West RU. In the action area Mexican spotted owls inhabit a great range of habitat types and are often found at lower elevations and different forest types than on the Mogollon Rim or elsewhere within the range of subspecies in the U.S. Most of the owls occur in isolated mountain ranges in oak, pine-oak, and mixed conifer forest types, often in steep canyons with relatively mesic conditions compared to the surrounding landscapes (see U.S. Fish and Wildlife Service 1993). Mexican spotted owl PACs in the action area occur in the Pajarito/Atascosa (4), Patagonia (3), Santa Rita (15), Santa Catalina (17), and Huachuca (28) mountains. These same mountain ranges also have designated critical habitat.

The following towers and associated access routes are within critical habitat for the owl: Santa Catalina Mountains: TCA-TUS-192; Pajarito/Atascosa Mountains: TCA-NGL-043, TCA-NGL-044, TCA-NGL-045, TCA-NGL-046, TCA-NGL-049, TCA-NGL-109; Patagonia Mountains: TCA-NGL-054, TCA-SON-115; Santa Rita Mountains: TCA-NGL-211; and Huachuca Mountains: TCA-SON-060, TCA-SON-061, TCA-SON-062. Tower TCA-SON-61 is 0.17 mile from a PAC. Table 5 lists towers and access routes that lie within PACs, as well as occupancy data for those PACs from 1997 through 2005. Occupancy data for 2006-2008 were unavailable, and no data were available for Joe's Canyon PAC. Equipment and vehicles will reach the tower sites in Table 5 via existing routes that will not be improved or reconstructed, with the exception of 132 ft of reconstructed road just downslope of the tower site at TCA-NGL-211.

Table 5. PACs directly affected by towers and access routes, plus occupancy data

PAC	Tower	1997	1998	1999	2000	2001	2002	2003	2004	2005
0502008 Cottonwood Canyon	TCA-NGL-211	NS	M	NS	NS	O	M	O,NU	M	M
0505010 Ski Valley	TCA-TUS-192	O,NN	O,NN	O,NU	O,NN	M	M	O	O,1Y	O,2Y
Joe's Cyn Coronado NM	TCA-TUS-062									

O=pair occupancy
M=single male
F=single female
#Y=# young fledged
#N=# nestlings if # fledged unknown
NU=nest, unknown how many young
NS=nest started, i.e. green twigs on nest
NF=nest failed
NS=not surveyed

Factors affecting the species within the action area. Fire frequency and intensity in Southwestern forests are much altered from historical conditions (Dahms and Geils 1997). Before 1900, surface fires generally occurred at least once per decade in montane forests with a pine component. Beginning about 1870-1900, these frequent ground fires ceased to occur due to intensive livestock grazing that removed fine fuels, followed by effective fire suppression in the mid to late 20th century (Swetnam and Baisan 1996). Absence of ground fires allowed a buildup of woody fuels that precipitated infrequent but intense crown fires (Danzer *et al.* 1997, Swetnam and Baisan 1996).

The Huachuca, Santa Rita, and Santa Catalina mountains within the action area have all experienced severe, recent crown fires that have, in some cases, dramatically degraded Mexican spotted owl habitat. For example, in 2003, 84,750 acres burned atop the Santa Catalina Mountains in the Aspen Fire. In 2005, 23,183 acres burned on the eastern slopes of the Santa Rita Mountains in the Florida Fire. A series of crown fires since 1977 have destroyed thousands of acres high in the Huachuca Mountains. These fires are a combination of lightening and human-caused fires. Recent drought and apparent climate change have exacerbated the problem by making forests more susceptible to catastrophic fire.

In addition to fire, Mexican spotted owls and their habitats in the action area are affected by recreational use, fire suppression and fire use, fuels management projects, illegal smuggling and immigration, and law enforcement response. Effects of recreational trail use on Mexican spotted owls were recently investigated by Swarthout and Steidl (2001, 2003). Delaney and Grubb (2003) evaluated the effects of off-highway vehicles on northern spotted owls, as well as effects of helicopters on the Mexican spotted owl (Delaney *et al.* 1999).

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 action may impact Mexican spotted owl critical habitat and three PACS. Major work on roads and towers, where significant amounts of equipment will be required, will be conducted during the July 15 to September 30, 2008 period, which is during the Mexican spotted owl breeding season. Disturbance of up to 100 by 100 ft will occur at each of 13 tower sites in critical habitat (see Status of the Species Within the Action Area section**,** above) for a total of 2.98 acres. Access routes will be constructed or reconstructed as follows: Pajarito/Atascosa Mountains: TCA-NGL-043 (439 ft of new road), TCA-NGL-044 (274 ft of new road), TCA-NGL-045 (409 ft of new road), TCA-NGL-046 (14 ft of new road, 1,486 ft of reconstructed road), TCA-NGL-049 (88 ft of new road, 3,035 ft of reconstructed road), Patagonia Mountains: TCA-NGL-054 (185 ft of new road, 1.57 mi of reconstructed road); Santa Rita Mountains: TCA-NGL-211 (132 ft of new road); and Huachuca Mountains: TCA-SON-060 (200 ft of reconstructed road), TCA-SON-061 (95 ft of new road). New routes proposed in critical habitat totals 1,636 ft. Proposed reconstructed roads in critical habitat total 2.46 mi. Routes will average 16 ft in width. Data are insufficient to assess impacts to constituent elements; however at least some of these tower sites and access routes are at lower elevations where constituent elements are lacking.

Disturbance within PACs will occur within the Cottonwood Canyon (Santa Rita Mountains), Ski Valley (Santa Catalina Mountains), and Joe's Canyon (Huachuca Mountains) PACs. The tower proposed for the Ski Valley PAC will be placed on Radio Ridge with other communications towers, and its placement requires no new or improved access. As a result, construction, operation, and maintenance of this tower are unlikely to have adverse effects to Mexican spotted owls in the area, despite its location in a PAC. A 100 by 100-ft area will be cleared for the tower. The tower site in Joe's Canyon PAC, which will require a 100 x 100-ft cleared area, is at or near a turnout and parking area on Coronado National Memorial at the top of Montezuma Pass. Construction activity may disturb nearby owls. This area is frequented by visitors to the Memorial, so that the tower's presence is unlikely to add any significant disturbance over and above that caused by visitors, at least during the day. However, at night it will emit generator, air conditioner, and air blower noise (the generator will operate about three hours per day). At 165 ft, the noise from the generator will be about 55 dBA. Delaney *et al.* (1999) found that spotted owls did not flush when chain saw noise was $\leq$ 46 dBA. So there will likely be a radius of 165-200 ft around the towers in which Mexican spotted owl, if present, might flush or be affected by the noise from the tower. The construction and tower noise may also cause owls to avoid the area to some extent. Similar effects are expected at the tower proposed for the Cottonwood Canyon PAC in the Santa Rita Mountains, except that effects might occur at night or during the day. Placement of the tower in the Cottonwood PAC will also require

reconstruction of about 100 ft of road immediately downslope of the tower site. This will create additional surface disturbance and reduce the value of the area for Mexican spotted owls.

Birds are known to collide with towers and tower guide wires. The potential for Mexican spotted owls to be killed or injured as a result of collisions is unknown, but they are agile flyers that negotiate dense forests and aerial mazes of branches. The likelihood of collisions with the towers is low.

Indirect effects to owls will likely occur via: (1) better access for the public provided by new or reconstructed routes; (2) reduction in illegal smuggling and immigration in the vicinity of the towers; and (3) redirection of illegal activities and associated law enforcement response to areas not covered by the towers. Public use in the three PACs is not expected to increase due to the towers; however, new and reconstructed access in critical habitat, totaling 1,630 ft of new access and 3.09 mi of reconstructed access, will provide better access for public use into eight areas of critical habitat. Increased public use will likely result in greater frequency of human-caused fire, as well as, hunting and illegal off-highway vehicle use. Delaney and Grubb (2003) found that northern spotted owl flush response and nest success and productivity were not substantially affected by motorcycles. Spotted owls did not flush when motorcycles were more than 230 ft away. Swarthout and Steidl (2003) concluded that cumulative effects of high levels of short-duration recreational hiking near nests may be detrimental to Mexican spotted owls, but that substantial effects were not likely unless more than 50 hikers per day frequented Mexican spotted owl habitat. Based on these studies, some adverse effects to Mexican spotted owls may occur due to increased public use, but are not expected to result in incidental take.

The proposed action should reduce the quantity of illegal traffic in the action area, but it may also shift traffic into more remote habitats occupied by Mexican spotted owls. If the tower and UGS technology covers all Mexican spotted owl habitat, and illegal traffic is significantly reduced in occupied Mexican spotted owl habitat, the proposed action will provide some benefits to the Mexican spotted owl and its habitat (see Cumulative Effects section, below). However, the physical presence of the towers will likely drive illegal traffic from exposed areas in line-of-site of a tower to more rugged terrain and canyon bottoms where they will be more difficult to detect. Because Mexican spotted owls often frequent mesic canyons, these more rugged areas and canyons are more likely to support Mexican spotted owls than exposed hilltops or mesas. This traffic is likely to result in degradation of habitats due to creation of trails, and fire frequency is likely to increase due to people building warming and cooking fires.

Data gathered from the towers will affect the types and location of agent patrols. Presumably, the towers will provide information about locations of illegal activities, such that the locations of interdictions will be increasingly driven by technology rather than what is found during routine patrols. It is reasonable to assume that patrols may decline, or may be directed into areas where towers do not provide good coverage. These would be the same as the areas described in (3) above, which are also likely to support Mexican spotted owls. Thus, patrols are likely to have increased impacts to Mexican spotted owls and its habitats as an indirect effect of the proposed action.

Although there may be thousands of UGSs placed at unspecified locations in the action area, each will require only a small disturbance footprint (up 16 ft^2 per UGS) and will be placed along existing access routes and not in wetted areas. The proposed mobile surveillance systems are placed in border patrol vehicles that travel along existing routes. Few or no impacts are anticipated from these project features.

Effects of Conservation Best Management Practices

The conservation measures that are part of the proposed action act to avoid or offset some adverse effects. For instance, there are several conservation measures that will act to limit habitat disturbance during construction and that promote design and construction or improvement of routes in ways that will minimize or eliminate increased erosion and sedimentation problems. Presence of a biological monitor will help ensure that conservation measures are implemented as designed. The conservation measures also call for restoration in Mexican spotted owl habitat, where possible.

Mitigation includes monitoring Mexican spotted owl core areas in Huachuca, Patagonia, and Pajarito/Atascosa mountains in areas of high use and taking corrective action if effects are detected. Where improved or new roads may increase use of sensitive areas, access will be prevented through gating, physical barriers, etc. Implementation of the latter measure will be dependent on the authority of CBP to close routes and the effectiveness of those closures. Funds for closure and restoration of unauthorized roads will be provided to the land management agency. Nonetheless, proposed mitigation measures will offset adverse effects to the Mexican spotted owl and its habitat to some extent.

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.

Because of the extent of Federal lands managed by the Coronado National Forest at or in the vicinity of Mexican spotted owl PACs and critical habitat potentially affected by the proposed action, most activities that may affect the Mexican spotted owl and its critical habitat are Federal activities and subject to additional section 7 consultation. Exceptions include private actions on small inholdings within Forest lands. Activities that may result in cumulative effects include livestock grazing activities, small-scale development, and road construction on these private lands. In some cases, these activities may directly or indirectly affect Mexican spotted owls or their habitats. Many illegal activities associated with cross-border smuggling and illegal immigration also occur in the action area. These activities result in creation of trails and routes that can degrade Mexican spotted owl habitats and disturb individual birds. Persons involved in these illegal activities often build cooking or warming fires, some of which escape and become wildfires.

Conclusion

This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR 402.02. Instead, we have relied upon the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

After reviewing the current status of the Mexican spotted owl, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that construction of towers and other features as proposed, is neither likely to jeopardize the continued existence of the Mexican spotted owl, nor result in adverse modification or destruction of critical habitat. We present these conclusions for the following reasons:

1. Surface disturbance will occur within three PACs. However, the acreage disturbed is relatively small compared to the size of the PACs (≥600 acres). The number of PACs affected is also small compared to the 1,025 PACs established on National Forest System lands in Arizona and New Mexico.

2. Although critical habitat will be impacted, the area impacted is relatively small compared to the 8.6 million acres designated throughout the range of the species.

3. Proposed conservation measures will reduce and offset many of the adverse effects of the action.

4. Few or no impacts are anticipated as a result of placement or operation of UGS and mobile surveillance systems.

5. Implementation of the proposed action will not preclude conservation of the species based on the scope and scale of effects discussed in the Effects of the Proposed Action section and the summary of reasons provided under Conclusions 1 through 4, above.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Best Management Practices that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take

We do not anticipate that Mexican spotted owl will be taken as a result of the proposed action.

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 your agency participate in the implementation of the Mexican spotted owl recovery plan.

2. We recommend that your agency work with us to identify key areas for Mexican spotted owl and then devise the means to direct illegal activities and law enforcement response away from those areas.

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

JAGUAR

Status of the Species

Description, Legal Status, and Recovery Planning

The jaguar was listed as endangered from the U.S. and Mexico international border southward to include Mexico and Central and South America (37 FR 6476). The species was originally listed as endangered under the Endangered Species Conservation Act of 1969 (ESCA). Under the ESCA, two separate lists of endangered wildlife were maintained, one for foreign species and one for the U.S. The jaguar appeared only on the foreign list. In 1973, the Act replaced the ESCA. The foreign and native lists were replaced by a single ‘‘List of Endangered and Threatened Wildlife,’’ (U.S. Fish and Wildlife Service 1975). In 1979, we published a notice (44 FR 43705) stating that, through an oversight in the listing of the jaguar (and six other endangered species), populations in the U.S. were not protected by the Act. The notice asserted that it was always our intent that all populations of jaguars were to be listed as endangered, whether they occurred in the U.S. or in foreign countries. Endangered status was extended to the jaguar in the U.S. in 1997 (62 FR 39147). Designation of critical habitat was found to be not

prudent because designation may increase the chance of direct taking. Critical habitat designation was again analyzed in 2006, and it was found to be not prudent because there would be no conservation benefit to the species (71 FR 39335).

The jaguar was addressed in *Listed Cats of Texas and Arizona Recovery Plan (with Emphasis on the Ocelot)* (U.S. Fish and Wildlife Service 1990), but only general information and recommendations to assess jaguar status in the U.S. and Mexico, and protect and manage occupied and potential habitat in the U.S. were presented. No specific recovery recommendations or objectives for the jaguar were presented. The AGFD published an assessment and strategy in 1997 for jaguars in Arizona and New Mexico (Johnson and Van Pelt 1997), which was accepted by the Jaguar Conservation Team. The AGFD and the New Mexico Department of Game and Fish (NMDGF) (the Lead Agency signatories), as well as the FWS (a Cooperator signatory), completed an updated conservation framework in July 2007 and a revised MOU was signed on March 22, 2007. Since then, other Federal and County governmental agencies in Arizona and New Mexico have also become Cooperator signatories. AGFD, NMDGF, and FWS are currently developing an updated assessment for jaguars in Arizona, New Mexico, and northwestern Mexico.

Life History and Habitat

Rangewide, jaguars measure about five to eight feet from nose to tip of tail and weigh from 80 to 348 lb, although the 80 and 348 lb weights are exceptional (Nowak 1999, Seymour 1989). Males are typically 10 to 25% larger than females (Emmons 1999, Wildlife Conservation Society 2007), or perhaps 20 to 30% larger (Sunquist and Sunquist 2007). In the southern part of the range, females tend toward 100 to 150 lb and males toward 170 to 220 lb. In Central America and southern Mexico, both sexes trend slightly larger than they do to the north or south. Leopold (1959) listed a weight range in Mexico of 140 to 250 lb for males and 100 to 180 lb for females. Jaguars have a relatively robust head, compact but muscular body, short limbs and tail, and powerfully built chest and forelegs (Leopold 1959, Nowak 1999, Seymour 1989, Tewes and Schmidly 1987, Wildlife Conservation Society 2007). They have the strongest teeth and jaws of any American cat, and their skulls are more massive than those of mountain lions (Brown and López González 2001). Their canines are well developed (Seymour 1989) and effectively deployed. The overall coat of a jaguar is typically pale yellow, tan, or reddish yellow above, and generally whitish on the throat, belly, insides of the limbs, and underside of the tail, with prominent dark spots or blotches throughout (Seymour 1989).

The life history of the jaguar has been summarized by Seymour (1989), among others. Jaguars generally breed year-round throughout their range, but at the southern and northern ends of their range there is evidence for a spring breeding season. Gestation is about 100 days; litters range from one to four cubs (usually two). Cubs remain with their mother for nearly two years. Females begin sexual activity at three years of age, males at four. Studies have documented few wild jaguars more than 11 years old.

The list of prey taken by jaguars range-wide includes more than 85 species (Seymour 1989). Known prey include peccaries (javelina), capybara, paca, armadillos, caimans, turtles, livestock, and various birds and fish. Although it is thought that javelina and deer are mainstays in the diet

of jaguars in the U.S.-Mexico borderlands, other available prey, including livestock, are probably taken as well. This is similar to the diet of jaguars in the tropical dry forest of Jalisco, where white-tailed deer and collared peccary (expressed as relative biomass consumed) represented the preferred prey species of jaguars (Núñez *et al*. 2000).

Like most large carnivores, jaguars have relatively large home ranges. According to Brown and López González (2001), their home ranges are highly variable and depend on topography, available prey, and population dynamics. However, little information is available on this subject outside tropical America, where several studies of jaguar ecology have been conducted. Quigley and Crawshaw (1992) estimated a minimum of 2000-3000 square kilometers (km^2) [772 to 1160 square miles (mi^2)] is needed to support 30 to 50 adult jaguars; the actual area depends on prey density, habitat composition, and the amount of human exploitation. Individual jaguar home ranges vary from 28 to 40 km^2 (11 to 15 mi^2) in Belize (Rabinowitz and Nottingham 1986) and from 25 to 60 km^2 (10 to 25 mi^2) for females in the dry and wets seasons, respectively, in Jalisco, Mexico (Núñez *et al.* 2002). The average home range of radio-collared male jaguars in Venezuela was 49 and 78 km^2 (19 to 30 mi^2) (Brown and López González 2001:60).

Several studies have shown that jaguars selectively use large areas of relatively intact habitat away from certain forms of human influence. In the state of Mexico, Monroy-Vichis *et al*. (2007) report that jaguars occur with greater frequency in areas relatively distant from roads and human populations. Zarza *et al*. (2007) report that towns and roads had an impact on the spatial distribution of jaguars (jaguars used more frequently than expected by chance areas located more than 6.5 km from human settlements and 4.5 km from roads) in the Yucatan peninsula.

Jaguars are known from a variety of vegetation communities (Seymour 1989), including those found in the arid Southwest (Nowak 1994). Toward and at middle latitudes, they show a high affinity for lowland wet communities, typically swampy savannas or tropical rain forests. However, they also occur in upland vegetation communities in warmer regions of North and South America. For example, jaguars occur in dry tropical forest in southern Sonora, Sinaloa, Nayarit, and Jalisco (E. Rojero Diaz, pers. comm., Navarro Serment *et al.* 2005, Núñez *et al.* 2000, Núñez Pérez 2007). Swank and Teer (1989) stated that jaguars prefer a warm, tropical climate, usually associated with water, and are rarely found in extensive arid areas. However, jaguars occur in arid areas, including thornscrub, desertscrub, lowland desert, mesquite grassland, Madrean oak woodland, and pine-oak woodland communities of northwestern Mexico and southwestern U.S. (Boydston and López Gónzalez 2005, McCain and Childs 2008, López Gónzalez and Brown 2002). Recently, several studies have helped refine general understanding of habitats that have been or might be used by jaguars in Arizona and New Mexico, including studies by the Sierra Institute Field Studies Program (2000), Hatten *et al.* (2002 and 2005), Menke and Hayes (2003), Boydston and López Gónzalez (2005), Robinson *et al.* (2006), and McCain and Childs (2008).

Distribution and Abundance

Jaguars historically ranged from southern U.S. to southern Argentina. Currently, they range from the southwestern U.S. to northern Argentina (Marieb 2005). Abundance and population trends for the jaguar are still not well known; however, populations throughout their range continue to be at risk. Sanderson *et al.* (2002) found that the jaguar is known to be extant in

about 8.75 million km^2 (3.4 million mi^2), which represents 46% of its historical range. Jaguars are known to be extirpated in 37% of their historical range, and their status in another 18% is unknown (Sanderson *et al.* 2002). The probability of long-term survival of the jaguar is considered high in 70% of the currently occupied range (over 6 million km^2 - 2.3 million mi^2) (Sanderson *et al.* 2002). Marieb (2005) updated Sanderson's (2002) work and found that the jaguar is known to be extant in about 7.28 million km^2, which represents 38% of its historical range. She cautions, however, that asserting that the range of the jaguar has shrunk by 8% in six years is unfounded because many areas where experts reported having knowledge in the 1999 survey (Sanderson *et al.* 2002 study) had no knowledge in the 2005 survey (Marieb 2005 survey), and thus the status of the jaguar in these areas is simply unknown. To better understand abundance and population trends for this species, research, inventories, and monitoring programs are being implemented in some parts of the jaguar range (IUCN 2007, Wildlife Conservation Society 2007, Chávez *et al.* 2007).

In northwestern Mexico[1], jaguars occur from the rugged barrancas connecting northeastern Sinaloa, southeastern Sonora, and southwestern Chihuahua, north to the border with the U.S. A summary of jaguars killed or captured in the Mexican states of Sonora and Chihuahua from 1900 to 2000 is provided in Brown and López González (2001). The most northern recently documented breeding population of jaguars occurs near the towns of Huasabas and Sahuaripa, about 130 mi (210 kilometers [km]) south of the U.S./Mexico international border (Brown and López González 2001).

Historically, as the listing rule (62 FR 39147) discusses, jaguars in the U.S. occurred in California, Arizona, New Mexico, Texas, and possibly Louisiana. The last jaguar sightings in California, Texas, and Louisiana were documented in the late 1800s or early 1900s. Sightings in the U.S in the late 20th century to the present have occurred mainly along the U.S./Mexico international border. Three records of a female with kittens have been documented in the U.S., the last in 1910 (Lange 1960, Nowak 1975, Brown 1989), and no females have been confirmed in the U.S. since 1963 (Brown and López González 2000). As a result, jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico.

Threats

A number of threats contributed to or continue to affect the status of northern jaguar populations, including illegal shooting; over hunting of jaguar prey species; and habitat loss, fragmentation, and modification. Most loss of occupied range has occurred in the southern U.S., northern Mexico, northern Brazil, and southern Argentina (Sanderson *et al.* 2002). Medellin *et al*. (2002) report that loss, fragmentation, and modification of jaguar habitat have contributed to population declines throughout much of the species' range, including northern Mexico. These changes in jaguar habitat have affected not only habitat for breeding and foraging, but also movement corridors. Increased illegal and law enforcement actions along the Mexico-U.S. international border may be limiting jaguar movement across the border, but it is uncertain if and how much this is affecting that movement. Chávez and Ceballos (2006) estimated that: 60% of the jaguar's historical range in Mexico had been lost; the nationwide population was less than 5,000

[1] For this document northwestern Mexico includes the area where Sinaloa, Chihuahua, and Sonora meet north to the U.S. border. Jaguars also occur south of this area, throughout most of Sinaloa.

individuals; and a variety of threats suggested that, absent effective conservation efforts, jaguar imperilment in Mexico would only worsen. Rosas-Rosas (2006) reported that jaguar habitats were degraded and conflicts between jaguars and human interests were common in Sonora. Furthermore, he reported illegal hunting of jaguars and their potential prey species and habitat fragmentation are probably the main threats to long-term conservation of jaguars in their northernmost western range. A model created from a population and habitat viability analysis for jaguars in the Sonora region indicates that without anthropogenic influences the jaguar population will be reduced to less than 50% of its original size in 100 years (or about 65 individuals) and that with anthropogenic influences (illegal killing of jaguars was the only anthropogenic influence included in this model) jaguars will be reduced to about 20 individuals in 100 years (Carrillo *et al.* 2007).

Planning and Conservation Efforts

The Wildlife Conservation Society held a workshop in 1999 during which 51 Jaguar Conservation Units (throughout the entire range of the jaguar) were identified as being important for conservation of the species (Sanderson *et al.* 2002). The most northern of these units occurs in the Sierra Madre Occidental of Sonora and Chihuahua. Mexico considers the jaguar an endangered (SEMARNAT 2002) and national priority species for conservation (Ramírez Flores and Oropeza Huerta 2007) and, as a result, has carried out many planning and conservation-related actions for jaguars on a national level. For example, after recognizing that conserving the jaguar throughout Mexico would require a sustained and large-scale effort of diverse governmental and non-governmental groups in Mexico, in 2005, the Instituto de Ecología de la UNAM (Ecology Institute of the National Autonomous University of Mexico), with the support of the CONANP (Comisión Nacional de Áreas Naturales Protegidas, the National Commission for Protected Natural Areas), sponsored its first national symposium on jaguar conservation, El Jaguar Mexicano en el Siglo XXI: Situación Actual y Manejo (Chávez and Ceballos 2006). Key objectives were to evaluate the current status of the jaguar in Mexico; determine threats to jaguar existence; and determine priority conservation actions at the local, regional, and national scale. Subcommittees were established to work at the local level, including one for the northern jaguar population in Chihuahua and Sonora. Using data gathered at this symposium, Chávez and Ceballos (2006) report that at least eight high-priority regions for the conservation of jaguar exist in Mexico; the most northern of these regions is northeastern Sonora. All regions, with the exception of two (one in Nayarit and the other Jalisco) are generally large enough to maintain populations of 100 or more animals.

During the first national symposium, the need to conduct a population and habitat viability analysis for jaguars in Mexico at a national scale was recognized (Carrillo *et al.* 2007). As a result, a second national symposium, Jaguar Mexicano en el Siglo XXI: Taller de Análisis de la Viabilidad de Poblaciones y del Hábitat (Population and Habitat Viability Workshop), was held in 2006 (Carrillo *et al.* 2007). The primary objective of the workshop was to develop an action plan that determines conservation strategies for the jaguar in Mexico (Carrillo *et al.* 2007). Extinction risk assessments were developed based on information provided at the workshop on life history, population dynamics, ecology, and history of different jaguar populations (the outcome of the assessment for jaguars is described in the previous section). A third national symposium was held in 2007 (Ramírez Flores and Oropeza Huerta 2007).

In addition to the national symposia and related publications (Chávez and Ceballos 2006 and Ceballos *et al.* 2007), in 2006, CONANP's *National Technical Consultants Subcommittee for Conservation and Management of the Jaguar* published a PREP (Proyectos de Recuperación de Especies Prioritarias – Recovery Projects for Priority Species) for jaguars in Mexico that outlines general conservation guidelines for the jaguar and its habitat (Ramírez Flores and Oropeza Huerta 2007). CONANP is also currently working to develop a PACE (Programa de Acción para la Conservación de Especies – Species Conservation Action Program) for the jaguar. PACEs are planning documents that establish the strategies, tools, and actions (i.e., protection, management, research, monitoring, evaluation, etc.) necessary to meet the conservation objectives of each priority species (Ramírez Flores and Oropeza Huerta 2007). Additionally, state-specific jaguar conservation strategies have been produced for Jalisco, Oaxaca, Nayarit, Michoacán, Chiapas, and San Luis Potosí (Ramírez Flores and Oropeza Huerta 2007), but not for Sonora or Chihuahua.

In addition to the above planning efforts, many other federally-supported conservation efforts for jaguars in Mexico have been made in the areas of public outreach (for example 2005 was nationally declared the "Year of the Jaguar"), habitat conservation (through the creation of new reserves, as well as incentive programs to conserve jaguar habitat within reserves, etc.), protection (through increased vigilance and law enforcement efforts), and international agreements (for example Mexico, Belize, and Guatemala signed a "Jaguars without Borders" initiative in 2006, to maintain habitat connectivity among the countries). Many jaguar conservation efforts are also being made at local levels. For example, in 2004 Naturalia and the Northern Jaguar Project (NJP) purchased a 10,000-acre ranch, Rancho Los Pavos, in northern Sonora for the conservation of jaguars and other species. In 2008, they purchased Rancho Zetasora, a 35,000-acre ranch located adjacent to Rancho Los Pavos for the purpose of jaguar conservation (NJP 2008). In 2007, Naturalia also started a working group with diverse governmental and non-governmental partners, to address conservation concerns of carnivores, with emphasis on felids, in Sonora.

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The action area for the jaguar consists of all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. For the currently-proposed action, the action area includes the areas around each tower that will be subject to construction disturbances and noise during operations, as well as the roads between each tower. The action area thus described is roughly equivalent to the area displayed in Figures 1 and 2, below.

Life History

Life history of the jaguar is described above in the Status of the Species. Generally, life history elements are similar throughout their range, though some, such as diet and vegetation community use vary by region (see Status of the Species). No home range studies have been conducted for jaguars in northwestern Mexico or southwestern US; though McCain and Childs (2008), based on the use of camera-traps, report one jaguar in south-central Arizona as having a minimum observed "range" of 1359 km^2. They report that data suggest jaguars in northeastern Sonora are more sparsely distributed than any other documented population.

Distribution, Abundance, and Trends

Rabinowitz (1997, 1999) suggested that there is a lack of evidence to support the presence of a significant U.S. population and stated that the southwestern U.S. has been "never more than marginal habitat at the extreme northern limit of the jaguar's range." He stated that several points stand out: (1) the low number of confirmed or credible sightings in the last century imply that there was no more than small, short-lived populations in the U.S. over the last century; (2) 74% of the sightings being male may be indicative of dispersal movements from south of the U.S./Mexico international border; (3) the likelihood of jaguars coming across the border from Mexico points to a strong possibility for jaguar populations in northern Mexico; (4) only three sightings of females with young in the early 1900s is not indicative of a long-term breeding population; and (5) the lack of references by Native Americans and early Europeans suggests a lack of permanent presence within the last several hundred years. He further concluded that there is no area in the U.S. that is critical for the survival of any northern jaguar population that may occur in Mexico, or for the species as a whole.

Both McCain and Childs (2008) and Grigione *et al.* (2007); however, report that the number of female jaguars with young historically recorded in Arizona suggests that there was once a breeding population in the state. Grigione *et al.* (2007) further state that this assertion, supported by the number of jaguars killed in Arizona between 1900 and 1979, was indicative of an overexploited population, rather than an irregular pattern indicative of immigrants from Mexico.

Current patterns of abundance are much more limited. Recently (1996 through 2007), four individual male jaguars have been documented in the U.S. One was observed and photographed on March 7, 1996, in the Peloncillo Mountains in New Mexico near the Arizona border (Glenn 1996, Brown and López González 2001). The Peloncillo Mountains run north-south to the Mexican border, where they join the foothills of the Sierra San Luis and other mountain ranges connecting to the Sierra Madre Occidental. Another was observed and photographed on August 31, 1996 in the Baboquivari Mountains of southern Arizona (Childs 1998, Brown and López González 2001). In February 2006, another jaguar was observed and photographed in the Animas Mountains in Hidalgo County, New Mexico (McCain and Childs 2008).

From 2001 to 2007, two jaguars were photographed (one repeatedly) using infra-red camera traps in south-central Arizona, near the Mexico border, one of which, "Macho B" was the male observed and photographed in 1996 in the Baboquivari Mountains. More specifically, these jaguars were documented in three different mountain range complexes in southeastern Arizona,

over an area extending from the U.S./Mexico international border north 47 mi and 39 mi east to west (McCain and Childs 2008). Jaguars were found using areas from rugged mountains at 1,577 m (5,174 ft) to flat lowland desert floor at 877 m (2,877 ft.) (McCain and Childs 2008). Most jaguar detections occurred in Madrean oak woodland communities; however, jaguars were also documented in open mesquite grasslands and desert scrub/grasslands on the desert valley floor. McCain and Childs (2008) were not able to use camera trapping techniques in open valley bottoms due the open expanses and lack of landscape features to direct or funnel wildlife movements and consequently could not determine the extent open areas are used by jaguars in Arizona. They report, however, the jaguars must at least cross the open valleys between mountain ranges, approximately 37 mi apart. Though more information on movement and distribution patterns needs to be gathered on jaguars in the borderlands region of Arizona, New Mexico, Sonora, and Chihuahua, it is believed that the males recently documented in Arizona and New Mexico likely interact with or are part of a jaguar population in northwestern Mexico.

Although the individual jaguars that occur in Arizona may not be critical to the continued survival of jaguars throughout their range (71 FR 39335), severing jaguar movement corridors between Sonora and Arizona could affect the ability of jaguars to disperse to the U.S. from the northern jaguar population. This area is one of eight high priority regions for the conservation of jaguars in Mexico (Chávez and Ceballos 2006). Hatten *et al.* (2002) identified 21-30% of Arizona (62,000-88,580 km^2 / 23,940-34,200 mi^2) as potentially suitable jaguar habitat; the species currently occurs in only a small proportion of the area so described. Based on a Genetic Algorithm for Rule-Set Production (GARP) model, Chávez and Ceballos (2006) reported that jaguars are likely currently distributed throughout about half of Sonora (or about 92,000 km^2 35,520 mi^2). Sanderson *et al.* (2002) reported the size of the Jaguar Conservation Unit in the Sierra Madre Occidental of Sonora and Chihuahua (the most northern unit identified as being important for conservation of the species) as 5,200 mi^2 (13,859 km^2).

Furthermore, conservation of species at the periphery of their historical geographical range may be more important than previously believed (Lomolino and Channell 1995, Channell and Lomolino 2000). Miller *et al.* (1996; as cited in Johnson *et al.* 2007) established the value of peripheral populations in recovery of the black-footed ferret, as did Schaller (1993 as cited in Johnson *et al.* 2007) for the giant panda. Ehrlich and Ehrlich (1992 as cited in Johnson *et al.* 2007), Garcia-Ramos and Kirkpatrick (1997 as cited in Johnson *et al.* 2007) affirmed the conservation value of populations at the fringe of a species' range in a more general sense. Taking these reports into consideration, conservation of jaguars in their northern-most portion of their range (i.e., the northern edge of the population), though perhaps not critical, may be important to the long-term survival of jaguars.

Population Trends and Threats

Some threats (i.e., legal or illegal killing of jaguars) that contributed to the historical decline of the jaguar in the U.S. have been reduced or eliminated (the most recent known killing of a jaguar in Arizona was in 1986; Brown and López González 2001), however, other threats exist. For example, development of infrastructure projects (i.e., vehicle barriers, pedestrian fences, etc.) along the U.S./Mexico international border are expected to impede movement of jaguars across the border. Because jaguars in Arizona are believed to be part of a population centered in

northern Mexico, preventing jaguar movement and exchange between the U.S. and Mexico will likely have deleterious effects on jaguars, particularly those in Arizona and New Mexico. Fences designed to prevent the passage of humans will also prevent passage of jaguars. However, the effect of permeable barriers, such as vehicle barriers, on jaguar movements is not known, though information suggests that they may also affect jaguars. The jaguar known as "Macho B" has not has not been documented near the border since temporary vehicles barriers were installed (E. McCain, Borderlands Jaguar Detection Project, pers. comm., August 2007). It is not known if this avoidance is due to increased human presence, the vehicle barriers, or some other reason. Increased illegal activities and law enforcement actions along the U.S./Mexico international border may limit jaguar movement across the border and affect jaguar behavior, but the extent is not known.

Recent drought and apparent climate change are contributing to habitat degradation within the range of this species in the action area. For instance, the montane woodlands at the higher elevations (Santa Rita, Santa Catalina, and Huachuca mountains) have all experienced drought and associated large-scale catastrophic wildfires in recent years that have severely altered habitat.

Planning and Conservation Efforts

In 1997, AGFD and NMDGF entered into the Jaguar Conservation Agreement with other state, local, and Federal cooperators, with voluntary participation by many private individuals and thereby formed the Jaguar Conservation Team, to contribute to conserving the jaguar in Arizona and New Mexico and to encourage parallel efforts in Mexico. The Jaguar Conservation Agreement provides opportunities and incentives for interested parties to become involved with conservation activities. These activities include collection of biological information (to provide a sound scientific basis for decisions); consideration of relevant cultural, economic, and political factors; design and implementation of a comprehensive approach to conservation (including public education); and monitoring, evaluation, and feedback. In addition to an over-arching Memorandum of Agreement among the signatories, the Conservation Agreement embraces two main components. The first is a Conservation Assessment, which describes the status of the jaguar in the U.S. and identifies threats to the jaguar in Arizona and New Mexico. The assessment focuses the second component, the Conservation Strategy, on reducing or eliminating threats in Arizona and New Mexico that might prevent expansion of the current range and distribution of the jaguar, and thus contribute to recovery of the species (Van Pelt 2006).

The Jaguar Conservation Team has made several conservation-related accomplishments, including: (a) collaboration with Mexico on jaguar conservation; (b) a jaguar-based educational curriculum (in Spanish and English) that meets State and National standards and is in use in area schools; (c) enhanced public awareness of jaguar presence and conservation needs; (d) increased penalties under state law for unlawful killing of jaguars (in Arizona these increased penalties apply only if the jaguar is delisted federally); (e) a jaguar detection project (using still and video "camera traps"); (f) a system for evaluating and archiving sighting reports; (g) GIS-based evaluations of areas and habitats of historical and recent jaguar occurrence in Arizona and New Mexico for delineation of primary emphasis areas in both states for this conservation effort; (h) delineation of research recommendations intended to guide studies and provide the Jaguar

Conservation Team with information requisite to science-based conservation efforts; (i) a rural outreach program (see Rinkevich and Bashum 2002 and Warshall and Bless 2003 as cited by Johnson *et al.* 2007); and (j) regular public forums in Arizona and New Mexico for discussion of jaguar-related issues (Johnson *et al.* 2007)

Past and Ongoing Federal Actions in the Action Area

Within the action area, the DHS/CBP has constructed pedestrian fences on the U.S./Mexico international border in Sasabe (7 mi, all of which were included in the August 29, 2007 biological opinion – see below for details), Nogales (about 6 mi, roughly 2 of which were included in the August 29, 2007 opinion), Naco (about 25 mi, 15 of which were included in the August 29, 2007 opinion), and Douglas (about 17 mi, 7 of which were included in the August 29, 2007 opinion). The December 2004, "Final Environmental Assessment for Temporary Vehicle Barriers, Tucson Sector" proposed the installation of 37 mi of temporary vehicle barriers along the U.S./Mexico international border within the Tucson Sector (about from the Pozo Verde Mountains east, in a non-contiguous fashion, to just east of the Pima-Santa Cruz County line). Temporary vehicle barriers have been constructed along the border in the San Rafael Valley in Santa Cruz and Cochise counties. However, the total amount of temporary vehicles barriers that have been installed is unknown. DHS/CBP has constructed an unknown amount of permanent vehicle barriers within the action area. Additionally, DHS/CBP – Tucson Sector regularly conducts patrol activities within the action area that likely affect jaguar movements. With one exception (the August 29, 2007 opinion – see below for details), consultation for the aforementioned DHS actions that affect jaguars has not been completed.

Three non-jeopardy opinions have been issued for actions that may affect jaguars. A biological opinion, issued September 26, 1997, addressed effects of the Bureau of Land Management Safford and Tucson Field Offices' Livestock Grazing Program in southeastern Arizona on the jaguar. Adverse effects to jaguars were expected to occur from the proposed action by means of habitat loss and predator control activities. The anticipated level of take was considered to be exceeded if: (1) any predator control activities associated with the proposed action are directed at, or ultimately result in death or injury of a jaguar; (2) the injury or mortality of any jaguar that occurs as a result of any activities associated with the proposed action; and (3) jaguar habitat is not maintained in riparian corridors of the project area. Several conservation recommendations were also provided. Another biological opinion, issued June 22, 1999, addressed effects of the Nationwide Wildlife Services Program on the jaguar. Adverse effects to jaguars could occur from certain animal damage control methods, including the use of leg-hold and box traps, snares, M-44s, etc. The anticipated level of take was considered to be exceeded if animal damage control activities are directed at jaguars, or if one jaguar is unintentionally trapped, injured, or killed. We are not aware of any recent incidental take attributable to activities associated with either of the aforementioned programs; however, the last female jaguar found in Arizona and the U.S. (1963) was killed by a Federal predator control agent. A third biological opinion, issued August 29, 2007 (number AESO/AE 22410-2007-F-0416), addressed effects of DHS's construction of pedestrian fence (and other associated activities such as road construction and maintenance) along the U.S./Mexico international border near Sasabe, Pima County; Nogales, Santa Cruz County; and near Naco and Douglas, Cochise County. Adverse effects to jaguars were expected to occur from the proposed action by impeding jaguar movement between Mexico

and the U.S., disturbing jaguars, and degrading their habitat. No incidental take was anticipated and a couple of conservation recommendations were provided.

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 action may result in degradation of jaguar habitat and disturbance to jaguars. Construction and maintenance of towers, roads, and ground sensors, as well as patrol activity associated with the towers and possible increased illegal activity in areas outside the detection capabilities of the towers will result in removal, destruction, and degradation of vegetation that may provide cover to jaguars and their prey and may disturb jaguars, causing changes in their habitat use and movement patterns. Though activities associated with the proposed action could be detrimental to jaguars, conservation measures included in the project description will minimize and help offset disturbance to jaguars and degradation of their habitat.

Installation and maintenance of towers, roads, and ground sensors will affect (cause the loss and degradation) jaguar habitat through resulting ground disturbance, vegetation removal, soil compaction, erosion, and possible alteration of hydrological processes. These impacts will decrease the amount of cover available to jaguars and their prey. The size of the loss, however, is small in the context of the amount of habitat available to jaguars in the action area (see Environmental Baseline for a summary of jaguar habitat in the action area). Further, disturbed ground will be susceptible to colonization by invasive non-native plants such as buffelgrass (*Pennisetum ciliare*). Non-native species may outcompete native species and may also carry fire better or burn hotter than native plants, which could also degrade jaguar habitat.

Construction, operations, and maintenance activities (including use of access roads) associated with the proposed action may result in increased disturbance to jaguars. Human activity, elevated noise levels (from vehicles, generators, etc.), and lights associated with tower construction and operations could possibly deter jaguar use of or movement through the area. Studies have shown that jaguars selectively use areas away from human influence (Monroy-Vichis *et al*. 2007, Zarza *et al*. 2007). As described in the Environmental Baseline, above, the jaguar known as "Macho B" has not has not been documented near the U.S./Mexico international border since temporary vehicles barriers were installed. "Macho B" may be avoiding the vehicle barriers or human activities and disturbance associated with them. It is also possible that "Macho B" may no longer be alive. Tower access road improvement and/or maintenance may lead to better public access and increased use, which could result in degradation of jaguar habitat and disturbance to jaguars. Also, increased public use will likely result in greater frequency of human-caused fire, as well as hunting and illegal off-highway vehicle use. Vehicle and foot

traffic can lead to the destruction of vegetation, increased erosion, and degradation of riparian and other sensitive habitats.

Initially, after tower deployment, we anticipate interdiction activities will increase within areas covered by towers. We assume patrol response will be guided by detections made by the towers, but will result in more targeted response, rather than the current geographically broad-based patrols needed to detect illegal traffic in the absence of the towers. We also anticipate that the proposed action will cause some redirection of illegal activities and associated law enforcement response to areas not covered by the towers, such as canyon bottoms and ravines – natural travel corridors for jaguars. Increased targeted patrol traffic (vehicle and pedestrian) within areas covered by towers, as well as increased illegal traffic and resulting interdiction activities in areas not covered by towers may lead to increased habitat degradation, increased fire risk, and increased disturbance to jaguar habitat. Disturbance to jaguars and their habitats can result in associated behavioral changes, such as increased energetic expenditures, and altered pattern of use of habitat and movement corridors. These could lead to decreased dispersal opportunities; decreased home range size; increased inter- and intra-specific competition; increased difficulty meeting energetic needs; etc. Jaguars may attempt to avoid activities associated with the towers, which may cause them to travel longer distances. Extra travel would require jaguars to expend additional energy and increase the potential for encounters with humans, vehicles, and other stresses. Given the large home range of jaguars and anticipated avoidance of human activities, we do not anticipate that these events will result in incidental take.

Given that many towers are located near the border, increased disturbance to jaguars associated with the towers could possibly hinder jaguar movement into the U.S. from Mexico and within the action area. Maintaining connectivity between Arizona and Sonora is critical to the continued persistence of jaguars in Arizona. Should all jaguar movement corridors be compromised, it is possible that the jaguar will become extirpated from Arizona, as it is believed the existence of jaguars in Arizona relies on interchange with jaguars in Sonora. Though maintenance of jaguar populations in Mexico and movement corridors into Arizona from Mexico are likely essential for the continued survival of jaguars in the U.S., the opposite case is not likely valid because jaguars in the U.S. represent such a small portion of the range-wide jaguar population (see Status of the Species and Environmental Baseline for a summary of jaguar distribution).

Effects of Conservation Best Management Practices

The Conservation Best Management Practices that are part of the proposed action act to avoid or offset some adverse effects. For instance, there are several Conservation Best Management Practices that will act to limit habitat disturbance during construction and that promote design and construction or improvement of routes in ways that will minimize or eliminate increased erosion and sedimentation problems. Presence of a biological monitor will help ensure that Conservation Best Management Practices are implemented as designed. The Conservation Best Management Practices also call for habitat restoration, where possible. Where improved or new roads may increase use of sensitive areas, access will be prevented through gating, physical barriers, etc. Implementation of the latter measure will be dependent on the authority of CBP to

close routes and the effectiveness of those closures. Nonetheless, proposed mitigation measures will offset adverse effects to the jaguar and its habitat to some extent.

Mitigation includes providing: (1) gating or other physical barriers where improved or new roads may increase human use of sensitive areas, (2) closure and/or restoration of unauthorized roads to help offset the increase of improved or new roads at a ratio of 2:1, and (3) funding to monitor jaguar presence and movement along the border, and in additional mountain ranges and corridors within the action area. Implementation of these conservation measures will help in offsetting impacts to jaguars and their habitat, and assist in improving the species' status. Implementation of survey and monitoring conservation measures not only provides basic information on jaguar locations and movements, but may help answer management questions: (1) does illegal and law enforcement traffic impact jaguar habitat use and movement; and (2) what types of effects do different kinds of border barriers, roads, and other infrastructure have on jaguar habitat use and movement? These conservation measures will partially implement the recommendations of the Jaguar Conservation Assessment (Johnson *et al.* 2007).

Cumulative Effects

Cumulative effects include the effects of future State, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under section 7 of the Act.

Many lands within the action area are managed by Federal agencies; thus, many activities that could potentially affect jaguars are Federal activities that are subject to section 7 consultation. However, a portion of the action area also occurs on private lands in the U.S. Residential and commercial development, road construction, farming, livestock grazing, mining and other activities occur on these lands and are expected to continue into the foreseeable future. These actions, the effects of which are considered cumulative, may result in fragmentation, loss, or degradation of jaguar habitat. Illegal hunting of jaguars and overexploitation (legal or illegal) of jaguar prey adversely affect jaguars.

Many illegal activities associated with cross-border smuggling and illegal immigration will continue to occur in the action area. Accidental wildfire from escaped cooking and warming fires, creation of trails, increased noise, increased trash, and introduction of exotic plants and pathogens are likely to degrade jaguar habitat and disturb jaguars.

Conclusion

After reviewing the current status of the jaguar, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the jaguar. Critical habitat has not been designated for this species; thus no critical habitat will be affected by the proposed action. We base our conclusion on the following:

1. Loss of jaguar habitat resulting from this project is relatively small in the context of the amount of habitat available to jaguars in the action area. Additionally, habitat disturbance will be minimized by conducting project activities within previously disturbed areas to the extent practicable.

2. Jaguars in the action area represent a small portion of the occupied range of the species.

3. Conservation measures for the jaguar should reduce and partially offset adverse effects of the proposed action.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Best Management Practices that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act, prohibit take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the proposed action is not considered to be prohibited taking under the Act provided such taking is in compliance with this Incidental Take Statement.

Amount or Extent of Take Anticipated

We do not anticipate the proposed action will result in incidental take of jaguars.

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 your agency participate in the implementation of the Jaguar Conservation Framework.

2. We recommend that your agency participate on the Jaguar Conservation Team.

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

LESSER LONG-NOSED BAT

Status of the Species

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1997 (U.S. Fish and Wildlife Service 1997). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. The recovery plan states that the species will be considered for delisting when three major maternity roosts and two post-maternity roosts in the U.S., and three maternity roosts in Mexico have remained stable or increased in size for at least five years, following the approval of the recovery plan. The five-year review has been completed and recommends downlisting to threatened (U.S. Fish and Wildlife Service 2007b).

The lesser long-nosed bat is migratory and found throughout its historical range from southern Arizona and extreme southwestern New Mexico through western Mexico and south to El Salvador. It is found in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County) and southeast to the Chiricahua Mountains (Cochise County), and south to the U.S./Mexico international border. Individuals have also been observed near the Pinaleño Mountains (Graham County) and as far north as Phoenix and Glendale (Maricopa County) (AGFD Heritage Data Management System [HDMS]). Occasionally, individuals have been reported outside of this range; for example, there are records of individuals from the Phoenix area and the Bill Williams River during July and August. In New Mexico, it occurs in the Animas and Peloncillo Mountains (Hidalgo County).

Within the U.S., habitat types for the lesser long-nosed bat include Sonoran Desert scrub, semi-desert and plains grasslands, and oak and pine-oak woodlands. Farther south, the lesser long-nosed bat occurs at higher elevations. Two sets of resources, suitable day roosts and suitable concentrations of food plants, are critical for the lesser long-nosed bat. Caves and mines are used as day roosts, with documentation showing that the species will fly long distances from roost sites to forage (Dalton *et al.* 1994, U.S. Fish and Wildlife Service 1997). Factors that identify potential roost sites as being "suitable" have not yet been identified, but maternity roosts tend to be very warm and poorly ventilated (U.S. Fish and Wildlife Service 1997). Such roosts reduce the energetic requirements of adult females while they are raising their young (Arends *et al*. 1995).

Roosts in Arizona are occupied from April to as late as early November (Cockrum and Petryszyn 1991; Slauson 1999, 2000); although the species has been recorded in winter at hummingbird feeders in Tucson (Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies in southwestern Arizona. These

roosts are typically at low elevations in Sonoran Desert scrub near concentrations of flowering columnar cacti. After the young are weaned, maternity colonies typically disband in July and August; some females and young move to higher elevations, ranging up to more than 6,000 ft, primarily in southeastern Arizona near concentrations of blooming paniculate agaves. Dates of these seasonal movements by lesser long-nosed bats are rather variable from one year to the next (Cockrum and Petryszyn 1991, Fleming *et al.* 1993). Adult males are not commonly encountered in the U.S. and typically occupy separate roosts, forming bachelor colonies. Adult males are known mostly from the Chiricahua Mountains, but also are occasionally found with adult females and young of the year at maternity roosts (U.S. Fish and Wildlife Service 1997).

Like many other bats, individuals of this species use night roosts for digesting their meals. These roosts include the bats' day roosts as well as other caves, mines, rock crevices, trees and shrubs, and occasionally abandoned buildings (Cockrum and Petryszyn 1991, Hoyt *et al.* 1994). The extent to which night roosts represent essential habitat in this species is currently unknown.

Food requirements of the lesser long-nosed bat are very specific. The lesser long-nosed bat is a nectar-, pollen-, and fruit-eating bat. In Arizona, they primarily feed upon Palmer's agave (*Agave palmeri*), Parry's agave (*A. parryi*), desert agave (*A. deserti*), and possibly amole (*A. schotti*). Cacti fed upon include saguaro (*Carnegiea giganteus*) and organ pipe cactus (*Stenocereus thurberi*). Because of its very specific food requirements, the lesser long-nosed bat is considered a major pollinator and seed disperser of columnar cacti (e.g., saguaros) and paniculate agave. A panicle is a compound inflorescence in which the central stem (main stem) bears flowering branches which are themselves branched again. Agaves that produce flowers in this arrangement are called paniculate agaves.

Adequate numbers of flowers and/or fruits are required within foraging range of day roosts and along migration routes to support large numbers of this bat. Location of good feeding sites therefore plays an important role in determining availability of potential roosting sites, and roost/food requirements must be considered jointly when discussing the habitat requirements of this bat. A suitable day roost is probably the most important habitat requirement, but potentially suitable roosts must be within reasonable foraging distances of sufficient amounts of required foods before they will be used by this bat.

The lesser long-nosed bat is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 24 km (15 mi), and in Mexico at 40 km (25 mi) and 61 km (38 mi) (one way) (Dalton *et al.* 1994; V. Dalton, Tucson, pers. comm., 1997; Y. Petryszyn, University of Arizona, pers. comm., 1997). A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 40 to 50 km (25-31 mi) each night to foraging areas in Organ Pipe Cactus National Monument (U.S. Fish and Wildlife Service 1997). Horner *et al.* (1990) found that lesser long-nosed bats commuted 48 to 58 km (30-36 mi) round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 75 km (47 mi) each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest potential roost site (Petryszyn, pers. comm., 1997).

Considerable evidence exists suggesting a dependence of *Leptonycteris* on certain agaves and cacti. Activities that adversely affect the density and productivity of columnar cacti and paniculate agaves may adversely affect populations of lesser long-nosed bats (Abouhalder 1992, U.S. Fish and Wildlife Service 1997). Excess harvest of agaves in Mexico, collection of cacti in the U.S., and conversion of habitat due to urban expansion, agricultural uses, livestock grazing, and other development may contribute to the decline of long-nosed bat populations (U.S. Fish and Wildlife Service 1988). Activities that directly or indirectly promote invasions or increased density of non-native grasses, particularly Lehmann lovegrass (*Eragrostis lehmanniana*), species of Bromus, and Mediterranean grass (*Schismus barbatus*), may result in increased fire frequency and intensity (Minnich 1994). Sonoran Desert scrub is not adapted to fire. It seems evident that the lesser long-nosed bat forages over wide areas and that large roosts require extensive stands of cacti or agaves for food. Therefore, destruction of food plants many miles from a roost could have a negative impact on this bat (U.S. Fish and Wildlife Service 1997).

Recent information indicates that lesser long-nosed bat populations appear to be increasing or stable at most Arizona roost sites identified in the recovery plan (AGFD 2005, Tibbitts 2005, Wolf and Dalton 2005). Lesser long-nosed bat populations additionally appear to be increasing or stable at other roost sites in Arizona and Mexico not included for monitoring in the recovery plan (Sidner 2005). Less is known about lesser long-nosed bat numbers and roosts in New Mexico. Though lesser long-nosed bat populations appear to be doing well, many threats to their stability and recovery still exist.

Approximately 20 - 25 large lesser long-nosed bat roost sites, including maternity and late-summer roosts, have been documented in Arizona (personal communication with Scott Richardson, U.S. Fish and Wildlife Service, 2008). Of these, 10 - 20 are monitored on an annual basis depending on available resources. Monitoring in Arizona in 2004 documented approximately 78,600 lesser long-nosed bats in late-summer roosts and approximately 34,600 in maternity roosts. Ten to 20 lesser long-nosed bat roost sites in Mexico are also monitored annually. Over 100,000 lesser long-nosed bats are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). These indicate that although a relatively large number of lesser long-nosed bats exist, the relative number of known large roosts is quite small.

The primary threat to lesser long-nosed bat is roost disturbance or loss. The colonial roosting behavior of this species, where high percentages of the population can congregate at a limited number of roost sites, increases the risk of significant declines or extinction due to impacts at roost sites. Lesser long-nosed bats remain vulnerable because they are so highly aggregated (Nabhan and Fleming 1993).

Some of the most significant threats to known lesser long-nosed bat roost sites are impacts resulting from use and occupancy of these roost sites by individuals involved in illegal border crossings, both from individuals crossing to look for work and the trafficking of illegal substances. Mines and caves which provide roosts for lesser long-nosed bats also provide shade, protection, and sometimes water, for border crossers. The types of impacts that result from illegal border activities include disturbance from human occupancy, lighting fires, direct mortality, accumulation of trash and other harmful materials, alteration of temperature and

humidity, destruction of the roost itself, and the inability to carry out conservation and research activities. These effects can lead to harm, harassment, or, ultimately, roost abandonment (U.S. Fish and Wildlife Service 2005). Other reasons for disturbance or loss of bat roosts include the use of caves and mines for recreation; the deliberate destruction, defacing or damage of caves or mines; roost deterioration (including both buildings or mines); short or long-term impacts from fire; and mine availability. Threats to lesser long-nosed bats forage habitat include excess harvesting of agaves in Mexico; collection and destruction of cacti in the U.S.; conversion of habitat for agricultural and livestock uses; the introduction of bufflegrass and other invasive species that can carry fire in Sonoran Desert scrub; wood-cutting; drought; fires; and urban development.

The lesser long-nosed bat recovery plan identifies the need to protect roost habitats and foraging areas and food plants. The lesser long-nosed bat recovery plan provides specific discussion and guidance for management and information needs regarding bat roosts and forage resources (U.S. Fish and Wildlife Service 1997).

The lesser long-nosed bat recovery plan (U.S. Fish and Wildlife Service 1997), listing document (U.S. Fish and Wildlife Service 1988), the biological opinion of the proposed ongoing and future military operations and activities at Fort Huachuca (22410-2007-F-0132) (U.S. Fish and Wildlife Service 2007a), and the 5-year review summary and evaluation for the lesser long-nosed bat (U.S. Fish and Wildlife Service 2007b), all discuss the status of the species, and threats, and are incorporated by reference.

Environmental Baseline

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

The action area for the lesser long-nosed bat consists of all areas to be affected directly or indirectly by the Federal action, not merely the immediate area involved in the action. The action area for this proposed project includes the area directly impacted by the all 56 towers (including construction, maintenance, operation, and access roads) and the area defined by a circle with a radius of 40 mi around each (Figure 1). Lesser long-nosed bats may occur anywhere between these tower sites during migration.

Foraging habitat, major post-maternity roosts, minor post-maternity roosts, and major maternity roosts occur within the Tucson, Nogales, Sonoita, Casa Grande, and Ajo stations' areas of operation; therefore, lesser long-nosed bats have the potential to occur at all tower sites. Individuals of the species can move long distances (about 40 mi) from roosts to foraging habitats. The action area represents only a small portion of the lesser long-nosed bat's range.

Three major maternity roosts and five major post-maternity roosts are known in Arizona and are identified in the Recovery Plan (U.S. Fish and Wildlife Service 1997). The three major maternity roosts are within the 40-mile radius of some of the tower sites. These include Bluebird Mine, Cabeza Prieta NWR; Copper Mountain Mine, Organ Pipe Cactus National Monument; and Old Mammon Mine, Tohono O'odham Nation (near Casa Grande). Five of the six major post-maternity roosts occur in the action area. These include Box Canyon Crevice, Saguaro National Park; Patagonia Bat Cave, Patagonia Mountains, Coronado National Forest; Manila Bat Cave, Fort Huachuca; State of Texas Mine, Coronado National Memorial; and Cave of the Bells, Santa Rita Mountains. Post-maternity roosts are typically transitory roosts used by adults and/or young bats in summer or fall (Fleming 1995). Observers have recorded over 15,000 lesser long-nosed bats at a mine in the Coronado National Memorial and over 30,000 bats at Patagonia Cave (McIntire 2006). Other records in or near the action area, many of which are within the 40-mile radius of a tower site, include: (1) Panama Mine near Pyeatt Ranch on the western boundary of Fort Huachuca; (2) Pyeatt Cave, Fort Huachuca; (3) Woodcutters Canyon, Fort Huachuca; (4) Wren Bridge, Fort Huachuca; (5) Brown Canyon, Huachuca Mountains; (6) Canelo Mine eight miles west of Fort Huachuca; (7) Miller Canyon, Huachuca Mountains; (8) San Pedro RNCA at Fairbank; (9) Ramsey Canyon, Huachuca Mountains; (10) Helvetia, Santa Rita Mountains; (11) Madera Canyon, Santa Rita Mountains; (12) Empire Ranch north of Sonoita; (13) several localities near Patagonia; and (14) Colossal Cave, Pima County (Cockrum and Petryszyn 1991, Fleming 1995, Sidner 1993, 1994). A lesser long-nosed bat was also found in 2006 close to the border in Sonora, Mexico, at Rancho Los Fresnos, which is south of School Canyon, San Rafael Valley (U.S. Fish and Wildlife Service files). Of the sites at Fort Huachuca, lesser long-nosed bats have been found day roosting at Pyeatt Cave and Manila Mine (some night roosting occurs at these sites as well). Wren Bridge is a night roost, and lesser long-nosed bats were mist-netted in Woodcutters Canyon (Sidner 1999, 1996, 1994). Upper Pyeatt Cave and Indecision Cave are considered potential day roosts, but the species has yet to be documented at these sites (Sidner 2005, 2000, 1999, 1996). A lesser long-nosed bat banded at Wren Bridge was found the next night at the Patagonia Bat Cave, demonstrating that individuals of this species move relatively long distances, and bats in the action area are part of a larger regional population (Sidner 1996, Howell 1996).

All tower sites that are located within five miles from known lesser long-nosed bat roosts are presented in Table 6. Tower TCA-SON-062 is less than a mile from the State of Texas Mine, a major bat roost. Lesser long-nosed bat Conservation Best Management Practices require that roads, fences, security zones, surveillance sites and other facilities that involve land clearing and have associated noise and high intensity artificial light components, will be located at least one mile from any known roost site. The further a project is sited from a roost, the less likely a disturbance to bats in the roost will occur. This includes the indirect effects of increased human access to the roosts. In addition to known roosts, unknown roosts could be located throughout the action area. This is especially a concern in the Patagonia Mountains, where there are many unsurveyed abandoned mines. Tower sites in or near the Pagatonia Mountains include TCA-SON-055, TCA-SON-056, TCA-SON-115, TCA-NGL-054, and TCA-NGL-285. Bats within the action area may also roost south of the U.S./Mexico international border within a few miles of tower sites. The tower closest to major maternity roosts Bluebird Mine in Cabeza Prieta National Wildlife Refuge and Copper Mountain Mine in OPCNM is TCA-AJO-305, located north of OPCNM.

Table 6. Tower sites located within five miles of known lesser long-nosed bat roosts.

Tower	**Distance from Roost (miles)**	**Name of Roost**
TCA-SON-062	>0.25 and <1	State of Texas Mine (day roost)
TCA-SON-060	>1 and <5	State of Texas Mine (day roost)
TCA-SON-061	>1 and <5	State of Texas Mine (day roost)
TCA-SON-115	>1 and <5	Patagonia Bat Cave (day roost)
TCA-SON-117	>1 and <5	Papago Springs Cave (day roost)
TCA-CAG-102	>1 and <5	Mine adits or caves that are known night roosts
TCA-NGL-045	>1 and <5	Mine adits or caves that are known night roosts
TCA-NGL-046	>1 and <5	Mine adits or caves that are known night roosts
TCA-NGL-047	>1 and <5	Mine adits or caves that are known night roosts
TCA-NGL-049	>1 and <5	Mine adits or caves that are known night roosts
TCA-NGL-211	>1 and <5	Mine adits or caves that are known night roosts
TCA-TUS-192	>1 and <5	Mine adits or caves that are known night roosts
TCA-TUS -032	<5	Known roost based on the BA[1]
TCA-TUS-085	<5	Known roost based on the BA[1]
TCA-TUS-287	<5	Known roost based on the BA[1]
TCA-TUS-291	<5	Known roost based on the BA[1]
TCA-TUS-299	<5	Known roost based on the BA[1]
TCA-TUS-300	<5	Known roost based on the BA[1]
TCA-TUS-306	<5	Known roost based on the BA[1]
TCA-TUS-307	<5	Known roost based on the BA[1]
TCA-NGL-045	<5	Known roost based on the BA[1]
TCA-NGL-050	<5	Known roost based on the BA[1]

[1] (CBP 2008)

Population trends of lesser long-nosed bats are difficult to assess. The number of bats plummeted at the Patagonia Bat Cave from approximately 50,000 individuals in recent years to approximately 1,000 individuals in 2007 (S. Richardson, U.S. Fish and Wildlife Service, pers. comm., July 17, 2008). However, increases in numbers have been documented since the approval of the Recovery Plan at Copper Mountain Mine, Bluebird Mine, Old Mammon Mammon Mine, and State of Texas Mine (U.S. Fish and Wildlife Service 2007b). Additionally, new roosts sites have been identified since the recovery plan was approved. Factors that need to be considered when interpreting roost-monitoring data include time of year, forage availability, climatic availability, and roost availability. While roost numbers appear to be increasing, the available data are inconclusive at the level of the individual roost. The available data do not indicate if there is a ± 10% change in numbers at certain roosts (U.S. Fish and Wildlife Service 2007b). This is the threshold that was set in the recovery plan to indicate stability (U.S. Fish and Wildlife Service 1997). Increases documented at some roosts may indicate population increases or may be the result of roost switching or roost abandonment in other parts of the range. A more robust monitoring protocol must be developed throughout the range in order to assess population trends.

Factors affecting the species within the action area

As stated above, the primary threat to lesser long-nosed bat is roost disturbance or loss. Some of the most significant threats to known lesser long-nosed bat roost sites are related to legal and illegal border activities. Mines and caves which provide roosts for lesser long-nosed bats also provide shade, protection, and sometimes water, for IAs. The types of impacts that result from illegal border activities include disturbance from human occupancy, lighting fires, direct mortality, accumulation of trash and other harmful materials, alteration of temperature and humidity, destruction of the roost itself, and the inability to carry out conservation and research activities. These effects can lead to harm, harassment, or, ultimately, roost abandonment.

Effects of increases in illegal border activities are evident at some known lesser long-nosed bat roost locations. The Bluebird Mine roost on Cabeza Prieta NWR was abandoned three times between 2000 and 2005, due to illegal border activities (McCasland 2005). Monitoring and research at the roost on Organ Pipe Cactus National Monument has been reduced or eliminated because of researcher safety concerns related to border issues (Billings 2005). Illegal border crossers have typically used the valley adjacent to the roost area. In 2005, trails, trash, and other indicators of illegal crossing activities moved to an area right below the Copper Mountain Mine roost site (Billings 2005). Additionally, there has been evidence of breach of the cable nets which protect the State of Texas Mine roost site in Coronado National Memorial (U.S. Fish and Wildlife Service 2007b).

Impacts also result from law enforcement and apprehension of illegal immigrants and smugglers. Of particular concern is the creation of new roads for surveillance and other tactical infrastructure used for border enforcement. Use of helicopters, off-road vehicles, lights, sensors and other enforcement equipment also have the potential to effect the lesser long-nosed bat and its habitat (U.S. Fish and Wildlife Service 2007b).

Loss of foraging habitat is also an important threat to lesser long-nosed bats. Causes of loss of foraging habitat in the action area include fire, livestock grazing, non-native invasive plants, and development (including the building of infrastructure on the border in the U.S.). Lesser long-nosed bats are directly affected by development, which removes forage habitat, but also indirectly as growing numbers of people increase the potential for roost disturbance. The impacts to lesser long-nosed bat habitat are of greatest concern because they tend to be permanent, long-term disturbances, as opposed to the often temporary, shorter-term impacts from fire, grazing, and agave harvesting (U.S. Fish and Wildlife Service 2007b).

Recent drought and apparent climate change are contributing to habitat degradation within the range of this species in the action area. For instance, the montane woodlands at the higher elevations (Santa Rita, Santa Catalina, and Huachuca mountains) have all experienced drought and associated large-scale catastrophic wildfires in recent years that have severely altered habitat.

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 lesser long-nosed bat is expected to be affected both directly and indirectly by the proposed action. Short-term, direct effects of construction, operation, and maintenance activities on the bat or its habitats (including maternity colonies, roosting sites, foraging areas, and areas between known maternity colonies/roosting sites and foraging areas) include disturbance from temporary noise associated with construction equipment and helicopter operations, and disturbance from artificial lights used for nighttime construction. Long-term, direct effects include loss of foraging habitat, disturbance of bats and habitat from operational noise associated with towers (including communication components and generators), disturbance associated with security lighting and FAA required tower lighting, disturbance from noise associated with helicopter operations (required for maintenance of three towers every 2 to 3 weeks), increased risks of collisions with tower structures, and increased risk of fire associated with operation and maintenance of the towers. Long-term, indirect effects include human disturbance from increased public access facilitated by construction and maintenance of new and repaired roads, increased fire risk associated with increased public access, and an increase of non-native invasive plants associated with disturbance of native habitats.

<u>Disturbance</u>

The proposed action will cause both short and long-term disturbance to lesser long-nosed bats and their habitats. Disturbance will occur fromnoise, lights, and helicopter operations associated with construction, maintenance, and operation of the towers. Lesser long-nosed bats are not very

sensitive to sounds below frequencies of 10 kiloHertz (kHz) (Howell 1974). Generally, high frequency noises attenuate in shorter distances than lower frequency noises. Because of the distance of the tower sites from known roosts, noise from the proposed action is not expected to disturb bats at those roosts. However, there are many unsurveyed old mines, particularly in the Patagonia Mountains, where bats may be roosting near proposed tower sites and could potentially be adversely affected by noise associated with the towers. Tower sites in or near the Pagatonia Mountains include TCA-SON-055, TCA-SON-056, TCA-SON-115, TCA-NGL-054, and TCA-NGL-285.

Noise will be associated with construction activities, construction equipment, construction vehicles, generators needed to operate the towers, and helicopters. Noise from vehicles (including cars, trucks, and off-road vehicles), aircraft, construction equipment, radios or human voices, and other equipment sources may disturb bats in the roost or affect their behavior entering or leaving the roost, particularly around maternity roosts (U.S. Fish and Wildlife Service 2007b). The threshold for noise disturbance that results in behavioral disturbance or abandonment of the roost is unknown and likely varies significantly based on distance to the roost, volume and frequency of the noise, and the pattern of the noise (continuous, intermittent, occasional, or sporadic). Construction noise will occur during the period that lesser long-nosed bats are present at Arizona roosts (July 15 through September 30). Construction noise would attenuate to below 55 dBA beyond about 1,000 ft from the source. There is no tower or road construction planned closer than 0.25 mi from known bat roosts; therefore tower and road construction noise is not expected to disturb bats at those roosts. However, foraging plants are documented near or at tower sites; therefore nighttime construction noise could disturb foraging bats. Agaves were documented at TCA-NGL-043, TCA-NGL-045, TCA-NGL-046, TCA-NGL-052, TCA-TUS-036, TCA-TUS-040, TCA-TUS-042, TCA-TUS-221, TCA-TUS-287, TCA-TUS-289, TCA-SON-055, TCA-SON-060, TCA-SON-062, TCA-SON-115. Saguaros were documented at TCA-CAG-100, TCA-CAG-102, TCA-CAG-195, TCA-CAG-197, and TCA-AJO-305 Organ pipe cactus was documented at TCA-AJO-305. Nighttime construction noise could also disturb bats traveling from roosts to forage habitat.

Noise associated with the generators is permanent and intermittent and would attenuate approximately 165 ft from the generator, or approximately 65 ft from the permanent disturbance area (assuming a 100-foot by 100-foot disturbance area). Generators for towers that are not connected to the commercial grid will operate twice per day, for one to three hours for each start. Run times will be shorter on sunny days. Generators for systems connected to the power grid will be limited to one hour twice per month for system conditioning and during commercial power interruptions. As stated above, there is no tower or road construction planned closer than 0.25 mi from known bat roosts; therefore generator noise is not expected to reach bat roosts and therefore, will not disturb bats. However, foraging plants are documented near or at tower sites (see list in preceding paragraph); therefore nighttime generator noise could disturb foraging bats that are immediately adjacent to those tower sites. Nighttime generator noise could also disturb bats traveling from roosts to forage habitat.

Helicopters operations will occur at TCA-NGL-109, TCA-TUS-040, and TCA-TUS-042. Helicopter noise associated with the proposed action will be a long-term intermittent noise that will attenuate to below 55dBA beyond 15,000 ft. During construction there will be 62 helicopter

trips per tower to carry equipment and two trips per day per tower, from July 15 to September 30, 2008 to carry personnel to the three remote towers. There will also be two helicopter trips per tower, every two to three weeks for tower maintenance for the three towers. Some types of flights are not a disturbance to the bat while they are in roosts (U.S. Fish and Wildlife Service 2007a). Dalton and Dalton (1993) note, however, that the long-term effects of repeated low level flights are unknown. There are no towers that require helicopter operations planned within 10 mi of known bat roosts; therefore, noise associated with helicopter operations is not expected to reach known bat roosts and disturb bat roosts. However, foraging plants are documented near or at the three tower sites that require helicopter operations. Noise associated with helicopter operations could disturb foraging bats that are immediately adjacent to a tower site, if helicopter operations occur after dark.

Lights will be associated with nighttime construction, FAA required lights for towers, and for security at the towers. Construction Conservation Best Management Practices require that lights will be shielded to direct light only onto the work site and the area necessary to ensure the safety of the workers, only the minimum foot candles needed will be used, and the number of lights will be minimized. Any light extending beyond the construction or maintenance area will be no greater than 1.5 foot candles. Lesser long-nosed bat Conservation Best Management Practices require that roads, fences, security zones, surveillance sites, and other facilities that would require land clearing and have associated noise and high-intensity artificial light components, will be located at least five miles from any known roost site. Facilities without noise or high intensity artificial light can be located closer than five miles to known roosts, provided that the facility does not inhibit bats exiting or returning to the roost. Tower Conservation Best Management Practices require that only white strobe lights are used at night, and these will be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. Security lighting for on-ground facilities and equipment will be down-shielded to keep light within the boundaries of the site.

Limited information is available on the effects of lights on bat behavior or habitat use. However, information for other animal species indicates that artificial lighting that shines into a habitat area may alter normal behavior patterns (foraging, vocalizations), and increase the risk of predation (Rich and Longcore 2006). The safe distance between high-intensity light sources and maternity or summer roost sites is unknown. Disturbances such as noise and light can result in the abandonment of the young (U.S. Fish and Wildlife Service 2007b). Activities outside the roost but in close proximity that allow noise or light may intrude into the roost may also result in stress to the resident bats. There is no tower or road construction planned closer than 0.25 mi from known bat roosts; therefore light associated with tower construction and operation is not expected to reach and disturb bats at those roosts. However, foraging plants are documented near or at tower sites; therefore lights associated with nighttime construction could disturb foraging bats. Disturbance is expected to be minimal because any light beyond the construction area is restricted to 1.5 foot candles. Only one tower will require FAA lighting, TCA-SON-213. This tower is not located within five miles of any known roosts. Therefore, it is unlikely that tower lights will adversely affect lesser long-nosed bats.

Effects to availability of foraging areas

Land clearing associated with construction of towers, new roads, and road repairs, will result in loss of foraging habitat. As noted above, the lesser long-nose bat feeds on the nectar, pollen, and fruit produced by columnar cacti (saguaro and organ pipe) and pollen of various agave species. While bats have been documented flying many miles to locate patches of blooming cacti and agaves, there is an energetic cost to such flights that must be accounted for in the density and quality of the nectar source (U.S. Fish and Wildlife Service 2007b). Preferentially, significant nectar sources would be located in proximity to roosts. Since the quality of blooming may vary between days, weeks, and, over the course of years, sufficient foraging habitat must be present and accessible around both maternity and summer roosts.

Loss of suitably dense, healthy patches of cacti or agaves is a loss of foraging opportunity for the bat. The large columnar cacti that produce bat pollinated flowers are mature survivors of past reproductive events and while these plants are long-lived, there must be successful recruitment of young cacti to the population if it is to persist. Actions that reduce the recruitment rate have long-term effects, particularly if followed by a die-off of adult cacti due to fire or freezing. It is not known how long it would take to restore a mature saguaro stand, but the estimates, assuming that conditions are right for recruitment and there is a seed base, are in terms of decades. Similarly, while agaves have a shorter life span, each plant only produces one flower stalk once in its life, and if that stalk is destroyed before it matures to blossom, it is not available to the bats. The agave clones provide an individual plant with several flowering seasons, but if land use practices or accident eliminates the clone, there is no future use. Destruction of too many clones in an area may result in another long period without sufficient forage opportunities for the bats. Agaves were documented at TCA-NGL-043, TCA-NGL-045, TCA-NGL-046, TCA-NGL-052, TCA-TUS-036, TCA-TUS-040, TCA-TUS-042, TCA-TUS-221, TCA-TUS-287, TCA-TUS-289, TCA-SON-055, TCA-SON-060, TCA-SON-062, TCA-SON-115. Saguaros were documented at TCA-CAG-100, TCA-CAG-102, TCA-CAG-195, TCA-CAG-197, and TCA-305-AJO. Organ pipe cacti were documented at TCA-AJO-305. Therefore construction at these proposed towers will reduce suitable lesser long-nosed bat foraging habitat.

Additionally, bats may avoid foraging areas in the vicinity of towers because of the electromagnetic field (EMF) produced by radar equipment. EMFs can also cause increases in bat's surface and deep body temperatures after prolonged exposures. Bats are particularly susceptible to EMF strengths of 2 volts/m (Nicholls and Racey 2007).

Conservation Best Management Practices require that no cacti or agaves will be disturbed during deployment and redeployment of UGS. As a result, no impact to lesser long-nosed bat foraging habitat is expected in regard to this aspect of the proposed action. Mobile surveillance systems will be deployed and operated on vehicles that traverse existing routes. As a result, no effects to lesser long-nosed bats are anticipated from those mobile systems.

Injury or Direct Mortality from Collisions

Mortality or injury of lesser long-nosed bats could also occur due to collisions with towers and the wind turbine. Bat collision mortality with towers and wind turbines are documented. In 1930, five bats (red, hoary, and silver-haired bats) were killed at a lighthouse in Ontario, Canada.

Since then, other bat collisions have been documented at television towers, communication towers, buildings, and powerlines (Johnson 2002). Migratory bird collisions with towers during inclement weather have been well-documented (Manville 2000). Similar evidence exists for bat collisions with towers (Johnson 2002). Bat collisions with wind turbines have also been reported (Horn *et al.* 2008). Available evidence indicates that most bat mortality at wind plants occurs with migrant or dispersing bats in late summer and fall. In his review of bat collision mortality, Johnson (2002) concluded that wind plants do not currently impact resident populations foraging within the wind plant or commuting between foraging and roosting areas. Bats that locate their prey via echolocation may have the ability to navigate through barriers such as towers and wind turbines (Johnson 2002). Foraging height and weather can also increase collision risk. Lesser long-nosed bats are fast-flying (Sahley *et al.* 1993), but we have hypothesized that their life history may render them less capable echolocators than insectivorous bats. As such, we are concerned that individuals may be susceptible to collisions with towers and wind-turbine blade strikes, which will likely be fatal in most cases (U.S. Fish and Wildlife Service 2007c). The frequency of such collisions and strikes is unknown. If helicopters are operated at night where bats are foraging, the extreme downdrafts produced during low-level flights could drive lesser long-nosed bats to the ground or into trees or shrubs where they could be injured or more susceptible to predation (U.S. Fish and Wildlife Service 2003).

Horn *et al.* (2008) documented bats actively investigating both moving and motionless turbine blades in a study in West Virginia. Bats alighting upon and investigating turbine blades and monopoles suggests that they may be attracted to the turbines. Bats may view these tall structures as roost trees (Kunz *et al.* 2007) or potential mating sites. One as yet unproven theory is that bats may be attracted to wind turbines by audible sound or ultrasound produced by the rotating blades, generator operation, or other moving components. It is unknown why bats investigate or pursue moving blades, but once they engage in such behavior, they may be caught by vortices that form in the wake of the blades, increasing the probability of a collision (Kunz *et al.* 2007, National Research Council 2007). Horn *et al.* (2008) documented bats actively avoiding moving turbine blades, but also documented bats being hit by moving turbine blades. It is generally thought that faster turbine speeds are more detrimental to bats than slower speeds, but in a parallel study in West Virginia, bat fatalities increased on low wind nights when insects are generally most active (Kerns *et al.* 2005). It is likely that insectivorous bats were foraging in the vicinity of the turbines. How lesser long-nosed bats, which are nectivorous, would be affected is unknown.

National Wind Coordinating Committee (2004) reports an average "wind project" bat fatality rate of 3.4 bats per turbine per year. It must be noted that that the wind turbines used at these wind projects are orders of magnitudes larger than the turbine that will be built as part of the proposed action (turbine diameters of 108 to 236 ft versus 10 ft). This mortality rate is based on extrapolations of the number of fatalities with the estimates corrected for observer detection, scavenging, and other sampling biases (National Wind Coordinating Committee 2004). National Wind Coordinating Committee (2004) indicates that actual kills are likely far higher than what can be monitored. The difference is because of searcher efficiency and scavenging.

All the towers have the potential to cause a collision risk for lesser long-nosed bats within the project area. Additionally, a wind turbine will be located at tower site TCA-NGL-109.

Helicopter operations at tower sites TCA-NGL-109, TCA-TUS-040, TCA-TUS-042 also pose a risk of helicopter/bat strikes or interactions.

Indirect Effects

Indirect effects to lesser long-nosed bat are likely to occur via 1) better access for the public provided by new or reconstructed routes, 2) the presence of towers between roosts and foraging habitat, 3) increased spread of non-native invasive plant species, 3) increased risk of fire, 4) fragmentation of foraging habitat, and 5) reduction in illegal smuggling and immigration in the vicinity of the towers.

Increased public access and use via new or reconstructed routes, totaling 1,630 ft of new access and 3.09 mi of reconstructed access, is expected to facilitate foot traffic through occupied bat habitat, leading to increased disturbance to bat roosts and habitat. This is especially a concern in areas where major roosts occur. All tower sites that are five miles or closer to known roosts are presented in Table 6. There is one tower that is less than a mile from the State of Texas Mine roost (TCA-SON-062) and two towers that are between one and five miles from this roost (TCA-SON-060 and TCA-SON-061). State of Texas Mines is in the Huachuca Mountains. Other tower sites in or near the Huachuca Mountains include TCA-SON-058 and TCA-SON-059. There is one tower that is between one and five miles from the Patagonia Bat Cave roost (TCA-SON-115). The Cave of Bells Mine roost is in the Santa Rita Mountains. The only tower located in the Santa Rita Mountains is TCA-NGL-211, which is more than five miles and less than 10 mi from the roost. Unknown roosts could occur in the Patagonia Mountains. Tower sites in or near the Pagatonia Mountains include TCA-SON-055, TCA-SON-056, TCA-SON-115, TCA-NGL-054, TCA-NGL-285. Humans entering roosts is a significant disturbance to the resident bats and abandonment of roosts due to human presence is well documented (U.S. Fish and Wildlife Service 2007b). In maternity colonies, young bats left alone at night are vulnerable to falling off the ceiling if stressed by human presence. This may also occur if their mothers are disturbed during daytime resting. Even if young bats remain safely on the ceiling, stress from the disturbance event can affect their general health and growth. Abandonment of post-maternity roosts is also a concern, however the amount of mortality is likely reduced since all bats in such roosts can fly. There may be an energetic cost to bats that are repeatedly disturbed in roosts and leave to find another shelter. Prolonged or frequent human presence can also change temperature and humidity within caves to the detriment of bats. In addition to disturbance, the enhanced public access will likely result in a greater frequency of human-caused fire, as well as hunting and illegal off-highway vehicle use.

The presence of the towers between roosts and forage habitat would result in an indirect effect on foraging habitat. Forage areas may still exist in the vicinity of a roost, but if access to these areas is compromised, bats may not be able to exploit them successfully. It is unclear if bats can easily cross areas of human development (U.S. Fish and Wildlife Service 2007b). The presence of lights and areas of natural vegetation or travel corridors may be factors in how well bats move through human developments. A localized barrier may allow for successful detours, although that does increase flight time and thus energy needs. Additionally, most of the action area is suitable foraging habitat. All three major maternity roosts and five out of six major post-maternity roosts occur with the action area. The proposed action will result in 56 communication

towers and associated roads and other features located through a large portion of the range of the lesser long-nosed bat in Arizona.

Nonnative plants often thrive in disturbed areas (Tellman 2002); hence, construction activities could encourage the spread and establishment of these plants. Activities that directly or indirectly promote invasion or increased density of non-native grasses, particularly buffelgrass and Lehmann lovegrass, may result in increased fire frequency or intensity, reduced densities of Palmer's agave, and thus reduced forage resources for the lesser long-nosed bat. Many non-native plants, such as Lehmann lovegrass, carry fire better and often burn hotter than the native plants (Bock and Bock 2002, Esque and Schwalbe 2002). As a result, the proposed action has the potential to reduce recruitment of forage plant species and increase fire frequency and intensity via spread of nonnative plants.

Fire can reduce the number of forage plants and can result in short-term impacts on bats from smoke and heat. More lasting impacts can result if the microclimate of the roost is affected by the impact of the fire (removal of vegetation, burning of supporting timbers, change in air currents, alteration of hydrology, etc.) (U.S. Fish and Wildlife Service 2007b).

Although the proposed action is anticipated to reduce the quantity of illegal traffic in the action area, it is also likely to redirect traffic into more remote and environmentally sensitive habitats in the action area. Indirect adverse effects resulting from shifts in IA activity could occur where tower sensor coverage is absent and/or where CBP agents are unsuccessful in capturing individuals. The location of these effects could occur anywhere within the action area, but are most likely in remote canyons and mountain ranges used by listed species. Remote caves and mines used by bats may be discovered by IAs looking for shelter, resulting in degradation of suitable bat habitat through increased temperature, humidity, and disturbance. The phased-in approach of this project will provide coverage for only a portion of the action area initially, leaving the rest of the action area vulnerable to the resultant shifting illegal traffic. Until the remaining towers are installed and operating effectively, illegal traffic in the uncovered parts of the action area is likely to increase. Once all towers are installed and operating, illegal traffic is likely to continue to shift to remote areas within the action area that towers and UGS cannot reach and/or where CBP agent capture attempts are unsuccessful.

Effects of Conservation Best Management Practices

The Conservation Best Management Practices and mitigation measures that are part of the proposed action act to avoid or offset some adverse effects. For instance, there are several Conservation Best Management Practices that will act to limit habitat disturbance during construction and that promote design and construction or improvement of routes in ways that will minimize or eliminate increased erosion and sedimentation problems. Presence of a biological monitor will help ensure that Conservation Best Management Practices are implemented as designed.

Two of the wind turbine Conservation Best Management Practices will not be implemented for TCA-NGL-109. TCA-NGL-109 will be sited on an exposed flat mountain top, which is likely to be in the flight path of bats. Turbine speed will range from 500 to 1800 rpms, which is greater

than the recommended speed. CBP will monitor the wind turbine for bat strikes and if mortality is documented, CBP will work with U.S. Fish and Wildlife Service to develop site-specific measures to reduce mortality.

To avoid disturbance of lesser long-nosed bats by lights, the Conservation Best Management Practices require that lights will be shielded to direct light only onto the work site and the area necessary to ensure the safety of the workers, the minimum foot-candles needed will be used, and the number of lights will be minimized. Any light extending beyond the construction or maintenance area will be no greater than 1.5 foot candles. Lesser long-nosed bat Conservation Best Management Practices require that roads, fences, security zones, surveillance sites and other facilities that require land clearing and have associated noise and high intensity artificial light components, will be located at least five miles from any known roost site. Facilities without noise or high-intensity artificial light can be located closer than five miles to known roosts, provided that the facility does not inhibit bats exiting or returning to the roost. Tower Conservation Best Management Practices require that only white strobe lights will be used at night, and these will be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. Security lighting for on-ground facilities and equipment will be down-shielded to keep light within the boundaries of the site. Although 22 towers will be sited closer than five miles to known bat roosts, none of these will have intense lighting, landing clearing, or noise associated with them.

Removal of some bat foraging plants is expected for tower site preparation or road modifications. Loss of an unknown number of agave and columnar cacti foraging plants will be permanent. The Conservation Best Management Practices state that removed plants a) will be salvaged and transplanted if plants are small, a significant portion of the roots are salvaged, and plants are watered and monitored or b) will be replaced at a 2:1 ratio. Replaced saguaros, which will be small, will take many years before they produce the volume of nectar and fruit of the larger cacti that will be removed.

The deployment and redeployment of UGS could also impact lesser long-nosed bat foraging habitat. Conservation Best Management Practices require that no cacti or agaves will be disturbed during this activity, but ground disturbance is likely to create suitable conditions for the invasion of exotic plant such as buffelgrass and Lehmann lovegrass. Exotic plants can preclude establishment of agaves and cacti or increase the frequency and intensity of fire, which can destroy these bat forage plants. Tower sites and wind turbines will be monitored for bat collisions. If lesser long-nosed bats are found dead or injured at the base of towers, CBP will work with FWS to reduce the likelihood of future mortalities and injury.

CBP will monitor roosts within one mile of tower sites for direct or indirect effects of the action for five years. CBP will install Hobo data loggers in lesser long-nosed bat roosts most prone to human use to detect changes in temperature, humidity, etc. CBP will take corrective actions in coordination with FWS and/or the landowners/land management agencies if such effects are detected. This may include road closures, gating, signing, fencing, etc.

Bats surveys will be conducted at roosts within one mile of a tower site or new or repaired road to document potential change. Bats will be telemetered at or near towers in the Patagonia

Mountains and tracked to determine roost sites. Mines or caves in the Patagonia Mountains will be protected from damage through gating, fencing, etc. if human use is negatively impacting roost sites.

Where improved or new roads may increase use of sensitive areas, including tower sites that are closer than one mile from a roost (see Table 6), access will be prevented through gating, physical barriers, etc. Implementation of the latter measure will be dependent on the authority of CBP to close routes and the effectiveness of those closures. Nonetheless, proposed mitigation measures will offset adverse effects to the lesser long-nosed bats and its habitat to some extent.

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.

Because of the extent of Federal lands managed by the Coronado National Forest and other Federal agencies at or in the vicinity of lesser long-nosed bats potentially affected by the proposed action and the vicinity of all lesser long-nosed bat habitat to the U.S./Mexico international border, most activities that may affect the lesser long-nosed bat are Federal activities and subject to section 7 consultation. Many legal border activities, such as construction of infrastructure and USBP operations, affect lesser long-nosed bats and their habitats and are subject to section 7 consultation. Exceptions include private actions on small inholdings within Federal lands. Activities that may result in cumulative effects include livestock grazing activities, small-scale development, and road construction on these private lands. In some cases, these activities may directly or indirectly affect lesser long-nosed bats or their habitats. Many illegal activities associated with cross-border smuggling and illegal immigration also occur in the action area. These activities result in creation of trails and routes that can degrade lesser long-nosed bat habitats and disturb individual bats. Persons involved in these illegal activities often build cooking or warming fires, some of which escape and become wildfires.

Conclusion

After reviewing the current status of the lesser long-nosed bats, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is our biological opinion that construction of towers and other features, as proposed, is not likely to jeopardize the continued existence of the lesser long-nosed bat. No critical habitat is designated for the bat, thus none will be affected. We present this conclusion for the following reasons:

1. No known roosts are expected to be directly affected and the anticipated extent of disturbance to foraging habitat is small compared to what is available in the action area, or throughout the distribution of the species.

2. Conservation Best Management Practices require that no cacti or agaves will be disturbed during deployment and redeployment of UGS.

3. Conservation Best Management Practices and mitigation measures will reduce and offset many of the adverse effects of the action. The telemetry study will provide new information on foraging, movement, and roost sites in the Patagonia Mountains. Roost sites where human use is likely to increase as a result of the proposed action will be protected through gating, fencing, etc.

4. The proposed action is likely to increase public use in some ecologically sensitive areas, but will reduce public use in other areas, including lesser-long-nosed bat foraging and roosting habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take

We anticipate that up to 10 lesser long-nosed bats will be taken as a result of this proposed action. This incidental take is expected to be in the form of collisions with towers and wind turbine blade-strike mortality. We anticipate that such mortality will be difficult to detect. As a result, the observed level of mortality will represent only a small proportion of the actual mortality; lesser long-nosed bats may be injured but die elsewhere, scavengers will remove carcasses prior to monitoring, and identification of bat carcasses to species may not be possible.

Effect of the Take

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the species.

Reasonable and Prudent Measures

All reasonable and prudent measures to minimize take of the lesser long-nosed bat have been included in the proposed action as Conservation Best Management Practices.

Review Requirement: Review requirement: If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of this opinion. CBP must immediately provide an explanation of the causes of the taking and review with us the need for possible modification of the proposed action and this opinion.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use 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 your agency participate in the implementation of the lesser long-nosed bat recovery plan.
2. We recommend that your agency work with us to identify key areas for lesser long-nosed bat and then devise the means to direct illegal activities and law enforcement response away from those areas.

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

PIMA PINEAPPLE CACTUS

Status of the Species

The Pima pineapple cactus was listed as an endangered species without critical habitat on September 23, 1993 (58 FR 49875). Factors that contributed to the listing include habitat loss and degradation, habitat modification and fragmentation, limited geographical distribution and species rareness, illegal collection, and difficulties in protecting areas large enough to maintain functioning populations. A five-year review was completed in 2007 and recommended no change to the cactus's classification as an endangered species (FWS 2007).

Pima pineapple cactus occurs south of Tucson, in Pima and Santa Cruz counties, Arizona and 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% and along the tops (upland areas) of alluvial bajadas. The plant is found at elevations between 2,360 ft and 4,700 ft (Phillips *et al*. 1981, Benson 1982, Ecosphere 1992), in vegetation characterized as either or a combination of the Arizona upland of the Sonoran Desert scrub and semi-desert grasslands (Brown 1982). Several attempts have been made to delineate suitable habitat within the range of Pima pineapple cactus (McPherson 2002, RECON Environmental Inc. 2006, U.S. Fish and Wildlife Service unpublished analysis) with very limited success. As such, we are still unable to determine exact

ecological characters to help us predict locations of Pima pineapple cactus or precisely delineate suitable habitat (U.S. Fish and Wildlife Service 2007).

As a consequence of its general habitat requirements, considerable suitable habitat for this species appears to exist in Pima and Santa Cruz counties, much of which is unoccupied. Pima pineapple cactus occurs at low densities, is widely scattered, and is 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 in much of its range. 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 this species is gathered primarily through the section 7 process; therefore, we only see projects that require a Federal permit or have Federal funding. There are many projects that occur within the range of Pima pineapple cactus 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.

Recent investigation 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. robustispina*. Baker (2005) found that there are distinct geographical gaps between the distribution of this subspecies and the other subspecies, which occur in southeastern 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).

Six demographic plots 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 Pima pineapple cactus measured, only 10 died, and two Pima pineapple cactus 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%, of the original population had died (mostly during the summer months), 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% 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.

The major pollinator of Pima pineapple cactus is *Diadasia rinconis*, a ground-nesting, solitary, native bee. McDonald (2005) found that Pima pineapple cactus plants need to be within approximately 600 m (1,969 ft) of each other in order to facilitate effective pollination. Pima pineapple cactus plants that are located at distances greater than that from one another become isolated. 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 Pima pineapple cactus. The native bees also pollinate other species of native cacti and the sole presence of Pima pineapple cactus may not be enough to attract pollinators.

The AGFD maintains the 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 Pima pineapple cactus records, 5,449 Pima pineapple cactus 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 Pima pineapple cactus plants are documented in the database as extirpated. We do know the number of Pima pineapple cactus detected during surveys for projects that have undergone section 7 consultation. For projects we have tracked between 1997 and 2003, approximately 1,168 Pima pineapple cactus (21% of the known individuals) were destroyed, removed, or transplanted as a result of residential and commercial development, indicating that development is a continuing threat for the species. This percentage may or may not be representative of the loss due to development in southern Arizona. It is difficult to quantify the total number of Pima pineapple cactus throughout its range that have been lost to development or the rate of habitat loss. There are two reasons for this: 1) we review only a small portion of development projects within the range of Pima pineapple cactus (those with Federal involvement), and 2) residential development that takes place without any jurisdictional oversight or permit is not tracked within Pima and Santa Cruz counties. The HDMS 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 recorded the loss of habitat because very few BAs quantify habitat for Pima pineapple cactus. Prior to 1997, we are not able to quantify the loss of Pima pineapple cactus, as much of the information is survey-based as opposed to project-based. We know the fate of Pima pineapple cactus detected on project sites associated with section 7 consultations; we do not know if Pima pineapple cactus detected during pre-1997 surveys are still present because the surveys have not been repeated.

Threats to Pima pineapple cactus continue to include habitat loss and fragmentation, competition with nonnative 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 Pima pineapple cactus and its habitat. However, we have no way of tracking the cumulative amount of development within the range of Pima pineapple cactus. 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 Pima pineapple cactus. 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 nonnatives (Ruyle *et al.* 1988, Anable *et al.* 1992). Roller and Halvorson (1997) hypothesized that fire-induced mortality of Pima pineapple cactus increases with Lehmann lovegrass density. Buffelgrass has become quite dominant in vacant areas in the City of Tucson and along roadsides, notably in the rights-of-way along I10 and State Route 86. Some portions of Pima pineapple cactus habitat along these major roadways are already being converted to dense stands of buffelgrass.

The Arizona Native Plant Law may 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 illegal taking of this species on State and private lands without a permit for educational or research purposes, it does not provide for protection of plants *in situ* through restrictions on development activities. Even if Pima pineapple cacti are salvaged from a site, transplanted individuals are not considered as functioning within the context of a self-sustaining population. Transplanted Pima pineapple cactus have low levels of survival, and past efforts to transplant individual Pima pineapple cactus to other locations have had only limited success. For example, on two separate projects in Green Valley, the mortality rate for transplanted Pima pineapple cactus after two years was 24% and 66%, respectively (SWCA, Inc. 2001, WestLand Resources, Inc. 2004). One project southwest of Corona de Tucson involved transplanting Pima pineapple cactus into areas containing *in situ* plants. Over the course of three years, 48% of the transplanted individuals and 24% of the *in situ* individuals died (WestLand Resources, Inc. 2008). As a result, transplanted Pima pineapple cactus are not likely to contribute significantly to the overall population. There is also the unquantifiable loss of the existing Pima pineapple cactus seed bank associated with the loss of suitable habitat. Furthermore, once individuals are transplanted from a site, Pima pineapple cactus is considered to be extirpated, as those individuals functioning in that habitat are irretrievably lost.

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% 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, Pima pineapple cactus) 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 Pima pineapple cactus. Any developer who cannot avoid this species or move it to another protected area must replace it. Most local nurseries do not grow Pima pineapple cactus (and cannot grow them legally unless seed was collected before the listing). As a result, environmental consultants are collecting Pima pineapple cactus 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 Pima pineapple cactus plants grown from seed back on these sites. This exercise probably has limited

conservation benefit for the species, as it is somewhat of a gardening experiment with very little control or oversight, and a high degree of uncertainty of lasting success. There have been no long-term studies of transplant projects. It also does not address the loss of habitat.

Other specific threats that have been previously documented (U.S. Fish and Wildlife Service 1993), such as overgrazing, illegal plant 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 Pima pineapple cactus 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 Pima pineapple cactus habitat and individuals is complicated by the varying landownership within the range of this species in Arizona. An estimated 10% of the potential habitat for Pima pineapple cactus is held in Federal ownership. The remaining 90% 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 piece of federally-owned land is the BANWR, located at the southwestern edge of the plant's range at higher elevations and with lower plant densities. No significant populations of Pima pineapple cactus exist in Sonora or elsewhere in Mexico (Baker 2005).

There have been some notable conservation developments for this species. There are two conservation banks for Pima pineapple cactus, one on a private ranch in the Altar Valley and another owned by Pima County that includes areas in both the Altar Valley and south of Green Valley. Nine projects have used the bank to mitigate the loss of Pima pineapple cactus and habitat from residential and commercial development (U.S. Fish and Wildlife Service 2007). Pima County and the City of Tucson's large-scale conservation efforts for this species are not yet complete, but strategies for Pima pineapple cactus conservation will likely include additional conservation banks, acquisition of occupied and suitable Pima pineapple cactus habitat, a revision of both the City and County ordinances dealing with native plant protection, and provisions for the protection of Pima pineapple cactus and habitat within subdivisions.

In summary, Pima pineapple cactus 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 Pima pineapple cactus or precisely delineate its habitat, and considerable area within the Pima pineapple cactus range has not been surveyed. Further, there are still significant gaps in our knowledge of the life history of Pima pineapple cactus; for instance, we have yet to observe a good year for seed germination and, with the exception of a few personal observations from researchers, we have not identified the seed dispersal agent(s). Demographic plots have been only recently established, and it will be years before we have enough information to assess population dynamics for Pima pineapple cactus in the Altar Valley.

Development and associated loss of habitat remains the primary and continuing threat to this taxon. The expanding threat of nonnative grasses and resulting altered fire regimes remain a serious concern for the long-term viability of the species. The full impact of drought and climate change on Pima pineapple cactus has yet to be studied, but it is likely that, if recruitment occurs

in punctuated events based on precipitation and temperature (Baker 2006), Pima pineapple cactus will be negatively affected by these forces. Conservation efforts that focus on habitat acquisition and protection, like those proposed by Pima County and the City of Tucson, will be important elements that will contribute to the long-term viability of this taxon. Regulatory mechanisms, such as the native plant protection ordinances, will provide conservation direction for Pima pineapple cactus habitat protection within subdivisions, and may serve to reduce Pima pineapple cactus habitat fragmentation within the urban areas of projected 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 proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions that 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.

Sites suitable for Pima pineapple cactus (elevations between 2,300 and 4,500 ft in areas at less than 10 to 15% slope) occur throughout the action area. While wide-ranging survey data are lacking, the species is known from several localities in which towers may be constructed, including the Altar and Santa Cruz River valleys, and the plains and bajadas surrounding the mountains bordering those valleys. The action area is a subset of the broader range of the Pima pineapple cactus, and is defined as the footprint of the nineteen (19) towers and up to 33.5 acres of total disturbance to the species' habitat. An unknown number of UGS will be installed within in Pima pineapple cactus habitat as well. The action area also includes a 0.25-mile area surrounding the tower and road boundaries; this is the area most likely to incur indirect effects from the proposed action (e.g. the area that may be affected by the spread of invasive grasses). The area encompassed by the proposed action occupies an appreciable proportion of the range of the species in the U.S. and therefore, the species' status in the action area is similar to the rangewide status.

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

Pima pineapple cactus habitat will be directly lost or modified due to construction activities (see Table 7). Areas of permanent disturbance will remove portions of the seed bank, and areas of temporary disturbance can also alter the seed bank. In addition, the complete removal of vegetation and disturbance of soils will change water infiltration, compact soil, and change local site conditions. Although some areas of temporary disturbance may recover, it may take many

years before full recovery is achieved. Vasek *et al*. (1975) found that desert vegetation is fragile and easily destroyed, but does have a long-term potential (probably measured in centuries) to recover from drastic disturbance such as a pipeline project. Sometimes Pima pineapple cactus can be found in areas of recent disturbance, as competition with other plants for nutrients and light are reduced.

Pima pineapple cactus will be adversely affected by construction, access, and maintenance activities in the vicinity of nineteen (19) tower sites and their access routes, including six (6) in the Altar Valley, three (3) in the Arivaca Creek watershed, one (1) in the Black Mesa area, and nine (9) in the Santa Cruz River Basin. It should be noted that Table 4.1 in your BA states there will be twenty-one (21) towers in Pima pineapple cactus habitat.

Each tower will be constructed on a pad no larger than 100 ft x 100 ft; some sites will have appreciably smaller cleared zones if pad sizes are downsized to fit terrain features and/or to reduce erosion. Table 7, below, illustrates the areal extent of temporary and permanent impacts to Pima pineapple cactus. The construction of towers will permanently disturb up to 1.18 acre of Pima Pineapple cactus habitat. The construction of towers will result in the temporary disturbance of up to 3.18 acres of Pima pineapple cactus habitat, though an appreciable portion of these impacts could be permanent if cacti are either removed or buried.

Construction of new access roads and repairs to existing routes will also affect Pima pineapple cactus. New roads will be at least 16 ft wide (12 foot roadway with 2-foot shoulders on each side), with widths up to 56 ft if cut and fill are required. Your BA and the matrix of tower and road impacts (Table 7) state that up to 2,030 ft of new road will be constructed, resulting in up to 2.61 acres of permanent disturbance and 1.86 acre of temporary disturbance. Approximately 19,286 ft of existing roads will be repaired or improved, which will result in permanent disturbance and temporary disturbance to 7.05 acres and 17.62 acres of Pima pineapple cactus habitat, respectively. In contrast to the tower sites and new road construction, it is unlikely that Pima pineapple cactus occur within the prism of existing roads.

The total permanent disturbance to Pima pineapple cactus habitat from road construction, road repair, and tower construction (see Table 7), is anticipated to be 10.84 acres. The total temporary disturbance to Pima pineapple cactus habitat from road construction, road repair, and tower construction (see Table 7), a portion of which may actually be permanent in nature, is anticipated to be 22.67 acres. The total effect all forms of disturbance to Pima pineapple cactus habitat is anticipated to be 33.5 acres. Installing the UGS will result in minor acreage of disturbance, as these are to be hand-placed, avoiding vegetation.

The CBP has committed to implement species-specific measures as described in the Conservation Best Management Practices section, above, to minimize the removal of native plant material, confine construction traffic to already-disturbed areas, etc. These species-specific measures are intended to limit impacts to native plants while reducing the spread of invasive plants. Implementation of these conservation measures will minimize, but not eliminate the proposed action's adverse effects. Conservation Best Management Practicess include:

(1) Monitoring to determine effects of the proposed actions. CBP will monitor suitable habitat within 50 feet of tower sites, repaired roads, and new roads annually for three years. CBP will take corrective action, in coordination with the landowners and/or land management agencies if Pima pineapple cactus habitat is degraded as a result of the proposed action and increased public use.

(2) Compensation for habitat loss at an established Pima pineapple cactus conservation bank approved by FWS.

Pima pineapple cacti were observed at the TCA-NGL-048, TCA-TUS-038, and TCA-TUS-290 tower sites. You have proposed to avoid or, if infeasible, transplant the cactus off-site. Transplantation has demonstrated relatively little success, although rigorous, long-term monitoring of transplanted cacti has not occurred. It is likely that Pima pineapple cacti are also present at other tower sites and in proposed road alignments. The proposed action will therefore result in the direct loss of an indeterminate number of individual Pima pineapple cactus (the total number affected will be determined by construction site monitors) and up to 33.5 acres of habitat in which the species may occur at varying densities. Preconstruction surveys will verify the presence of Pima pineapple cactus at the remaining sites. The total affected acreage will be determined at a later time. Per the Conservation Best Management Practices, you will purchase the necessary number of credits at the Pima pineapple cactus conservation bank at a 1:1 ratio within one year of completion of tower construction.

Indirect effects will also occur as a result of non-native plant invasions and associated effects, and increased public access along new or improved routes to the towers. New disturbance and equipment can contribute to the spread of non-native species into a previously uninfected area. Nearby areas already support stands of buffelgrass and Lehmann lovegrass, and additional disturbance can facilitate spread of these species, as well as that of other exotic plants. These invasive grass species have the potential to alter the ecosystem of the plant community by forming monotypic stands that do not allow for the regeneration of native species and create a much heavier fuel load with higher fire intensities. This change in plant composition can lead to a permanent change in the plant community by allowing fires to burn hotter and more frequently than would occur in the natural vegetation. Certain species (like Pima pineapple cactus) that are not fire-adapted can be lost as a result of such fires.

The deployment and redeployment of UGS could also impact Pima pineapple cactus habitat. Conservation Best Management Practices require that no cacti or will be disturbed during this activity, but ground disturbance is likely to create conditions suitable for the invasion of exotic plants that can preclude establishment cacti.

New permanent roads will allow for public access into areas that were not available before. In addition, in some cases improvement of existing routes will allow access by low-clearance or two-wheel drive vehicles that could not occur but for the improvements. Vehicle access via these roads will allow for off-road vehicle operation and other recreational pursuits enroute to the towers. Pima pineapple cactus can be affected by off-road vehicle use, which modifies habitat and results in the destruction of cacti. We have observed Pima pineapple cactus that have been run over by off-highway vehicles. Increased public use will also increase the likelihood of human-caused wildfire.

Table 7. Matrix of tower and road effects to Pima pineapple cactus

	Road Length (feet)		New Road Disturbance (acres)		Improved Road Disturbance (acres)		Road Acreage		Tower Site Disturbance (acres)		Total Disturbance (acres)		
Tower Site (TCA-)	New Rd.	Improved Rd.	Perm.	Temp.	Perm.	Temp.	Total Perm.	Total Temp.	Perm.	Temp.	Perm.	Temp.	Temp. + Perm.
NGL-046	14	1486	0.0180	0.01	0.546	1.365	0.56	1.38	0.15	0.08	0.71	1.46	2.17
NGL-047	0	3803	0.0000	0.00	1.397	3.492	1.40	3.49	0.06	0.17	1.45	3.66	5.12
NGL-048*	0	0	0.0000	0.00	0.000	0.000	0.00	0.00	0.06	0.17	0.06	0.17	0.23
NGL-049	88	3035	0.1131	0.08	1.115	2.787	1.23	2.87	0.06	0.17	1.29	3.04	4.33
NGL-050	37	1476	0.0476	0.03	0.542	1.355	0.59	1.39	0.06	0.17	0.65	1.56	2.21
NGL-052	68	0	0.0874	0.06	0.000	0.000	0.09	0.06	0.06	0.17	0.14	0.23	0.38
NGL-054	185	8285	0.2378	0.17	3.043	7.608	3.28	7.78	0.06	0.17	3.34	7.95	11.29
NGL-210	78	0	0.1003	0.07	0.000	0.000	0.10	0.07	0.06	0.17	0.16	0.24	0.40
NGL-285	22	0	0.0283	0.02	0.000	0.000	0.03	0.02	0.06	0.17	0.09	0.19	0.28
TUS-032	0	50	0.0000	0.00	0.018	0.046	0.02	0.05	0.06	0.17	0.08	0.22	0.29
TUS-038*	25	0	0.0321	0.02	0.000	0.000	0.03	0.02	0.06	0.17	0.09	0.20	0.28
TUS-041	0	178	0.0000	0.00	0.065	0.163	0.07	0.16	0.06	0.17	0.12	0.34	0.46
TUS-085	33	825	0.0424	0.03	0.303	0.758	0.35	0.79	0.06	0.17	0.40	0.96	1.36
TUS-187	86	0	0.1106	0.08	0.000	0.000	0.11	0.08	0.06	0.17	0.17	0.25	0.42
TUS-287	0	98	0.0000	0.00	0.000	0.000	0.00	0.00	0.06	0.17	0.06	0.17	0.23
TUS-290*	58	50	0.0746	0.05	0.018	0.046	0.09	0.10	0.06	0.17	0.15	0.27	0.42
TUS-291	60	0	0.0771	0.06	0.000	0.000	0.08	0.06	0.06	0.17	0.13	0.23	0.36
TUS-298	1276	0	1.6404	1.17	0.000	0.000	1.64	1.17	0.06	0.17	1.70	1.34	3.04
TUS-299	0	0	0.0000	0.00	0.000	0.000	0.00	0.00	0.06	0.17	0.06	0.17	0.23
Total	2030.00	19286.00	2.61	1.86	7.05	17.62	9.66	19.48	1.18	3.18	10.84	22.67	33.50

* Indicates that Pima pineapple cactus has already been documented at the site and/or road alignment. Remaining sites will require surveys to confirm the species' presence.

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.

The passage of illegal aliens and smugglers through the action area is likely to trample and disturb Pima pineapple cactus, degrade habitat, and potentially spread or introduce pathogens and non-native plants. Off-highway vehicle use is prevalent on some State and Federal lands, and has effects similar to those associated with human traffic.

Residential, commercial, and mineral development in this geographic area can be expected to increase. State and private lands not presently developed within and surrounding the action area are quickly becoming urbanized. It is unknown what the plans are for the State and private lands. Much of this development will have little or no Federal nexus. Without any protection under the Act, the only protection available is through the Arizona Native Plant Law, which provides only for salvage for scientific and educational expenses. Regardless of salvaged Pima pineapple cactus transplant success, the habitat would be lost in urbanized areas. Much of the habitat and the individuals of the species are at significant risk of destruction or continued degradation. Without the protection under section 9 that applies on non-Federal lands, there is little regulatory authority to use in reducing those risks.

Conclusion

We reviewed the current status of the Pima pineapple cactus, the status of the species, the environmental baseline for the action area, and the effects of the proposed action, including the cumulative effects. It is our biological opinion that the proposed action is not likely to jeopardize the species. Critical habitat has not been designated for this species; therefore, none will be affected. In making our determination we considered the following:

1. The effects of road repair, new road construction, and tower construction will be reduced by the implementation of preconstruction surveys, avoidance of cacti to the extent practicable, sediment control measures, and limited removal of native vegetation. These measures will minimize the scale of effects to Pima pineapple cactus, but will not completely offset them.

2. Effects to Pima pineapple cactus not avoided or minimized through Conservation Best Management Practices will be mitigated by the purchase of credits at a 1:1 ratio from a Pima pineapple cactus conservation bank approved by FWS.

3. Post-construction monitoring (and future project planning) will document effects from proposed actions and facilitate avoidance of future impacts. CBP will take corrective action, in coordination with the landowners and/or land management agencies, if Pima pineapple cactus habitat is degraded as a result of the proposed action and increased

public use. Efforts to control post-construction invasion of non-native species (buffelgrass and Lehmann lovegrass in particular) will be important.

4. Closure and restoration of illegal roads, in cooperation with landowners and/or land management agencies will help prevent future degradation.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Best Management Practices that were incorporated into the project design.

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 or recovery permits are needed from us for implementation of the proposed action.

Pima pineapple cactus is protected as a highly safeguarded, protected native plant under Arizona State Law (Arizona Revised Statutes §§3-900-916 and Arizona Administrative Code Article 11, §§ R3-3-1101-1111). State permits may be required in order to translocate this species.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species.

The recommendations provided here do not necessarily represent complete fulfillment of the agency's section 2(c) or 7(a)(1) responsibilities for Pima pineapple cactus. In furtherance of the purposes of the Act, we recommend consideration of the following actions:

We recommend that DHS participate in efforts to identify and conserve Pima pineapple cactus throughout its range, including participation in forums that address the control of invasive, exotic plants (e.g. buffelgrass).

In order that we are kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

Disposition of Dead or Injured Listed Species

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.

REINITIATION NOTICE

This concludes formal consultation on the Secure Border Initiative (SBI*net*) Tucson West Tower Project, Ajo, Tucson, Casa Grande, Nogales, and Sonoita Stations Area of Operation, U.S. Border Patrol, Tucson Sector, Arizona, as outlined in the June 19, 2008, biological assessment. 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.

In keeping with our trust responsibilities to American Indian Tribes, by copy of this memorandum, we notify the Tohono O'dham Tribe, which may be affected by the proposed action. We encourage you to invite the Bureau of Indian Affairs to continue participating in the review of this action.

We appreciate your efforts to identify and minimize effects to listed species from this project. For further information please contact Ms. Susan Sferra at (602) 242-0210 or Mr. Jim Rorabaugh at (520) 670-6150 (x230). Please refer to consultation number 22410-F-2008-0373 in future correspondence concerning this project.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Refuge Manager, Buenos Aires National Wildlife Refuge, Arivaca, AZ
U.S. Customs and Border Protection, Washington, DC (Attn: Glenn Bixler)
U.S. Customs and Border Protection, Washington, DC (Attn: Patience Patterson)
Refuge Manager, Cabeza Prieta National Wildlife Refuge, Ajo, AZ

Bureau of Land Management, Phoenix, AZ (Attn: Lori Young)
Forest Supervisor, Coronado National Forest, Tucson, AZ
Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ
Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ (Attn: Joan Scott)
Tohono O'dham Nation, Sells, AZ (Attn: Karen Howe)
Park Superintendent, Organ Pipe Cactus National Monument, Ajo, AZ

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APPENDIX A: CONCURRENCES

This appendix contains background information and our concurrence with your determination that the proposed SBI*net* Tucson West Tower Project located in Maricopa, Pinal, Pima, Cochise, and Santa Cruz Counties, Arizona, may affect, but is not likely to adversely affect, the endangered Sonoran tiger salamander (*Ambystoma tigrinum stebbinsi*), the threatened Sonora chub (*Gila ditaenia*) and its critical habitat, the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*), the endangered masked bobwhite (*Colinus virginianus ridgewayi*), the endangered ocelot (*Leopardus pardalis*), and the endangered Huachuca water umbel (*Lilaeopsis schaffneriana* var. *recurva*) and its critical habitat.

SONORAN TIGER SALAMANDER

Status of the Species in the Action Area

The Sonoran tiger salamander (*Ambystoma mavortium stebbinsi*) was listed as endangered in 1997 (62 FR 665) without critical habitat. A final recovery plan was completed in September 2002. The Sonoran tiger salamander is known from 71 breeding localities, although not all are occupied at any one time (U.S. Fish and Wildlife Service files). During surveys by the AGFD from 2001 to 2006, Sonoran tiger salamanders were found at 37 of 139 stock tanks, which were sampled from 1 to 7 times each. At 23 of 29 tanks where salamanders were found, and which were sampled more than once, salamanders were not found on at least one visit. Salamander populations are regularly extirpated due to drought and disease, but are then often recolonized at a later date. The number and location of occupied sites at any one time is unknown, although previously occupied sites are likely to support populations now or in the future.

All sites where Sonoran tiger salamanders have been found are located in Arizona in the Santa Cruz and San Pedro River drainages, including sites in the San Rafael Valley and adjacent foothills and canyons of the Patagonia and Huachuca mountains in Santa Cruz and Cochise counties. All confirmed historical and extant aquatic populations are found in cattle tanks or impounded cienegas within 19 miles of Lochiel, Arizona. Salamanders collected from a ciénega at Rancho Los Fresnos in the San Rafael Valley, Sonora, Mexico, were likely *A. m. stebbinsi*. However, surveys during 2006 failed to locate additional salamanders, and most waters on the ranch are now occupied by non-native bullfrogs, crayfish, green sunfish (*Lepomis cyanella*), or black bullhead (U.S. Fish and Wildlife Service files and trip reports).

Although most records for Sonoran tiger salamanders occur at impoundments where breeding occurs, terrestrial metamorphs may wander considerable distances from these aquatic habitats. Other subspecies of tiger salamanders have been documented moving more than a mile overland. However, unlike other subspecies, Sonoran tiger salamanders are almost never found in upland habitats or on roads.

Primary threats to the salamander include predation by non-native fish and bullfrogs, diseases, catastrophic floods and drought, illegal collecting, introduction of other subspecies of salamanders that could genetically swamp *A. m. stebbinsi* populations, and stochastic

extirpations or extinction characteristic of small populations.

The proposed action will result in the placement of the following towers within the range of the salamander: TCA-SON-055, 056, 057, 058, 059, 060, 061, and 062. TCA-SON-056 is about 800 ft East-Northeast of Upper 13 Reservoir and the access route (existing, no improvements needed) passes within about 400 ft of that reservoir. Sonoran tiger salamanders were confirmed at Upper 13 Reservoir by AGFD in 2008. The proposed TCA-SON-061 site is about 660 ft Northeast of Game and Fish Tank, which although dry when sampled in 2008, supported Sonoran tiger salamanders in 1996. No improvements to the road into TCA-SON-061 are proposed, and the access does not come any closer to the tank than the tower (about 660 ft). No other towers or access road improvement or construction is close enough to a salamander locality to affect it.

Effects of the Action

Salamanders are most likely to be affected at Upper 13 Reservoir (TCA-SON-056) and Game and Fish Tank (TCA-SON-061). The only possible direct effect would be vehicles or equipment running over surface active salamanders or digging them up at the tower sites. The probability of this is very low. Terrestrial metamorphosed Sonoran tiger salamanders have almost never been found surface active, so the likelihood of running them over is extremely small. Tower sites are sufficiently far from breeding localities that it is very unlikely that salamanders would be residing underground in rodent burrows or under surface debris at those tower sites. Indirect effects could include increased sedimentation into tanks from vehicle or equipment use on access roads as well as construction at the tower sites. However, no improvements are proposed to the access roads, and no significant sediment movement is expected from the roads into the tanks, which are about 400-660 ft away. In addition, Conservation Best Management Practices reduce the likelihood of sedimentation and erosion problems. Construction of the towers is not expected to affect public use at or near salamander localities, because no road improvements are proposed at the sites most likely to affect the salamander.

No effects are anticipated from placement, operation, or maintenance of UGSs and mobile surveillance systems. The former will not be accessed off existing routes, it will result in a small area of surface disturbance (up to 16 ft^2), and it will not be placed in wetted areas. The mobile surveillance systems will be placed on vehicles that will drive existing routes.

Conclusion

After reviewing the current status of the Sonoran tiger salamander, the environmental baseline for the action area, and the effects of the action, we concur with your determination that the proposed action may affect, but is not likely to adversely affect, the Sonoran tiger salamander. No critical habitat has been designated for this species, therefore, none will be affected. We present this conclusion for the following reasons:

1. Two tower sites and access routes are proposed for 400-800 ft from Sonoran tiger salamander breeding ponds; however, no direct or indirect effects are anticipated due to the distance to the ponds and Conservation Best Management Practices that reduce or eliminate possible sedimentation or erosion problems.

2. No effects are anticipated to salamanders or their habitats from UGS or mobile surveillance systems, because of the small area of surface disturbance and placement outside of wetted areas in regard to the former, and operation of the latter on vehicles that will maneuver only on existing routes.

SONORA CHUB

Status of the Species in the Action Area

We listed the Sonora chub in the U.S. and Mexico as threatened on April 30, 1986 (51 FR 16042) with critical habitat. Critical habitat was designated at the time of Federal listing to include Sycamore Creek, extending downstream from and including Yank Spring (= Hank and Yank Spring), to the International border. Also designated was the lower 2.0 km (1.2 mi) of Penasco Creek, and the lower 0.25 mi of an unnamed stream entering Sycamore Creek from the west, about 1.5 mi downstream from Yank Spring. In addition to the aquatic environment, critical habitat includes a 12 m 9.3 ft-wide riparian area along each side of Sycamore and Penasco Creeks. This riparian zone is believed essential to maintaining the creek ecosystem and stream channels, and to conservation of the species (Fish and Wildlife Service 1986). Sonora chub is locally abundant in Sycamore Creek, although the habitat is limited in areal extent (Minckley and Deacon 1968). In 1995, Sonora chub were found in California Gulch by the AGFD (1995). The overall estimated current chub habitat is 10 mi stream miles in Sycamore Creek and California Gulch including a 12m wide riparian area along each side of Sycamore and Penasco creeks.

The action area includes Sycamore Canyon and California Gulch and their respective watersheds. Sonora chub spawn at multiple times during spring through summer, most likely in response to flood or freshets during the spring and summer rains (Henderickson and Juarez-Romero 1990). Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic waters, Henderickson and Juarez-Romero (1990) found it commonly in pools less than 2 ft deep, adjacent to or near areas with a fairly swift current, over sand and gravel substrates. It was less common in reaches that were predominately pools with low velocities and organic sediments. Sonora chub are adept in exploiting small marginal habitats, and can survive under severe environmental conditions. It is also apparent that they can maneuver upstream past small waterfalls and other obstructions to colonize newly-wetted habitats (Carpenter and Maughan 1993).

Both Sycamore Canyon and California Gulch are occupied by Sonora chub every year, though intra- and interannual abundance varies in response to hydrologic conditions. The species has been able to survive in this watershed due to the nature of this species in response to these wet and dry cycles by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. On an individual basis, a substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survived the dry period. This species has an amazing capacity for reproduction and recruitment as its habitat expands; it can seemingly explode from a small number of individuals occupying

newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of its habitat, which has allowed the Sonora chub to survive to the present (Bell 1984).

Effects of the Action

Your June 2008 BA states that a total of four (4) tower sites (Towers TCA-NGL-043, 044, 045, and 109) will be constructed in the Sycamore Creek basin approximately one (1) mile upstream of Sonora chub critical habitat. Only three (3) will include access roads; Tower TCA-NGL-109 will be situated atop Montana Peak. There are no towers planned for California Gulch.

You have proposed to implement species-specific measures as described in the Conservation Best Management Practices section, above, to reduce or prevent the entry of sediment, chemicals, and other environmental contaminants to aquatic ecosystems. While their effectiveness is difficult to quantify, we anticipate that the implementation of these construction practices, in combination with the buffer distances from the mainstem of Sycamore Canyon and the intermittently-occupied (by Sonora chub) lower reaches of its tributary streams will be sufficient to reduce the proposed action's effects to the aquatic environment.

No effects are anticipated from placement, operation, or maintenance of UGS and mobile surveillance systems. The former will not be accessed off existing routes, result in a small area of surface disturbance (up to 16 ft^2), and will not be placed in wetted areas. The mobile surveillance systems will be placed on vehicles that will drive existing routes.

The effects to Sonora chub critical habitat are similarly minimal, and are not likely to affect the primary constituent elements of that habitat.

Conclusion

After reviewing the current status of the Sonora chub, the environmental baseline for the action area, and the effects of the action, we concur with your determination that the proposed action is not likely to adversely affect Sonora chub or its critical habitat for the following reasons:

1. Construction practices to reduce or eliminate the introduction of sediment and other contaminants to aquatic ecosystems will be implemented.

2. No effects are anticipated to Sonora chub or its critical habitat from UGS or mobile surveillance systems, because of the small area of surface disturbance and placement outside of wetted areas in regard to the former, and operation of the latter on vehicles that will maneuver only on existing routes.

3. Implementation of the proposed action will not preclude conservation of the species because the effects are insignificant and discountable, as discussed in the Effects of the Action section and the summary of reasons provided under Conclusions 1 and 2, above.

GILA TOPMINNOW

Gila topminnow was listed as endangered in 1967 without critical habitat. Only Gila topminnow populations in the United States, and not in Mexico, are listed under the Act. The reasons for decline of this fish include past dewatering of rivers, springs and marshlands, impoundment, channelization, diversion, regulation of flow, land management practices that promote erosion and arroyo formation, and the introduction of predacious and competing nonnative fishes.

Status of the Species in the Action Area

Natural Gila topminnow populations are extant in the Santa Cruz River near Lochiel and downstream of the Nogales International Wastewater Plant, and in Sonoita and Cienega creeks (Voeltz and Bettaso 2003). Only the Santa Cruz River localities are in the action area.

Effects of the Action

Your June 2008, BA states that a total of fourteen (14) tower sites are situated within the watersheds of streams occupied by Gila topminnow. Nine (9) towers are in the western portion of the Santa Cruz River watershed (Towers TCA-NGL-046, 047, 048, 049, 050, 052, 054, 112, 113, 210, and 285), three (3) are within the San Rafael Valley watershed (TCA-SON-055, 056, and 057), and two (2) are in the Sonoita Creek watershed (TCA-SON-115 and 117).

A total of 286 ft of new road construction and 7,670 ft of road repair have been identified for the tower sites in the San Rafael Valley; none will occur within two miles of occupied habitat. In the Santa Cruz River watershed, 414 ft of new roads and 10,625 ft of road repair will be required.

You have proposed to implement species-specific measures as described in the Conservation Best Management Practices section, above, to minimize the effects of soil disturbance and removal to Gila topminnow. These Conservation Best Management Practices are similar to those associated with SWPPP and pertain to implementing construction activities in a manner that reduces or prevents the entry of sediment, chemicals, and other environmental contaminants to aquatic ecosystems. While their effectiveness is difficult to quantify, we anticipate that the implementation of these construction practices, in combination with the buffer distances from the mainstem of the Santa Cruz River in the San Rafael Valley and the appreciable level of baseline upland disturbance in the Santa Cruz Valley, will be sufficient to reduce the proposed action's effects to the aquatic environment to insignificant levels. The towers will likely have long-term beneficial effects to Gila topminnow if they are successful in reducing the amount of human activity in Gila topminnow habitat in the Santa Cruz River

Conclusion

After reviewing the current status of the Gila topminnow, the environmental baseline for the action area, and the effects of the action, we concur with your determination that the proposed action is not likely to adversely affect Gila topminnow for the following reasons:

1. Construction practices to eliminate the introduction of sediment and other contaminants to aquatic ecosystems will be implemented.

2. No effects are anticipated to Gila topminnow or its habitats from UGS or mobile surveillance systems, because of the small area of surface disturbance and placement outside of wetted areas in regard to the former, and operation of the latter on vehicles that will maneuver only on existing routes.

3. Implementation of the proposed action will not preclude conservation of the species because the effects are insignificant and discountable, as discussed in the Effects of the Action section and the summary of reasons provided under Conclusions 1 and 2, above.

MASKED BOBWHITE

Status of the Species in the Action Area

We listed the masked bobwhite as endangered with the original passage of the Endangered Species Conservation Act of 1969 (Public Law 91-135; 83 Stat.275). Critical habitat is not designated for this species. A recovery plan for the masked bobwhite exists and has been revised several times (U.S. Fish and Wildlife Service 1995).

The reintroduced individuals on the BANWR make up the only known population in the U.S. The Refuge continues to breed and release more individuals. The population has been monitored continually using summer call counts. Few masked bobwhite have been detected in recent years at BANWR. Unfortunately, populations have crashed recently in Sonora, Mexico. As a result, the masked bobwhite is likely close to extinction in the wild.

Although likely very scarce, masked bobwhite quail could be encountered refuge-wide in appropriate grassland habitat (approximately 80% of the refuge is suitable for bobwhite). They are most likely to occur in the valley bottom, and least likely to be found in the foothills, Brown Canyon, and in the riparian areas. The species could occur off-refuge, as well, with reports as far north as the Diamond Bell area near Three Points and on Rancho de la Osa west of Sasabe.

Effects of the Action

Eight towers, with five requiring new access roads, will be constructed in masked bobwhite habitat. There will be 161 ft of new road constructed. An additional 1,637 ft of road will be improved.

You have proposed to implement species-specific measures as described in the Description of the Proposed Conservation Best Management Practices section, above, to minimize the effects of soil disturbance and removal of masked bobwhite habitat. You have also proposed to implement species-specific measures as described in the Description of the Proposed Conservation Best Management Practices section, above, which will minimize the harassment of masked bobwhite and other wildlife,

Conclusion

The U.S. Fish and Wildlife Service concurs with the DHS's determination that the proposed action may affect, but is not likely to adversely affect the masked bobwhite. We base this determination on the following:

1. Construction practices will be implemented that will reduce the effects of erosion, which could otherwise compromise grassland masked bobwhite habitat.

2. Measures will be implemented that will minimize the number of vehicular incursions into masked bobwhite habitat and reduce the potential for vehicle strikes.

3. Conservation Best Management Practices will be developed and implemented to avoid and control invasive species like buffelgrass and Lehmann lovegrass.

4. No effects are anticipated to masked bobwhite or its habitats from UGSs or mobile surveillance systems, because of the small area of surface disturbance and placement outside of wetted areas in regard to the former, and operation of the latter on vehicles that will maneuver only on existing routes.

5. Effects to masked bobwhite habitat are very small (161 ft of new road and 1,637 ft of road improvements) and are insignificant compared to the extent of habitat available.

6. Masked bobwhite are very rare at BANWR and adjacent areas, and thus direct effects to birds are discountable.

OCELOT

Endangered status was extended to the U.S. portion of the ocelot's range with a final rule published July 21, 1982 (U.S. Fish and Wildlife Service 1982). Critical habitat is not designated for this species. Recovery for the ocelot was originally addressed in *Listed Cats of Texas and Arizona Recovery Plan (with Emphasis on the Ocelot)* (U.S. Fish and Wildlife Service 1990). An updated recovery plan was drafted in 2006 (U.S. Fish and Wildlife Service 2006). Two of the 11 recognized subspecies of ocelot have occurred in the U.S.: the Texas ocelot (*L. pardalis albescens*) and the Sonora ocelot (*L. p. sonoriensis*) (Hall 1981).

Status of the Species in the Action Area

As the listing rule (47 FR 31670) states, the lack of evidence of historical populations of ocelots in Arizona indicates that the ocelot was never firmly established in Arizona. The last confirmed account was of an ocelot that was shot on Pat Scott Peak in the Huachuca Mountains in 1964 (Hoffmeister 1986, López González *et al*. 2003). However, it is possible that ocelots currently occur in southern Arizona. López González *et al*. (2003) reported three verified ocelot records in Sonora from areas adjacent to Arizona (one record from Rancho Tapila, Agua Prieta in 2000 and two records near Casitas, Nogales in 1974 and 1966). The Rancho Tapila sighting was in pine-

oak forest and the Casitas, Nogales sightings were in oak woodland. These were all males that likely were dispersing rather than residents in a breeding population. Ocelots were recently verified within 48 km (30 mi) of the U.S./Mexico international border at Rancho El Aribabi through the use of infra-red cameras (U.S. Fish and Wildlife Service Trip Report 2007). Ocelots are not currently known from within Arizona.

Threats to ocelots throughout their range generally include habitat loss, habitat fragmentation, logging, and harvest (legal and illegal) of the ocelot and its prey. Ocelot hunting varies between and within countries, and is legal in Ecuador, El Salvador, Guyana, and Peru. Currently, habitat conversion, fragmentation, and loss are probably replacing hunting as the major threat (Sunquist and Sunquist 2002). Human population growth and development continue throughout the ocelot's range. Connectivity among ocelot populations or colonization of new habitats is discouraged by the proliferation of highways and increased road mortality among dispersing ocelots. Increased illegal and law enforcement actions along the U.S./Mexico international border could limit ocelot movement across the border, but it is uncertain if and how much this is affecting that movement.

Effects of the Action

Installation and maintenance of towers, roads, and ground sensors may affect (cause the loss and degradation of) ocelot habitat as a result of ground disturbance, vegetation removal, soil compaction, erosion, and possible alteration of hydrological processes. These effects will decrease the amount of cover available to ocelots and their prey. Disturbed ground will be susceptible to colonization by invasive non-native plants such as buffelgrass and Lehmann lovegrass. Nonnative species may outcompete native species and the introduced grasses also carry fire better and burn hotter than the native species, which would degrade ocelot habitat. Given that many towers are located near the border, increased disturbance to ocelots associated with the towers could possibly hinder ocelot movement into the U.S. from Mexico.

You have proposed to implement species-specific measures as described in the Conservation Best Management Practices section, above, to minimize and help offset disturbance to ocelot habitat.

Conclusion

> After reviewing the current status of the ocelot, the environmental baseline for the action area, and the effects of the proposed action, we concur with your determination that the proposed action may affect, but is not likely to adversely affect, the ocelot. No critical habitat has been designated for this species; thus no critical habitat will be affected. We base our conclusion on the following:
>
> Although the ocelot recently has been confirmed nearby in Mexico in relatively contiguous habitat with the action area, the ocelot has not been verified in Arizona since 1964. The proposed action's effects to the species are unlikely to occur and are thus discountable.

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HUACHUCA WATER UMBEL

The Huachuca water umbel is found in mostly small ciénegas and stream segments in five major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, Río Sonora, and Río Magdalena. All sites are 3,500 to 6,500 ft. in elevation. The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of refugia where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

The following areas are designated as critical habitat for Huachuca water umbel: 1.25 mi. of Sonoita Creek, 2.7 mi. of the Santa Cruz River, 3.4 mi. of Scotia Canyon, 3.8 mi of Garden Canyon, and 33.7 mi. of the San Pedro River. There are other smaller reaches of streams on the Coronado National Forest that are included in the critical habitat designation.

Status of the Species in the Action Area

Huachuca water umbel occurs in several streams and cienegas throughout the action area, including Sonoita Creek, Scotia Canyon, Cienega Creek, Garden Canyon, and the San Pedro River (Gori *et al.* 1990, Falk and Warren 1994, Engineering and Environmental Consultants, Inc. 2004).

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. Populations are in most cases isolated, as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

The inclusion of Ajo-area towers in Table 4.1 in your BA is incorrect; Huachuca water umbel does not occur that far west. There are thus six (6) tower sites within areas within which Huachuca water umbel occurs.

Effects of the Action

Your June 2008 BA identifies seven (7) tower sites within watersheds occupied by Huachuca water umbel and/or with critical habitat present: one tower in the Sonoita Creek watershed (TCA-SON-117), one in the San Rafael Valley (TCA-SON-057), two in the Huachuca Mountains (TCA-SON-059 and 060), one in the Sierra Vista area (TCA-SON-213) and one) tower in the Ajo area . Water umbel does not occur in the Ajo area and will not be affected by project features there.

Towers TCA-SON-055, 056, and 117 are more than two mi upstream of Huachuca water umbel habitat. Tower TCA-SON-059, including 225 ft of new road, will be constructed upstream. Tower TCA-SON-057 and approximately 1,250 ft of road repair is situated upstream of critical habitat, and an additional 2,406 ft of road repair is upstream of habitat not designated as critical, but suitable nonetheless. Tower TCN-SON-060 and its access road are upstream of both suitable habitat and critical habitat, though the access road will use an existing bridge.

No project-related activities will occur directly in suitable and critical water umbel habitat. No effects are anticipated from placement, operation, or maintenance of UGS and mobile surveillance systems. The former will not be accessed off existing routes, it will result in a small area of surface disturbance (up to 16 ft^2), and it will not be placed in wetted areas. The mobile surveillance systems will be placed on vehicles that will drive existing routes.

However, towers and associated roads are located upstream of occupied and critical habitat. Downstream effects from sedimentation and contamination, caused by road construction, repair, and increased use may affect suitable and critical habitat.

You have proposed to implement species-specific measures as described in the Conservation Best Management Practices section, above, to minimize the effects of soil disturbance and removal to Huachuca water umbel. These Conservation Best Management Practices are similar in nature to those associated with SWPPP and pertain to implementing construction activities in a manner that reduces or prevents the entry of sediment, chemicals, and other environmental contaminants to aquatic ecosystems. While their effectiveness is difficult to quantify, we anticipate that the implementation of these construction practices will be sufficient to reduce the proposed action's effects to the aquatic environment to insignificant levels.

Conclusion

After reviewing the current status of the Huachuca water umbel, the environmental baseline for the action area, and the effects of the proposed action, we concur with your determination that the proposed action is not likely to adversely affect Huachuca water umbel or its critical habitat for the following reasons:

1. Construction practices to reduce or eliminate the introduction of sediment and other contaminants to aquatic ecosystems will be implemented.

2. No effects are anticipated for Huachuca water umbel or its habitat from UGS or mobile surveillance systems, because of the small area of surface disturbance and placement outside of wetted areas in regard to the former, and operation of the latter on vehicles that will maneuver only on existing routes.

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Appendix B: Tower type, location, landownership, and power source of proposed tower sites

Tower Site	Tower Foundation[1]	Tower Type[2]	Tower Height	County	Latitude	Longitude	Land Use Road	Land Use Tower	Power Type
TCA-CAG-102	SST	CRT	Approximately 120 ft	Pinal	32.65063	-111.39606	None needed	Private	Grid power
TCA-CAG-195	Existing SST, lattice	CRT	Approximately 100 ft	Pinal	33.00243	-111.67427	Gila Indian Reservation	Gila Indian Reservation	Grid power
TCA-NGL-043	RDT	RRVS	up to 120 ft	Santa Cruz	31.44770000	-111.18993300	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-044	RDT	RRVS	up to 120 ft	Santa Cruz	31.42466700	-111.17043300	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-045	RDT	RRVS	up to 120 ft	Santa Cruz	31.38088	-111.14728	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-046	SST	RRVS	Approximately 120 ft	Santa Cruz	31.35448300	-111.05693300	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-047	RDT	RRVS	120 ft	Santa Cruz	31.39167	-111.05380	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-048	RDT	RRVS_CRT	up to 120 ft	Santa Cruz	31.70373	-111.04471	None needed	Private	Generator-Solar Hybrid
TCA-NGL-049	RDT	RRVS	up to 120 ft	Santa Cruz	31.35315	-111.03523	USFS in the CNF, and Private land	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-050	RDT	RRVS	up to 120 ft	Santa Cruz	31.35543300	-110.98745000	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-052	RDT	RRVS	up to 120 ft	Santa Cruz	31.35853300	-110.87435000	Private	Private	Generator-Solar Hybrid
TCA-NGL-054	RDT	RRVS	up to 120 ft	Santa Cruz	31.35229	-110.77514	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-109	RB30	CRT	Approximately 30 ft	Santa Cruz	31.44345	-111.22664	USFS in the CNF	USFS in the CNF	Solar and Wind Turbine

Tower Site	Tower Foundation[1]	Tower Type[2]	Tower Height	County	Latitude	Longitude	Land Use Road	Land Use Tower	Power Type
TCA-NGL-210	SST	CRT	Approximately 100 ft	Santa Cruz	31.67701000	-111.06292000	Private	ADOT	Generator-Solar Hybrid
TCA-NGL-211	SST	CRT	Approximately 100 ft	Santa Cruz	31.67676000	-110.87934000	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-NGL-285	RDT	RRVS	up to 120 ft	Santa Cruz	31.41026975	-110.8248081	Private	Private	Grid power
TCA-SON-055	RDT	RRVS	up to 120 ft	Santa Cruz	31.36641	-110.69358	USFS in the CNF and Private Land	Private	Generator-Solar Hybrid
TCA-SON-056	RDT	RRVS	up to 120 ft	Santa Cruz	31.356372	-110.65205937	None needed	USFS in the CNF	Grid power
TCA-SON-057	RDT	RRVS	up to 120 ft	Santa Cruz	31.35136670	-110.55935000	USFS in the CNF and Private Land	USFS in the CNF	Generator-Solar Hybrid
TCA-SON-058	RDT	RRVS	up to 120 ft	Cochise	31.39866700	-110.43218330	USFS in the CNF and Private Land	Privately leased USFS in the CNF	Generator-Solar Hybrid
TCA-SON-059	RDT	RRVS	up to 120 ft	Cochise	31.37875000	-110.40236670	USFS in the CNF	Privately leased USFS in the CNF	Generator-Solar Hybrid
TCA-SON-060	RDT	RRVS	up to 120 ft	Cochise	31.37336670	-110.35436670	USFS in the CNF	USFS on the CNM	Generator-Solar Hybrid
TCA-SON-061	RDT	RRVS	up to 120 ft	Cochise	31.35915	-110.30267	USFS on the CNM	USFS in the CNF	Generator-Solar Hybrid
TCA-SON-062	SST	RRVS_CRT	up to 120 ft	Cochise	31.35016075	-110.2855048	None needed	CNM Park Service; paved overlood	Generator-Solar Hybrid
TCA-SON-213	SST	CRT	200 ft, 6 inches	Cochise	31.65569000	-110.34602000	Private	Private	Grid power

Tower Site	Tower Foundation[1]	Tower Type[2]	Tower Height	County	Latitude	Longitude	Land Use Road	Land Use Tower	Power Type
TCA-TUS-032	RDT or a SST	RRVS_CRT	up to 180 ft	Pima	31.64642	-111.50053	BANWR	Pima County	Grid power
TCA-TUS-035	RDT	RRVS	up to 120 ft	Pima	31.66460	-111.41228	BANWR	BANWR	Generator-Solar Hybrid
TCA-TUS-036	RDT	RRVS	up to 120 ft	Pima	31.48462	-111.37740	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-038	RDT	RRVS	up to 120 ft	Pima	31.54951	-111.33651	Stae, Private and USFS land	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-040	RDT	RRVS	up to 120 ft	Santa Cruz	31.41554	-111.29500	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-041	RDT	RRVS	up to 120 ft	Pima	31.52528	-111.28925	ASLD near the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-042	RDT	RRVS	up to 120 ft	Santa Cruz	31.45641	-111.28498	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-085	RDT	RRVS_CRT	up to 120 ft	Pima	31.56598000	-111.55484000	BANWR	BANWR	Generator-Solar Hybrid
TCA-TUS-181	RDT	CRT	up to 120 ft	Pima	31.46066	-111.41348	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-185	RDT	CRT	up to 120 ft	Pima	31.49454	-111.38851	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid
TCA-TUS-187	RDT	CRT	up to 120 ft	Pima	31.63226	-111.43529	BANWR	BANWR	Generator-Solar Hybrid
TCA-TUS-287	RDT	RRVS_CRT	up to 120 ft	Pima	31.49453	-111.55465	None needed	BANWR	Grid power
TCA-TUS-290	RDT	RRVS_CRT	up to 120 ft	Pima	31.59331	-111.34944	ASLD and Private Land	Private	Grid power
TCA-TUS-291	RDT	CRT	up to 120 ft	Pima	31.48442	-111.54356	CBP	CBP	Grid power
TCA-TUS-298	RDT	RRVS_CRT	up to 120 ft	Pima	31.45838	-111.43371	USFS in the CNF	USFS in the CNF	Generator-Solar Hybrid

Tower Site	Tower Foundation[1]	Tower Type[2]	Tower Height	County	Latitude	Longitude	Land Use Road	Land Use Tower	Power Type
TCA-TUS-299	RDT	RRVS_CRT	up to 120 ft	Pima	31.48200	-111.47014	None needed	BANWR	Generator-Solar Hybrid
TCA-TUS-300	SST	CRT	Approximately 120 ft	Pima	31.64645	-111.50032	BANWR	Pima County, existing tower	Generator-Solar Hybrid
TCA-TUS-306	SST	CRT	Approximately 180 ft	Pima	31.64752	-111.49909	BANWR	BANWR	Generator-Solar Hybrid
TCA-TUS-307	RDT	RRVS	Up to 120 ft	Pima	31.64751	-111.49973	BANWR	BANWR	Generator-Solar Hybrid

[1] RDT=Rapidly Deployed Towers, SST=Self Standing Towers, RB=Ravens Butte

[2] RRVS_CRT=Combination Radar and Remote Video System and Communications Relay Tower, CRT=Communications Relay Tower, RRVS=Radar and Remote Video System

Appendix C: Road condition and estimated length and area of road to be repaired or constructed at proposed tower sites.

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
TCA-CAG-102	Y	Y	N	0	0	Az. Upland Sonoran Desertscrub	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-CAG-195	N	Y	N	0	3570	Az. Upland Sonoran Desertscrub	0.0000	0.00	1.311	3.278	1.31	3.28
TCA-NGL-043	N	Y	N	439	0	Madrean Evergreen Woodland	0.5644	0.40	0.000	0.000	0.56	0.40
TCA-NGL-044	N	Y	N	274	0	Madrean Evergreen Woodland	0.3522	0.25	0.000	0.000	0.35	0.25
TCA-NGL-045	N	Y	Y	409	0	Madrean Evergreen Woodland	0.5258	0.38	0.000	0.000	0.53	0.38
TCA-NGL-046	N	Y	N	14	1486	Madrean Evergreen Woodland	0.0180	0.01	0.546	1.365	0.56	1.38
TCA-NGL-047	N	Y	Y	0	3803	Madrean Evergreen Woodland	0.0000	0.00	1.397	3.492	1.40	3.49
TCA-NGL-048	Y	Y	N	0	0	Semidesert Grassland	0.0000	0.00	0.000	0.000	0.00	0.00

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
TCA-NGL-049	N	Y	Y	88	3035	Madrean Evergreen Woodland	0.1131	0.08	1.115	2.787	1.23	2.87
TCA-NGL-050	N	Y	N	37	1476	Madrean Evergreen Woodland	0.0476	0.03	0.542	1.355	0.59	1.39
TCA-NGL-052	N	Y	N	68	0	Semidesert Grassland	0.0874	0.06	0.000	0.000	0.09	0.06
TCA-NGL-054	N	Y	Y	185	8285	Semidesert Grassland	0.2378	0.17	3.043	7.608	3.28	7.78
TCA-NGL-109	N/A	AIR	LIFT	0	0	Madrean Evergreen Woodland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-NGL-210	Y	Y	N	78	0	Semidesert Grassland	0.1003	0.07	0.000	0.000	0.10	0.07
TCA-NGL-211	N/A	N/A	N/A	132	0	Madrean Evergreen Woodland	0.1697	0.12	0.000	0.000	0.17	0.12
TCA-NGL-285	N	Y	Y	22	0	Semidesert Grassland	0.0283	0.02	0.000	0.000	0.03	0.02
TCA-SON-055	N	Y	Y	286	4014	Madrean Evergreen Woodland	0.3677	0.26	1.474	3.686	1.84	3.95

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
TCA-SON-056	N	Y	N	0	0	Madrean Evergreen Woodland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-SON-057	N	Y	N	0	3656	Plains & Great Basin Grassland	0.0000	0.00	1.343	3.357	1.34	3.36
TCA-SON-058	N	Y	N	106	0	Plains & Great Basin Grassland	0.1363	0.10	0.000	0.000	0.14	0.10
TCA-SON-059	N	Y	N	225	0	Plains & Great Basin Grassland	0.2893	0.21	0.000	0.000	0.29	0.21
TCA-SON-060	N	Y	N	0	200	Madrean Evergreen Woodland	0.0000	0.00	0.073	0.184	0.07	0.18
TCA-SON-061	N	Y	N	95	0	Madrean Evergreen Woodland	0.1221	0.09	0.000	0.000	0.12	0.09
TCA-SON-062	N/A	N/A	N/A	0	0	Madrean Evergreen Woodland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-SON-213	N/A	N/A	N/A	491	0	Chihuahuan Desertscrub	0.6312	0.45	0.000	0.000	0.63	0.45
TCA-TUS-032	Y	Y	N	0	50	Semidesert Grassland	0.0000	0.00	0.018	0.046	0.02	0.05

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
TCA-TUS-035	N	Y	N	42		Semidesert Grassland	0.0540	0.04	0.000	0.000	0.05	0.04
TCA-TUS-036	Y	Y	N	0	55	Madrean Evergreen Woodland	0.0000	0.00	0.020	0.051	0.02	0.05
TCA-TUS-038	Y	Y	N	25	0	Madrean Evergreen Woodland	0.0321	0.02	0.000	0.000	0.03	0.02
TCA-TUS-040	N	Y	Y	1138	13995	Semidesert Grassland	1.4630	1.04	5.140	12.851	6.60	13.90
TCA-TUS-041	Y	Y	N	0	178	Madrean Evergreen Woodland	0.0000	0.00	0.065	0.163	0.07	0.16
TCA-TUS-042	N	Y	Y	3	6155	Madrean Evergreen Woodland	0.0039	0.00	2.261	5.652	2.26	5.65
TCA-TUS-085	Y	Y	N	33	825	Semidesert Grassland	0.0424	0.03	0.303	0.758	0.35	0.79
TCA-TUS-181	N	Y	Y	48	9684	Semidesert Grassland	0.0617	0.04	3.557	8.893	3.62	8.94
TCA-TUS-185	N	Y	N	49	4519	Madrean Evergreen Woodland	0.0630	0.04	1.660	4.150	1.72	4.19

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
TCA-TUS-187	Y	Y	N	86	0	Semidesert Grassland	0.1106	0.08	0.000	0.000	0.11	0.08
TCA-TUS-287	Y	Y	N	0	98	Semidesert Grassland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-TUS-290	Y	Y	N	58	50	Semidesert Grassland	0.0746	0.05	0.018	0.046	0.09	0.10
TCA-TUS-291	Y	Y	N	60	0	Semidesert Grassland	0.0771	0.06	0.000	0.000	0.08	0.06
TCA-TUS-298	N	Y	N	1276	0	Semidesert Grassland	1.6404	1.17	0.000	0.000	1.64	1.17
TCA-TUS-299	Y	Y	N	0	0	Semidesert Grassland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-TUS-300	N/A	N/A	N/A	0	0	Semidesert Grassland	0.0000	0.00	0.000	0.000	0.00	0.00
TCA-TUS-306	N/A	N/A	N/A	250	0	Semidesert Grassland	0.3214	0.23	0.000	0.000	0.32	0.23
TCA-TUS-307	N/A	N/A	N/A	512	0	Semidesert Grassland	0.6582	0.47	0.000	0.000	0.66	0.47

Tower Site	Road Accessible by		Major Road Repair Needed?	Length (feet)		Vegetation Type	New Road Disturbance (acres)		Repaired Road Disturbance (acres)		Total Road Disturbance (acres)	
	2 wheel drive?	4 wheel drive?		New Road	Road Repair		Permanent	Temporary	Permanent	Temporary	Permanent	Temporary
Total				**6529**	**65134**		**8.40**	**5.99**	**23.89**	**0.000**	**32.29**	**65.71**

Appendix D: Estimated ground disturbance expected at proposed tower sites

Tower Site	Veg Type of Tower and Road	Tower Disturbance (acres)		Total Tower and Road Disturbance (acres)		Total (Permanent and Temporary) Tower and Road Disturbance - (acres)
		Permanent	Temporary	Permanent	Temporary	
TCA-CAG-102	Az. Upland Sonoran Desertscrub	0.15	0.17	0.15	0.17	0.32
TCA-CAG-195	Az. Upland Sonoran Desertscrub	0.15	0.08	1.46	3.36	4.82
TCA-NGL-043	Madrean Evergreen Woodland	0.06	0.17	0.62	0.58	1.20
TCA-NGL-044	Madrean Evergreen Woodland	0.06	0.17	0.41	0.42	0.83
TCA-NGL-045	Madrean Evergreen Woodland	0.06	0.17	0.58	0.55	1.13
TCA-NGL-046	Madrean Evergreen Woodland	0.15	0.08	0.71	1.46	2.17
TCA-NGL-047	Madrean Evergreen Woodland	0.06	0.17	1.45	3.66	5.12
TCA-NGL-048	Semidesert Grassland	0.06	0.17	0.06	0.17	0.23
TCA-NGL-049	Madrean Evergreen Woodland	0.06	0.17	1.29	3.04	4.33
TCA-NGL-050	Madrean Evergreen Woodland	0.06	0.17	0.65	1.56	2.21
TCA-NGL-052	Semidesert Grassland	0.06	0.17	0.14	0.23	0.38
TCA-NGL-054	Semidesert Grassland	0.06	0.17	3.34	7.95	11.29
TCA-NGL-109	Madrean Evergreen Woodland	0.01	0.00	0.01	0.00	0.01
TCA-NGL-210	Semidesert Grassland	0.06	0.17	0.16	0.24	0.40

Tower Site	Veg Type of Tower and Road	Tower Disturbance (acres)		Total Tower and Road Disturbance (acres)		Total (Permanent and Temporary) Tower and Road Disturbance - (acres)
		Permanent	Temporary	Permanent	Temporary	
TCA-NGL-211	Madrean Evergreen Woodland	0.15	0.08	0.32	0.20	0.52
TCA-NGL-285	Semidesert Grassland	0.06	0.17	0.09	0.19	0.28
TCA-SON-055	Madrean Evergreen Woodland	0.06	0.17	1.90	4.12	6.02
TCA-SON-056	Madrean Evergreen Woodland	0.06	0.17	0.06	0.17	0.23
TCA-SON-057	Plains & Great Basin Grassland	0.06	0.17	1.40	3.53	4.93
TCA-SON-058	Plains & Great Basin Grassland	0.06	0.17	0.19	0.27	0.46
TCA-SON-059	Plains & Great Basin Grassland	0.06	0.17	0.35	0.38	0.73
TCA-SON-060	Madrean Evergreen Woodland	0.06	0.17	0.13	0.36	0.49
TCA-SON-061	Madrean Evergreen Woodland	0.06	0.17	0.18	0.26	0.44
TCA-SON-062	Madrean Evergreen Woodland	0.15	0.08	0.15	0.08	0.23
TCA-SON-213	Chihuahuan Desertscrub	0.06	0.17	0.69	0.62	1.31
TCA-TUS-032	Semidesert Grassland	0.06	0.17	0.08	0.22	0.29
TCA-TUS-035	Semidesert Grassland	0.15	0.08	0.20	0.12	0.32
TCA-TUS-036	Madrean Evergreen Woodland	0.06	0.17	0.08	0.22	0.30
TCA-TUS-038	Madrean Evergreen Woodland	0.06	0.17	0.09	0.20	0.28

Tower Site	Veg Type of Tower and Road	Tower Disturbance (acres)		Total Tower and Road Disturbance (acres)		Total (Permanent and Temporary) Tower and Road Disturbance - (acres)
		Permanent	Temporary	Permanent	Temporary	
TCA-TUS-040	Semidesert Grassland	0.06	0.17	6.66	14.07	20.73
TCA-TUS-041	Madrean Evergreen Woodland	0.06	0.17	0.12	0.34	0.46
TCA-TUS-042	Madrean Evergreen Woodland	0.06	0.17	2.32	5.83	8.15
TCA-TUS-085	Semidesert Grassland	0.06	0.17	0.40	0.96	1.36
TCA-TUS-181	Semidesert Grassland	0.06	0.17	3.68	9.11	12.78
TCA-TUS-185	Madrean Evergreen Woodland	0.06	0.17	1.78	4.37	6.15
TCA-TUS-187	Semidesert Grassland	0.06	0.17	0.17	0.25	0.42
TCA-TUS-287	Semidesert Grassland	0.06	0.17	0.06	0.17	0.23
TCA-TUS-290	Semidesert Grassland	0.06	0.17	0.15	0.27	0.42
TCA-TUS-291	Semidesert Grassland	0.06	0.17	0.13	0.23	0.36
TCA-TUS-298	Semidesert Grassland	0.06	0.17	1.70	1.34	3.04
TCA-TUS-299	Semidesert Grassland	0.06	0.17	0.06	0.17	0.23
TCA-TUS-300	Semidesert Grassland	0.15	0.08	0.15	0.08	0.23
TCA-TUS-306	Semidesert Grassland	0.15	0.08	0.47	0.31	0.78
TCA-TUS-307	Semidesert Grassland	0.15	0.08	0.81	0.55	1.36
Total		**3.28**	**6.69**	**35.57**	**72.40**	**107.97**

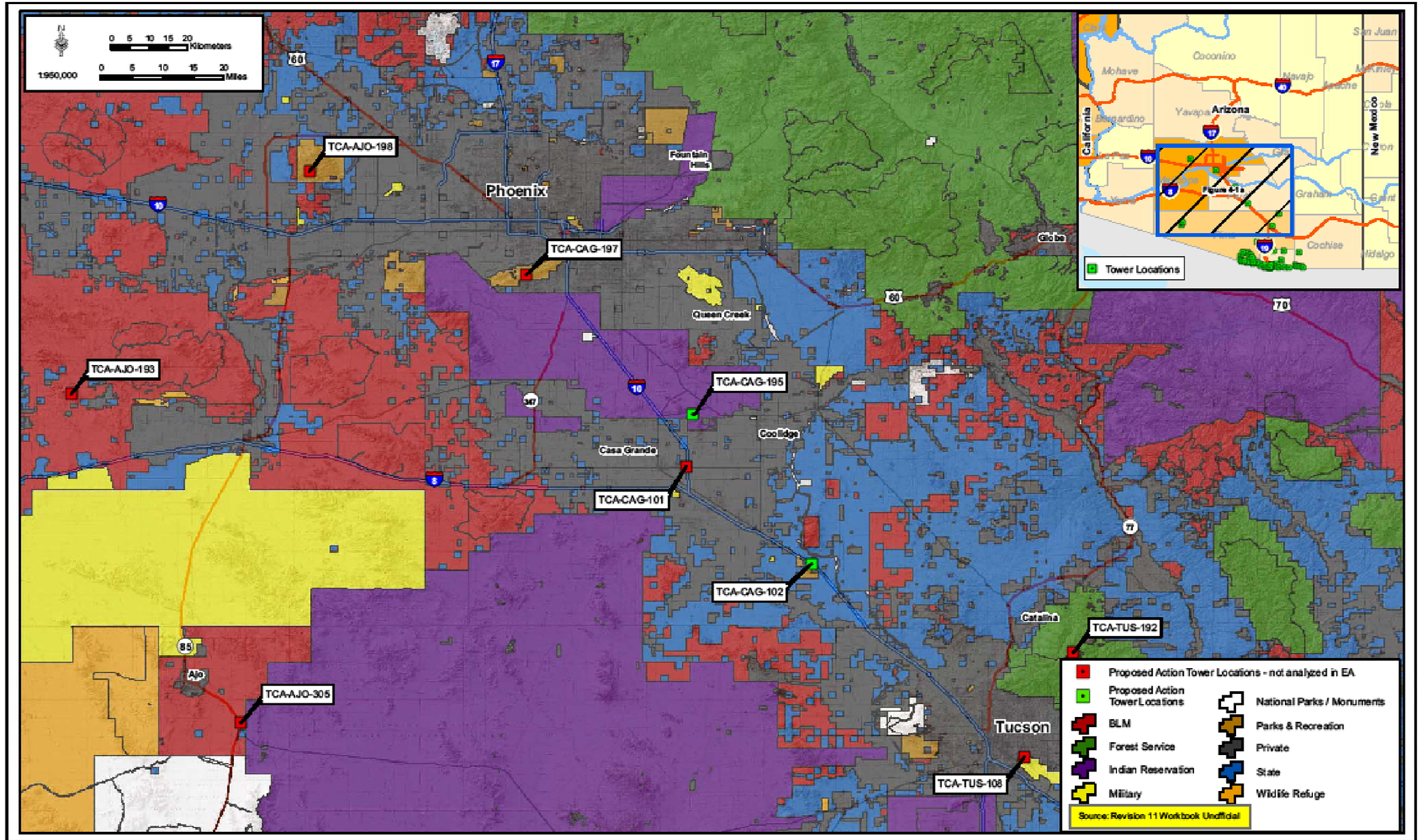

Figure 1. SBInet Tucson West Project Overview

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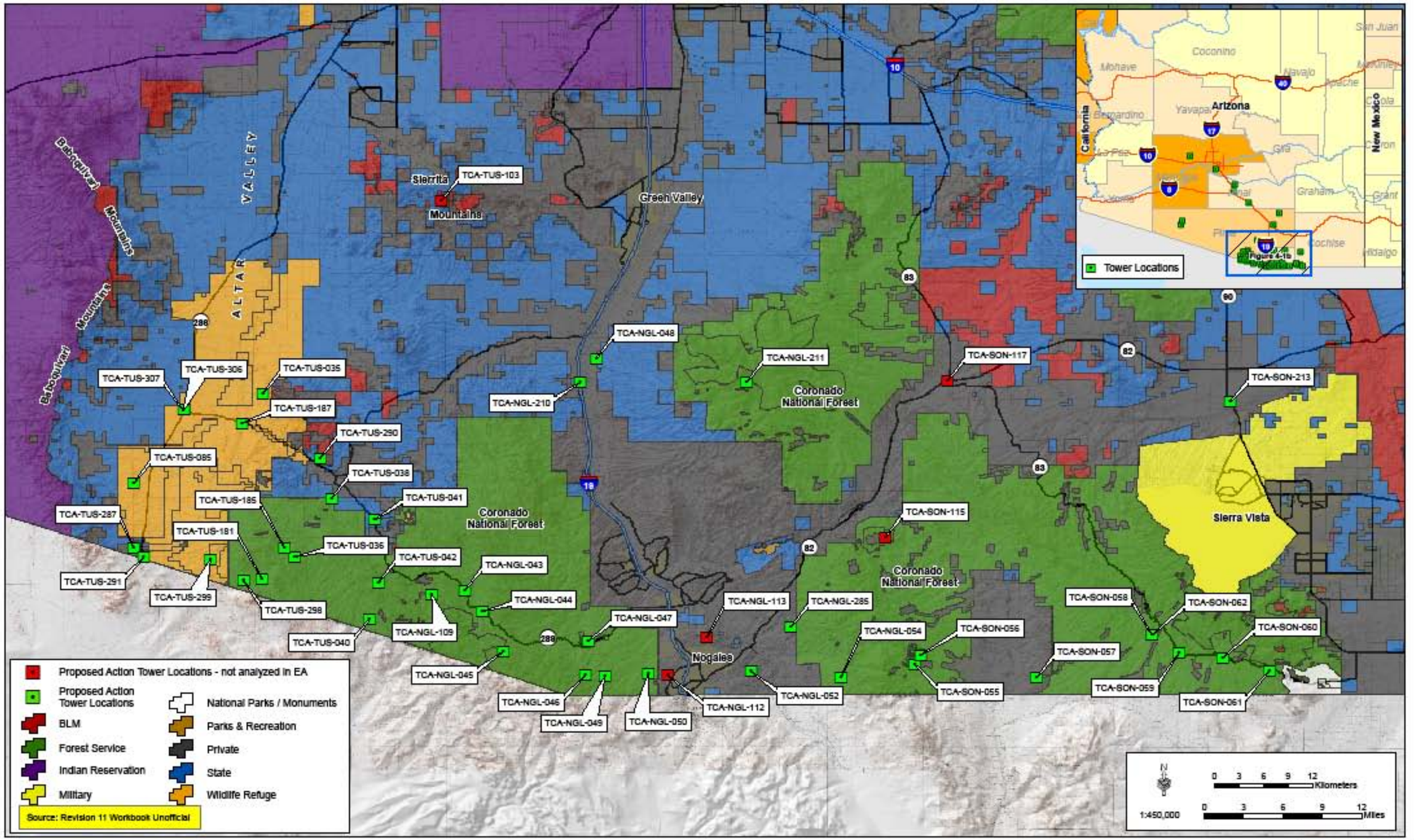

Figure 1, continued. SBInet Tucson West Project Overview

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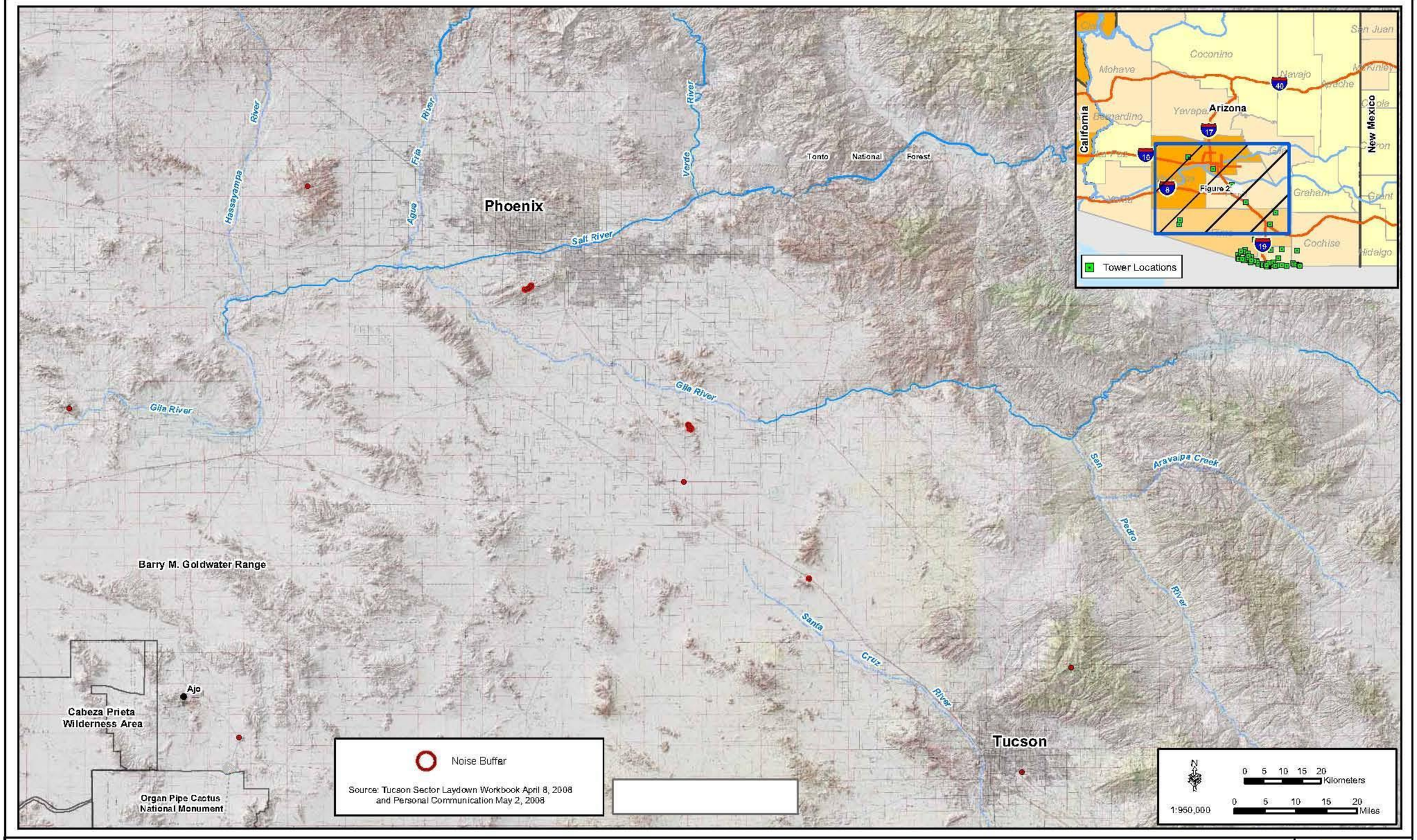

Figure 2. SBInet Tucson West Project Noise Buffers

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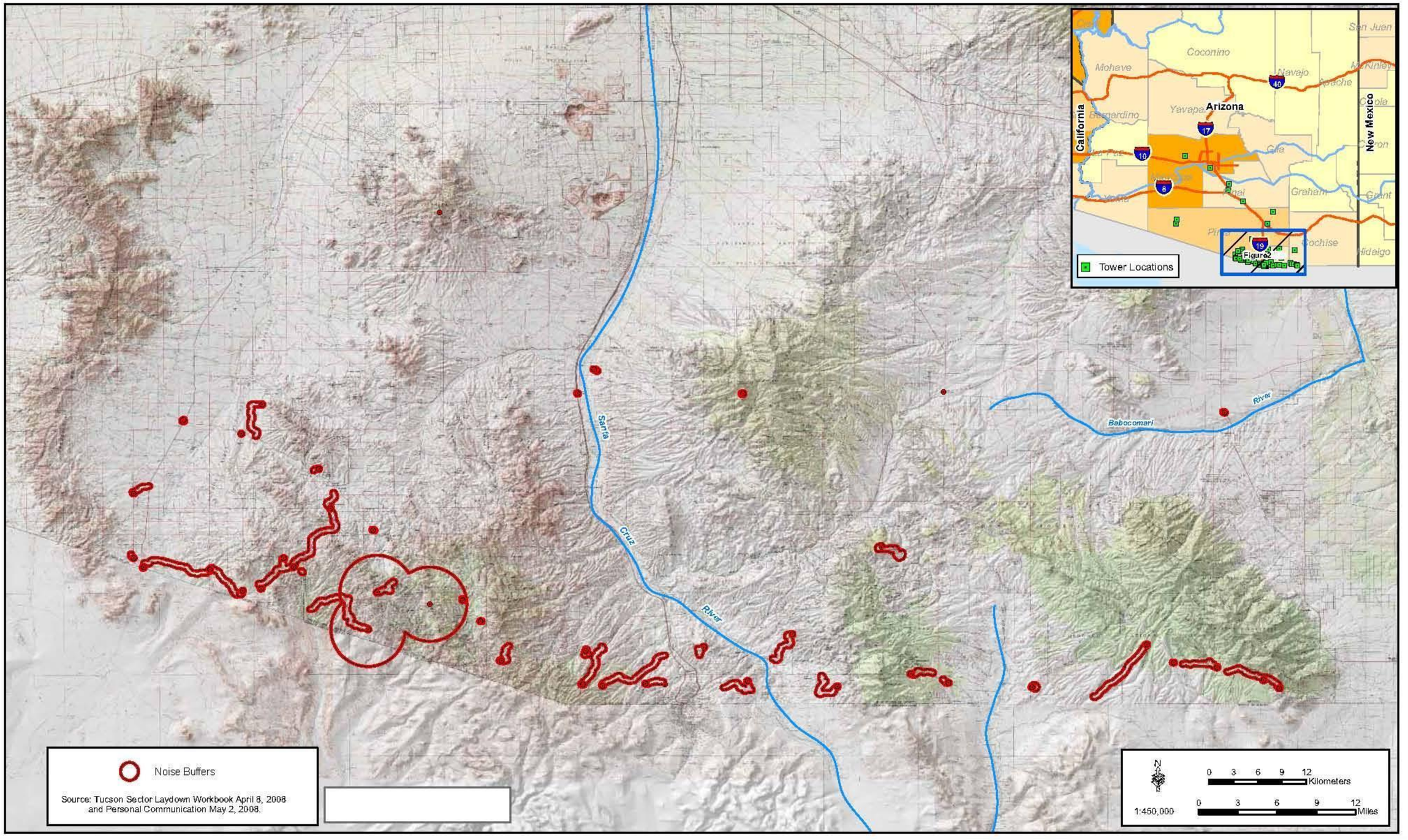

Figure 2, continued. SBInet Tucson West Project Noise Buffers

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