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AESO/SE
02-21-95-F-0114R4 August 6, 2003

Mr. Ronald Pearce
Director of Range Management
Marine Corps Air Station
P.O. Box 99100
Yuma, Arizona 85369-9100

Dear Mr. Pearce:

This document constitutes the U.S. Fish and Wildlife Service's (Service) revised biological opinion based on our review of the proposed and ongoing activities by the Marine Corps Air Station-Yuma (MCAS-Yuma) in the Arizona portion of the Yuma Training Range Complex (YTRC) on the Barry M. Goldwater Range (BMGR), Yuma and Maricopa counties, and its effects on the endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) and endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (ESA). This revised biological opinion is provided in response to a Memorandum Opinion and Order dated January 7, 2003, from Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia in the case of *Defenders of Wildlife, et al., v. Bruce Babbitt, et al.* (Civil Action No. 99-927 [ESH]).

Your June 2003 biological assessment finds that the proposed action will not affect Peirson's milkvetch (*Astragalus magdalenae peirsonii*) or the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). In the last revision of this opinion (November 16, 2001) we addressed Peirson's milkvetch in formal consultation, and we also concurred with your determination that the proposed action may affect, but was unlikely to adversely affect, the pygmy-owl. Since that revision, the specimen of Peirson's milkvetch collected from the western portion of the BMGR has been reindentified as *Astragalus lentiginosus borreganus* (Richard Felger, pers. comm. 2003); thus Peirson's milkvetch has not been found in Arizona to date. However, please note that based on field work on the BMGR, we believe this species is likely to be found in the Yuma Dunes on the BMGR. The pygmy-owl also has never been found on the BMGR, although it has

occurred in recent years nearby. If Peirson's milkvetch or a pygmy-owl is subsequently located on the BMGR in areas where MCAS-Yuma activities occur, reinitiation of consultation may be warranted (50 CFR 402.16[b]).

Your original request included conferencing on the flat-tailed horned lizard (*Phrynosoma mcallii*), which was proposed for threatened status at the time. The proposal to list the lizard was withdrawn in January 2003; thus conferencing is no longer needed. Note however, that the original April 1996 biological and conference, which included a formal conference on the lizard, is still the guiding document for MCAS-Yuma activities in the conservation agreement and strategy for this species (Flat-tailed Horned Lizard Interagency Coordination Committee 2003).

This biological opinion is based on a revised biological assessment for the project (MCAS-Yuma 2003), information provided during the previous consultation on this action, updated information on the proposed action provided by your agency, new information on the status of the pronghorn and lesser long-nosed bat, telephone conversations, field investigations, and other sources of information as detailed herein. A complete administrative record of this consultation is on file in the Phoenix, Arizona, Ecological Services Field Office. We request you provide comments on this draft document to our office by July 28, 2003. We encourage you to coordinate the review of this document with the Arizona Game and Fish Department.

## CONSULTATION HISTORY

Only key actions in the consultation history are included here for the period prior to issuance of the last revision of this opinion (November 16, 2001). Please refer to the November 16, 2001, and April 17, 1996, opinions for a complete history of the consultation prior to November 16, 2001.

☛ April 17, 1996. We issued a biological and conference opinion on the MCAS-Yuma Arizona portion of the YTRC. The opinion found that the effects of the action were not likely to jeopardize the continued existence of the pronghorn or flat-tailed horned lizard. The Service also concurred with MCAS's determinations that the action may affect, but was not likely to adversely affect, the lesser long-nosed bat and cactus ferruginous pygmy-owl.

☛ January 1997. A final Environmental Impact Statement (EIS) for YTRC was made available to the public.

☛ September 24, 1998. A Record of Decision was signed for the YTRC EIS.

☛ March 18, 1998. The Service responded to a letter from MCAS-Yuma, dated March 13, 1998, asking that the proposed action in the April 17, 1996, biological opinion be revised to clarify use of Stoval Field for use in training operations in support of Weapons Tactics Instructor (WTI) courses. Our response, which was the first reinitiation of the April 17, 1996, opinion,

revised the proposed action as requested, and determined that the revision did not change the conclusions in the biological and conference opinion and did not precipitate a need to modify reasonable and prudent measures or terms and conditions.

☛October 5, 1999. Congress passed the Military Lands Withdrawal Act (MLWA) of 1999. The MLWA transferred land management jurisdiction from the Secretary of the Interior, who acted locally through the Bureau of Land Management (BLM), to the Secretaries of the Air Force And Navy, who act locally through the Air Force and Marine Corps. The Marine Corps serves as the manager for the western portion of the BMGR (lands under airspace R-2301W, or BMGR-West) and the U.S. Air Force serves as the manager for the eastern portion of the BMGR (BMGR-East). The lands are withdrawn from the public domain for Department of Defense (DoD) purposes until 2024. Before 1999, the Air Force was the military manager for the entire BMGR. BLM jurisdiction for managing BMGR lands ended on November 6, 2001, initiating resource management by DoD pursuant to the Sikes Act. The MLWA also terminated DoD withdrawal of lands at Cabeza Prieta National Wildlife Refuge (NWR). However, the MLWA stipulated that:

> The Secretary of the Interior, in coordination with the Secretary of the Navy and the Secretary of the Air Force, shall manage the Cabeza Prieta NWR and Cabeza Prieta Wilderness--
>
> (A) for the purposes for which the refuge and wilderness were established; and
> (B) to support current and future military aviation training needs consistent with the November 21, 1994, memorandum of understanding among the Department of the Interior, the Department of the Navy, and the Department of the Air Force, including any extension or other amendment of such memorandum of understanding under this section. [Public Law (P.L.) 106-65 § 3032 (b)(1)]

The MLWA further provided that:

> When determined by the Secretary of the Navy or the Secretary of the Air Force to be essential to support military aviation training, the Secretary of the Navy, the Secretary of the Air Force, and the Secretary of the Interior shall negotiate amendments to the memorandum of understanding referred to in subsection (b)(1)(B) in order--
>
> (i) to revise existing or establish new low-level training routes or to otherwise accommodate low-level overflight;
> (ii) to establish new or enlarged areas closed to public use as surface safety zones; or
> (iii) to accommodate the maintenance, upgrade, replacement, or installation of existing or new associated ground instrumentation. [P.L. 106-65 § 3032 (d)(1)(A)]

☛February 12, 2001. In Defenders of Wildlife, *et al.* v. Bruce Babbitt, *et al.,* the court "ordered that this matter is remanded to Fish and Wildlife Service, which was given 120 days from the date of the Order to reconsider, in consultation with defendants, those portions of the Biological Opinions that have been found to be contrary to the dictates of the Endangered Species Act." The order remanded five biological opinions, including this one, Organ Pipe Cactus National Monument's (NM) General Management Plan, grazing on 5 BLM livestock allotments near Ajo, the Arizona Amy National Guard's Western Army National Guard Aviation Training Site

(WAATS) expansion project, and military training on the BMGR authorized by Luke Air Force Base. The Judge's order also remanded those portions of the YTRC EIS and Organ Pipe Cactus National Monument's (NM) General Management Plan (FEIS) that addressed cumulative impacts on Sonoran pronghorn, and in regard to the Sonoran pronghorn recovery plan, required the Service to develop objective, measurable recovery criteria and schedules for implementing recovery actions.

☛September 2001. The supplemental EIS for the YTRC (MCAS-Yuma 2001) addressing cumulative impacts to Sonoran pronghorn was finalized, as directed by the February 12, 2001, court order.

☛November 16, 2001. Revised biological opinions were signed by the Service's Regional Director, Region 2, Albuquerque, New Mexico, for MCAS-Yuma's Arizona portion of the YTRC and the other four opinions that were remanded. The YTRC opinion concluded that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn or Peirson's milkvetch. An incidental take statement with terms and conditions for the Sonoran pronghorn was included. Appended to the opinion was a concurrence with your determination that the proposed action may affect, but was unlikely to adversely affect, the pygmy-owl. We did not concur with your determination that the action may affect, but is not likely to adversely affect, the lesser long-nosed bat.

☛November 23, 2001. A Record of Decision for the YRTC's supplemental EIS was published in the Federal Register.

☛April 11, 2002. A Record of Decision for Organ Pipe Cactus NM's supplemental EIS, re-analyzing cumulative impacts to the Sonoran pronghorn, as directed by court order, was published in the Federal Register.

☛September 30, 2002. A revised biological opinion was signed for BLM's proposed livestock grazing on 5 allotments near Ajo.

☛November 27, 2002. A Federal Register notice was published in which critical habitat was proposed for the pygmy-owl. Included was critical habitat proposed at Organ Pipe Cactus NM, on BLM lands north of Organ Pipe Cactus NM, and lands on Cabeza Prieta NWR. No lands within the BMGR were proposed for critical habitat.

☛December 17, 2002. We completed the third reinitiation of MCAS-Yuma YTRC opinion. In that reinitiation, we addressed possible effects of contaminants at the munitions training range on the flat-tailed horned lizard. We concluded that the proposed action is not likely to jeopardize the continued existence of the flat-tailed tailed horned lizard. Other conclusions in the opinion remained unchanged.

☛January 3, 2003. A Federal Register notice was published withdrawing the proposed rule to list the flat-tailed horned lizard as a threatened species.

☛January 7, 2003. Judge Ellen Huvelle remanded back to us the November 16, 2001, biological opinion for Organ Pipe Cactus NM's General Management Plan. Judge Huvelle gave us 90 days to produce a biological opinion that was consistent with her previous order of February 12, 2001.

☛February 6, 2003. Judge Ellen Huvelle entered a stipulation among the parties to have us revise the MCAS-Yuma YTRC, Luke Air Force Base, and WAATS November 16, 2001, biological opinions consistent with her January 7, 2003, order within 180 days.

☛April 7, 2003. In compliance with Judge Huvelle's January 7, 2003, order, a revised biological opinion was signed and delivered to Organ Pipe Cactus NM covering their General Management Plan. The opinion found that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn and the pygmy-owl, and was not likely to result in destruction or adverse modification of critical habitat proposed for the pygmy-owl. The opinion refers the reader to previous opinions for conclusions on the lesser long-nosed bat (which found that the proposed action was not likely to jeopardize the continued existence of the bat). No incidental take of listed animals was anticipated.

☛May 5, 2003. MCAS-Yuma provided a draft biological assessment to this office for review.

☛May 19, 2003. We sent comments on the May 5, 2003, draft biological assessment, via electronic mail, to Ron Pearce, MCAS-Yuma.

☛June 4, 2003. MCAS-Yuma provided another revision of the draft biological assessment to this office for our use.

☛July 14, 2003. We sent a draft biological opinion on MCAS-Yuma's Arizona portion of the YTRC via electronic mail and the U.S. Post Office to Ron Pearce, MCAS-Yuma.

☛July 25, 2003. Ron Pearce, MCAS-Yuma, sent to this office via electronic mail comments on the draft biological opinion.

## BIOLOGICAL OPINION

### DESCRIPTION OF PROPOSED ACTION

The following description of the proposed action is based primarily on MCAS-Yuma (2003 and 2001). Further details of the proposed action can be found in those documents. Figures referred to herein can be found at the end of this document or in the cited documents.

MCAS-Yuma is the responsible local land management authority, local command for military ground and airspace operations, and primary user of BMGR-West and the R-2301W restricted airspace. R-2301W overlies BMGR-West and the western portion of the Cabeza Prieta NWR.

Most of the ground-based Marine Corps activities addressed in this opinion are conducted within BMGR-West under the R-2301W airspace. A small number of Marine Corps ground-based activities addressed herein occur in BMGR-East, which is managed by Luke Air Force Base. Most Marine Corps training flights at the BMGR are conducted within R-2301W. A small number of Marine Corps training flights also use the R-2301E, R-2304, and R-2305 restricted airspaces that overlie BMGR-East. Luke Air Force Base is the responsible local land management authority, local command for military ground and airspace operations manager, and primary military user of BMGR- East and the overlying R-2301E, R-2304, and R-2305 restricted airspaces. High altitude (7,500 to 20,000 feet) flights also occur over airspace in northwestern Yuma County and southern La Paz County (Figure 1-2 of MCAS-Yuma 1995). This biological opinion addresses activities funded, authorized, or carried out by MCAS-Yuma in support of the YTRC in Arizona. Note that the MLWA directed DoD to prepare and implement an Integrated Natural Resources Management Plan for the BMGR in accordance with the Sikes Act. This INRMP is scheduled for completion this year and will be the subject of future section 7 consultation. The term of the proposed action addressed herein does not have an end point. MCAS-Yuma will reinitiate consultation as needed pursuant to 50 CFR 402.16.

The primary objective of YTRC management is to maintain and advance the training conditions of the complex so that it continues to offer Marine Corps and other service commanders the diversity and flexibility necessary to employ and exercise their units in all phases of tactical aviation to the fullest extent and under conditions that realistically simulate combat. The current primary mission of BMGR-West is to support readiness training of Marine Corps and Navy aircrews from units that are manned, qualified, and equipped to perform war-fighting operations. Although most of this training involves air operations alone, ground troops or technical personnel are periodically deployed within the range surface area to participate in integrated air-ground training exercises or provide technical support to aviation training operations. The purposes of the proposed action that is the subject of this consultation are to: 1) continue ongoing Marine Corps training activities within BMGR-West, associated BMGR-East airspace and ground areas, and airspace overlying the Cabeza Prieta NWR; and 2) maintain the air and ground facilities that are necessary to support these activities. Some of these training activities include evolutions that make use of air-to-ground weapons ranges within BMGR-East and designated low-level flight routes that overlie portions of BMGR-West, BMGR-East, and the Cabeza Prieta NWR.

Marine Corps activities at the BMGR provide training in six categories, including: 1) anti-air warfare, 2) offensive air support, 3) assault support, 4) aerial reconnaissance, 5) electronic warfare, and 6) control of aircraft and missiles. Both developed facilities and undeveloped ground unit support areas have been established in dispersed BMGR-West locations to support air, air-ground, and ground operations. In order to support and optimize ongoing training, BMGR-West has been partitioned into four subranges, including 1) Auxiliary Airfield 2 (AUX-2) flight operations area, 2) Moving Sands target complex, 3) Cactus West target complexes, and 4) Yuma Tactical Aircrew Combat Training System (TACTS) Range. Each

subrange consists of specific ground-based facilities and a designated portion of the R-2301W airspace and BMGR-West land area. As shown in Figure 1, ground-based facilities that have been established within BMGR-West to support ongoing training activities include:

A developed complex (Cannon Air Defense Complex), of approximately one square kilometer, that provides administrative, support, and training areas for the daily activities of a Marine Air Control Squadron. Located at the northwestern corner of the BMGR, just off County 14th, this complex is the headquarters, training, and maintenance site for the 1st Light Anti-aircraft Missile Battalion stationed at MCAS-Yuma.

1. AUX-2, a small outlying auxiliary airfield, supports training in forward airfield operations and related functions. AUX-2 consists of two 4,400-foot long asphalt runways and an asphalt access road that form an equilateral triangle. The center portion of the east-west runway has been developed with steel runway matting to resemble the deck and landing control tower of a U.S. Navy Landing Helicopter Assault ship. The northeast-southwest runway, known as the tactical landing zone, is used to train C-130 transport aircrews in landings and take-offs from unimproved surfaces. Helicopter crews use AUX-2 and the surrounding area for flight training at night with night-vision goggles. AUX-2 is also used by these aircrews and occasionally by AV-8B aircrews as a forward arming and refueling point. As part of the proposals in the YTRC EIS, a narrow-width runway/roadway would be constructed at AUX-2 for AV-8B roadway operations. This proposal is on hold pending funding, but is part of the proposed action under consultation herein. The existing C-130 runway was resurfaced and narrowed from 200 to 90 feet in 1998. The planned narrow-width runway would be constructed parallel to the C-130 runway and within the 200-foot width of the original northeast- to southwest-oriented runway. Located adjacent to AUX-2 is a tow banner drop area for the controlled release of aerial-towed practice gunnery targets.

2. The Moving Sands and Cactus West target complexes (currently the only air-to-ground weapons ranges at which actual ordnance delivery occurs within BMGR-West). These targets support instruction in precision air-to-ground bombing. Both target complexes have bull's-eye type bombing targets with a current impact radius of 1,500 feet. Both include air-to-ground rocket, bomb, and strafing targets. The Moving Sands complex also contains laser targets and a Mobile Land Target. The latter is a remote-controlled movable target. MCAS-Yuma had maintained cleared run-in lines, approximately 11 miles in length, to guide pilots to the targets. Clearing of these run in lines ended after issuance of the April 17, 1996, biological opinion, although Border Patrol now uses them as vehicle routes. Ordnance delivery to the targets is limited to inert ordnance only. Inert bombs of up to 1,000 pounds and inert rockets are authorized, as well as the use of laser target designation. Explosive ordnance disposal (EOD) sweeps, including target area clearing and grading, are conducted as often as quarterly on both target complexes. In accordance with proposals in the YTRC EIS, new target scenarios have been

added to the Moving Sands target. Modifications have yet to be made at the Cactus West target.

3. A 30-lane rifle range and 20 lane pistol range, located near the entrance to the BMGR at County 19th, are used for small arms training.

4. A parachute drop zone, located near AUX-2, is used to receive training parachute cargo drops from C-130 transport aircraft. Cargo pallets are recovered from the drop zone with a tactical forklift designed to operate on rough ground. A proposal in the YTRC EIS included moving the parachute drop cargo recovery area from a relatively undisturbed site southwest of AUX-2 to a previously disturbed site southeast of AUX-2. This proposal has been implemented.

5. An explosive ordnance disposal (EOD) operating area (also known as the Munitions Treatment Range), at which munitions with expired shelf-lives are disposed of, under a Resource Conservation and Recovery Act (RCRA) Part B interim permit, is located approximately 1.5 mile south-southwest of AUX-2. The Munitions Treatment Range is an authorized location for disposal of ordnance. The site is accessed via a road from AUX-2 and consists of an open burn area, a class A and B detonation area, and a white phosphorus detonation area. Approximately 6.5 square miles ($mi^2$) surrounding the operating area are designated as restricted to entry for safety purposes.

6. A live ordnance jettison area at which unarmed live ordnance or other external stores, such as fuel tanks, are jettisoned when required by an in-flight malfunction.

8. Thirty-five ground support areas within BMGR-West were established in 1988 to support a Marine Corps proposal to continue the ongoing semi-annual WTI Course and other periodically scheduled training exercises. Three other ground support areas - Stoval Auxiliary Airfield, an undeveloped support area nearby Stoval (established in 1998), and AUX-11, used for the WTI Course, are located within BMGR-East. Constructed in 1943 during World War II, Stoval and AUX-11 each have three approximately 150- by 3,700-foot runways laid out as equilateral triangles. Ground support areas were established to provide approved off-road locations to which Marine Corps ground units could deploy with vehicles, other equipment, and troops to participate in air and ground or ground only training activities.

   Although no ground-based training activities other than the semi-annual WTI Courses have required the use of these ground support areas in the last four years, the requirement to support periodically scheduled exercises through use of the ground support areas remains. Such exercises would typically involve the same types of ground units as participate in the WTI Courses but on a smaller scale of

deployment. The activities that would be conducted at the ground support areas would be similar to those that occur during the WTI Courses and all of the same rules of conduct that govern the use of the support areas during WTI Courses would be in effect. Units conducting non-WTI Course exercises would be directed to ground support areas outside of the current habitat of the Sonoran pronghorn unless specific training requirements mandated the use of support areas in the Mohawk Valley.

The 35 support areas were established in geographically dispersed and tactically realistic positions to provide ground unit commanders with sufficient flexibility to deploy their forces to meet the tactical challenges of a variety of possible war-fighting training scenarios. Marine Corps ground units that typically participate in training activities at the BMGR include air defense, air control, communications and command, and support units. Stoval and AUX-11 are used by the Marine Corps as forward arming and refueling points for helicopters. Stoval is also used for primitive airfield operations by C-130 aircraft, a four-engine tactical transport. Maneuver warfare training involving mechanized ground combat forces has not been, nor is it a part of, the currently foreseeable Marine Corps training activities at the BMGR.

Ground unit participation in WTI Courses and other periodic exercises is essential for simulating realistic air-to-air, air-to-ground, and ground-to-air battlefield conditions. These units assume roles as either friendly or hostile forces and benefit from participating in WTI training through improvement of their own warfare specialties. The 35 ground support areas provide ground units participating in WTI Courses or other exercises with adequate, although not always ideal, deployment flexibility. Troops supporting the fall WTI Course are typically in the field during October but the course sometimes extends into the first week of November. The field phase of the spring WTI Course typically occurs during March but may extend into the first week of April.

Most undeveloped support areas are about 250 acres or less in size but a few multiple unit sites are larger. A total of 2,971 acres of the undeveloped ground support areas - in Sites 40, 41, 43, 44, 45, 46, 48 (partial), 49 (partial), 66, and 67 and the site near Stoval - are within the current range of the Sonoran pronghorn. Stoval Auxiliary Airfield, which is within the northernmost periphery of the active range of this animal, encompasses about 330 acres, of which approximately 40 acres are covered with macadam-paved runways and aprons. The forward arming and refueling points and C-130 activities at Stoval occur on the paved surfaces. In total, about 3,300 acres of ground support areas available for Marine Corps use are located inside the current range of the Sonoran pronghorn.

An additional 7,180 acres of support areas - in Sites 21, 22, 23, 24, 25, 27, 30, 31, 33, 34, 35, 36, 37, 39, 48 (partial), 49 (partial), 50, 54, 55, 57, 59, 60, 61, 62, 63, 64, and 65 - are located within the historical range of the Sonoran pronghorn between the Gila and Tinajas Altas mountains and the western extent of its current active range. AUX-11, covering about 300 acres, is also within the historical range of this animal.

The levels of use each ground support area receives varies significantly from site to site as a result of changes in training scenarios, advances in weapons and support technology, experience gained in war-fighting tactics, and physical deterioration in soil conditions at some sites. Although use of the ground support areas within or near the current range of the Sonoran pronghorn has diminished in recent years, for the reasonably foreseeable future, the Marine Corps will continue to use these support areas—including areas 37, 39, 40, 41, 43, 44, 45, 46, 48, 49, 55, 60, 61, 62, 63, 64, 65, and 66—during WTI Courses or other occasionally scheduled exercises. Ground support areas 43, 44, 45, 46, and 67, which are located the farthest east within the current range of the Sonoran pronghorn, are used by ground units that emit electronic threats or track aircraft. These activities typically involve up to12 Marines using equipment mounted on up to four vehicles. A ground support area is customarily used for these activities between eight and 12 hours per day. An individual deployment to a support area may last up to 36 hours. Use of these five support areas for such activities typically occurs during about six days of the period from 15 March through March 31, but may occasionally extend into the first week of April with the close of the Spring WTI course. No use of the sites occurs after the end of the Spring WTI through July 15, which is the end of the sensitive fawning season. Use of these support areas after 15 July through 15 March usually occurs during about 12 days, which is typically scheduled during the Fall WTI course. This course usually occurs during October but may extend into the first week of November. Ground support areas 22, 33, and 50 have been used for each WTI Course in recent years. Area 50 often serves as a major base camp. Stoval has also been used for each recent WTI Course and AUX-11 has been used during several courses. Although no observations of Sonoran pronghorn have been documented close to Stoval from 1994-2001, Stoval is within the northernmost margins of current range of the Sonoran pronghorn. However, ground support areas 22, 33, and 50 and AUX-11 are all well outside of the current range.

Marine Corps use of undeveloped ground support areas involves off-road vehicle driving, placing equipment on the ground, erecting tents and the other facilities of a military bivouac, and troops walking within the site. Vehicles that are deployed within the ground support areas are parked and are not involved in further driving within the support areas until the vehicle departs the area. Parked vehicles,

equipment, and stocks of petroleum, oil, or lubricants that may leak or spill contaminants are placed over temporary containment aprons formed from plastic sheeting or tarps overlying the ground and, where necessary, a perimeter berm formed by underlying sandbags. All litter, trash, and garbage generated by Marine Corps ground units is collected, bagged, and removed from the BMGR by a waste management contractor for disposal at an approved off-range landfill. Similarly, no human sewage disposal occurs at bivouac sites. Commercial portable toilets are placed at each bivouac for use by the troops. A commercial contractor manages these facilities and removes all sewage from the range for disposal at an approved waste-water treatment facility.

Uses of ground support areas other than WTI include early warning control training and low altitude anti-aircraft defense (LAAD) team training (described below). Other DoD and Marine Corps training/testing exercises have occurred in the past and may do so in the future on the BMGR-West on an irregular basis. These exercises could include aviation units from the Air Force and Navy as well as aviation and aviation-related ground units from the Marine Corps. Aviation and ground units deployed in conjunction with these exercises would conduct operations in the same manner as the exercises described above. Such exercises have typically been short, lasting three to five days.

9. Tactical Aircrew Combat Training System (TACTS) Range electronic instrument stations, target simulations, and air defense radar threat emitters are dispersed sites east of the Gila and Tinajas Altas mountains that support training in air-to-air, air-to-ground, and electronic warfare. The Yuma TACTS has the capability to simultaneously track up to 36 individual aircraft by using a highly sophisticated, computer driven, telemetry system that records the flight paths of both "friendly" aircraft and "unfriendly" aggressor aircraft. The recorded information is evaluated to determine the overall effectiveness of the mission, including electronically simulated use (no ordnance is actually used) of either air-to-air or air-to-ground weapons. A replay of the entire mission can be provided so that participants can review and evaluate their performance following a flight. The air-to-air combat portion of the TACTS range incorporates altitudes from 5,000 to 80,000 feet above mean sea level (MSL). Strategically placed at prominent locations within R-2301W, nine remote tracking sites feed data on aircraft maneuvers directly to a master tracking station at Baker Peak. In addition to these capabilities, the TACTS range incorporates facilities that allow aircraft to perform simulated air-to-ground strikes on 11 separate simulated target complexes underlying R-2301W without using or actually releasing ordnance (see Figure 2-1 of MCAS-Yuma 2001). The probable success of the intended attack is generated and scored via computer simulation. As with the TACTS air-to-air training mode, results regarding computerized target hits can be relayed immediately back to the aircrew during an air-to-ground training mission. Mission results can also be transmitted to MCAS

Miramar or NAF El Centro, California for post flight review and evaluation. The TACTS Range is composed of three sets of developed facilities within BMGR-West: 1) electronic instrumentation used to provide aircraft tracking and data telemetry and communication; 2) an electronic air-to-ground weapons training component, which does not include actual weapons use, consisting of passive simulated targets and electronic instrumentation; and 3) electronic threat emitters that simulate air defense systems.

The electronic instrumentation used to operate the TACTS consists of eleven remote tracking and instrumentation subsystem (TIS) stations and one TIS/master station. The remote TIS stations consist only of solar/battery electronic tracking and telemetry instrumentation with a surface footprint of about 100 square feet. TIS stations are usually visited semi-annually, principally to service or replace the solar-charged batteries that power each station. All of the TIS stations that are within the current habitat of the Sonoran pronghorn are accessed for service by vehicle via existing roads. Ten TIS stations and the TIS/master station are located at sites dispersed within BMGR-West between the Mohawk Mountains and Gila and Tinajas Altas mountains. The eleventh TIS station is located on a mountain ridgeline within the Cabeza Prieta NWR. Four of the BMGR-West TIS stations are located within the current range of the Sonoran pronghorn. Three of these stations (one near Ground Support Area 41, one at the northern end of the Sierra Pinta in Cabeza Prieta NWR, and one in the Mohawk Mountains) are in elevated positions that place them vertically out of Sonoran pronghorn habitat. Of the five remaining TIS stations within the historical range of this animal in BMGR-West, three are in elevated positions outside of suitable habitat. The TIS/Master Station at Baker Peaks is also within the historical range of the pronghorn but is vertically located outside of suitable habitat. The aggregate surface area of TIS facilities within Sonoran pronghorn habitat is negligible.

The air-to-ground weapons training component of the TACTS Range is supported by 112 individual passive tactical target sites situated within BMGR-West east of the Gila and Tinajas Altas mountains placed in 11 complexes or individual settings that simulate airfield installations, power stations, fuel storage facilities, buildings, railway facilities, air defense missile and artillery positions, and military vehicles. All TACTS Range targets are accessible by existing roads for maintenance, which typically occurs once in every several years. Aircrews training in air-to-ground weapons delivery maneuver their aircraft as to attack these targets but neither carry nor release actual munitions. Instead, electronic pulses (rather than actual ordnance drops) are used to simulate the trajectories of munitions. As a result, there are no munitions impact areas. TACTS Range targets within the simulated main airfield complex, about 11 miles south of Wellton, may be designated for attack through the use of airborne lasers. The lasers used are not eye safe and could cause eye injury or blindness if an observer looks directly into the laser light. The area approved for laser use is posted as a laser hazard area and no personnel are allowed to enter this area when it is active without eye protection that is

approved for the specific type of laser in use. Only three of the 11 target complexes are located within the current range of the Sonoran pronghorn. These three complexes encompass about 10 acres in aggregate. The eight remaining complexes are all within the historical range of the Sonoran pronghorn but one is within a canyon in the Copper Mountains outside of suitable habitat. The other seven complexes encompass about 380 acres in aggregate.

The third set of TACTS Range facilities consists of 18 fixed-site electronic threat emitters and 17 mobile threat emitter sites located adjacent to existing roads within BMGR-West east of the Gila and Tinajas Altas mountains. Threat emitters consist of tracking and targeting radars that simulate air defense systems that utilize surface-to-air missiles and/or anti-aircraft artillery. Controllers operate the threat emitters to challenge aircrews training within the TACTS Range with realistic air defense threats. The necessary power generation, radar transmission, and TACTS Range telemetry equipment is permanently installed at fixed threat emitter sites. Service and maintenance on the fixed-site threat emitters is conducted on about a 20-day cycle and includes the use of a single truck to refuel/repair the threat emitters. All of the fixed-site threat emitters are accessed for service by vehicle via existing roads. The mobile sites are designated locations at which mobile threat emitter equipment, transported by a vehicle-pulled trailer, is periodically operated, typically for a day at a time.

Six of the fixed threat emitters are located within the far western perimeter of the current range of the pronghorn. The perimeter of each of these facilities is fenced and typically encloses about 0.2 acre. The six fixed threat emitters within the current range of the pronghorn collectively comprise an area of about 1.2 acres. Each threat emitters is equipped with a 20-kilowatt generator that produces the needed electrical power. The noise signature of the 20-kilowatt generator is 81 decibels (dBA) at 10 feet and 40 dBA at 80 feet (MCAS-Yuma 2001). A noise level of 40 dBA is equivalent to that of a quiet private office. Each fixed threat emitter generator typically operates for 40 hours per month. Fixed-site generators operate on liquefied petroleum gas (LPG) that is stored in 350- or 500-gallon tanks. In the event of a leak, LPG dissipates as a gas into the atmosphere so secondary containment is not required for the LPG storage vessels. The refueling cycle for the fixed threat emitters is typically once every 20 days. About three days are required to refuel all of the fixed threat emitters in the Baker Peaks and Copper Mountains areas, including the six sites within the current range of the pronghorn. A contractor delivers the fuel using an LPG tanker truck.

Each of the 17 mobile threat emitter sites includes a concrete pad upon which the trailer carrying the emitter equipment can be positioned. Each site is about 0.2 acre in area. Six of the 17 sites are located within the far western extent of the current range of the pronghorn. The six sites collectively occupy about 1.2 acres. The remaining 11 mobile threat emitter sites are arrayed along a road leading to the west-southwest from the Baker Peaks or are located adjacent to other roads in the

Lechuguilla Desert. These 11 sites encompass about 2.2 acres in aggregate. Mobile threat emitters are powered by 6- or 10-kilowatt generators that produce 80 dBA of noise at 15 feet and 40 dBA at 90 feet (MCAS-Yuma 2001). Spring 2001 use figures for the mobile threat emitters show that one of the six mobile emitter sites is typically active for seven hours per month and the other five sites are typically active for 14 hours per month (MCAS-Yuma 2001).

The radar energy transmitted by threat emitters is sufficient to be a radiation burn hazard to people or animals close to the transmitter and in the path of the transmitted energy. Personnel are on the ground at active mobile threat emitter sites and keep people clear of the radiation hazard areas. The transmitting antenna of fixed threat emitter are sufficiently elevated to ensure that no emitted energy can strike the ground at a range any less than that needed to attenuate the energy to a safe level. The fixed emitters are posted to warn people to keep a safe distance. The chain-link fencing around the site keeps large mammals, such as Sonoran pronghorn, a safe distance from the threat emitter.

10. Small tactical units conduct reconnaissance training missions within BMGR-West, either in association with a WTI Course or as an independent exercise. These Marine Corps training missions typically involve eight to 10 troops that conduct long-range cross-country reconnaissance patrols on foot with the intent of remaining undetected. The reconnaissance patrols are inserted into BMGR-West by parachute drop or helicopter at approved locations or by vehicles using existing roads. Personnel parachute drops in the Lechuguilla Desert are typically performed as a part of small tactical unit training exercises. Any of several locations within the Lechuguilla Desert may be used for this purpose. Development or clearance of the drops zones is unnecessary as the drops are limited to personnel and do not include cargo or vehicles. Selected drop zone locations typically include existing physical features, such as road intersections or TACTS Range target simulations, that are readily visible from the air. The destination of these cross-country patrols is often a TACTS Range target simulation, such as the main airfield in the Lechuguilla Desert, or a ground support area occupied by another Marine Corps unit. The duration of these training missions is typically one to several days. Reconnaissance units are self-contained and carry out all trash or other items, including parachutes, that they brought in to the range. The patrol units bury their human wastes.

11. A particular training activity that occurs during WTI Courses, and at some other times, is conducted by the low altitude anti-aircraft defense (LAAD) battalion. The LAAD uses the Avenger air defense system, which is composed of a multiple Stinger Missile launcher mounted on a High-Mobility Multipurpose Wheeled Vehicles (HMMWV). LAAD teams use Avenger equipped HMMWVs to provide local low-altitude air defense. The primary purpose of LAAD training is to

provide individual LAAD teams with experience in the planning and selection of tactical firing sites that would provide air defense protection to Marine Corps ground units. LAAD teams use existing roads to reach their selected firing sites. Their vehicles may be pulled up to 25 feet off of the road in order to facilitate camouflaging the vehicles from aerial observation and to clear the road for other traffic. LAAD teams do not concentrate in particular areas when deployed, but rather tend to disperse to many points along the BMGR-West road system to provide effective air defense coverage commensurate with the training scenario of the exercise. LAAD team training does not involve the actual firing of Stinger Missiles.

12. A road system is used by Marine Corps ground units and other authorized official users to access facilities and other locations within BMGR-West to participate in or support training operations. This road system also supports law enforcement and natural and cultural resource management activities performed by the Marine Corps in BMGR-West. Of the 1,019 miles of roads within BMGR-West, 368 miles are within the current range of the Sonoran pronghorn.

    The Marine Corps uses 555 miles of roads to conduct and support training operations and to maintain and operate TACTS Range facilities within BMGR-West. The Marine Corps currently uses 124 miles of roads within the current range of the Sonoran pronghorn and 230 miles within this animal's historical range in the conduct of these activities.

    The bulk of the vehicle traffic associated with Marine Corps training activities occurs during the semiannual WTI Courses. A variety of 5-, 10-, and 15-ton trucks and 2.5- to 3-ton HMMWVs are used to transport troops, equipment, and supplies to and among ground support areas during this training exercise. Off-road driving is limited to confines of the ground support areas.

13. The HAWK FIREX program, evaluated in the 1996 biological opinion as part of the proposed action, was a live-fire exercise designed to validate the performance of HAWK missiles and associated equipment. This program has been discontinued and missile exercises are not part of this proposed action. If a new proposal emerges to fire missiles on the BMGR-West, MCAS-Yuma will reinitiate consultation on that proposed action.

**WTI Course**

Marine Aviation Weapons and Tactics Squadron One (MAWTS-1), stationed at MCAS-Yuma, conducts the WTI course. The WTI course, which began at MCAS-Yuma and the BMGR in 1978, provides graduate level training in Marine aviation weapons and tactics. The course syllabus includes approximately six weeks of intensive academics, command and control

integration, and flight instruction. The objective is to graduate flight officers who: 1) are fully qualified in their warfare specialty, 2) can plan and execute missions that integrate logistics and tactics for both aviation and ground support assets, and 3) have the experience and knowledge necessary to conduct an effective and comprehensive aircrew training program for their respective squadrons. The course is designed to provide one WTI per squadron or unit per year to enhance service-wide capabilities in advanced aviation weapons and tactics. The course occurs twice a year. The field phase of the fall WTI Course is typically held during October but the course sometimes extends into the first week of November. The field phase of the spring WTI Course typically occurs during March but may extend into the first week of April.

Officers from Marine infantry and ground support units also attend the WTI course to strengthen the interfaces between air and ground units. The course requires deployment of Marine ground units to perform land-based air control, air defense, electronic warfare, communications, and forward area helicopter refueling and rearming. These and other functions help create a complex air-ground battlefield with sophisticated air defense threat capabilities to allow WTI training to realistically simulate likely warfare conditions. Ground unit deployments occur only within designated areas of BMGR-West and BMGR-East (see above). No ground units enter the Cabeza Prieta NWR.

The WTI course includes three phases: academics, flight instruction, and final exercise. The flight phase, which begins the third week of the course, consists of one week of specific weapons and tactics employment for each type of aircraft or Marine Air Command Control System agency, a second week of fixed-wing and helicopter common flight orientation, and a third week of increasingly challenging integrated flight evolutions. The last week of the course is set aside for a final exercise that is essential to WTI training. During this capstone event, WTI students plan, execute, and debrief missions that integrate all facets of Marine aviation in a simulated battlefield environment on the BMGR that incorporates a complex and realistic array of tactical objectives, sophisticated hostile air and ground forces, and friendly supporting ground forces.

The entire BMGR is required for the final exercise, which may incorporate as many as 80 tactical aircraft of all types. The tactical training scenario that WTI students must assess and cope with usually places units simulating hostile forces within the Air Force ground and airspace sections of the range and units participating as friendly forces operating from MCAS-Yuma and the BMGR-West.

**Air Operations - WTI and Other Exercises**

Approximately 11,000 individual training flights (or sorties) are conducted in R-2301W annually. About half of these sorties occur within the TACTS Range area of operations and the other half occur within the Moving Sands and Cactus West target complexes or AUX-2 operational areas (see Figure 1). The eastern portion of the TACTS Range airspace overlies the current range of the Sonoran pronghorn. Fixed-wing aircraft use, as opposed to helicopter use,

is the predominant flight activity over pronghorn habitat and is conducted throughout the year. Most fixed-wing sorties occur during the day. The most prevalent fixed-wing aircraft types that currently use R-2301W are the AV-8B, F/A-18, F-5, F-16, and EA-6, although nearly all types of tactical fixed-wing aircraft in the U.S. inventory are periodically flown in this airspace.

Approximately 18, 20, 23, and 39 percent of all fixed-wing aircraft flight time within R-2301W occurs at altitudes of 200 to 1,500 feet, 1,500 to 5,000 feet, 5,000 to 10,000 feet, and above 10,000 feet above ground level (AGL), respectively. Supersonic flight is authorized within a supersonic corridor in R-2301W from the surface to 80,000 feet MSL, except over the Cabeza Prieta NWR where the floor for such activity is 1,500 feet AGL. However, supersonic flight below 10,000 feet MSL is rare. Of the two aircraft types that currently account for most of the flight time in R-2301W, the AV-8B Harrier II is incapable of supersonic flight and the F/A-18 Hornet and Super Hornet cannot sustain supersonic flight below 5,000 feet MSL. Aircraft such as the F-15 and B-1, which are flown by the Air Force, and the F-14, which is operated by the Navy, are capable of supersonic flight below 5,000 feet MSL. These aircraft periodically participate in the semi-annual WTI courses. Supersonic flight represents less than two percent of the annual hours within R-2301W. Supersonic flight may occur in R-2301E during each WTI Course during six of the nine training evolutions that use BMGR-East. These evolutions include participation by Marine Corps F/A-18s and possibly Air Force or Navy aircraft that are supersonic capable. The potential always exists for aircraft to go supersonic, depending on the tactical situation. Supersonic flight in R-2301E is conducted in accordance with AFI 13-212 V1 Luke Supplement 1, which establishes a floor of 5,000 feet AGL for supersonic operations. Outside of WTI Courses, low-level (200 to 1,500 feet AGL) flights by fixed-wing aircraft may occur anywhere at any time within R-2301W except over the Cabeza Prieta NWR where non-WTI Course overflights are limited to altitudes of 1,500 feet AGL or above.

Helicopter use of TACTS Range airspace occurs principally in January, February, and March and in September and October, but most flights occur during the semi-annual WTI Courses in March and October. The principal types of helicopters used in R-2301W include the CH-46, CH-53, UH-1, and AH-1. Helicopters at BMGR-West typically operate out of MCAS-Yuma and are rarely flown east of the eastern slopes of the Baker Peaks and Copper Mountains (which roughly coincides with the western extent of the current range of the Sonoran pronghorn) except during the final phases of WTI courses or for special training purposes. There are two reasons why helicopters usually operate only in the western two-thirds of BMGR-West. First, the unrefueled radius of action for most helicopters is too limited to allow these aircraft to reach locations further to the east and still have sufficient fuel reserves to both perform training activities, other than cross-country flying, and return to MCAS Yuma. Second, the ground-based assets needed to support most helicopter training missions are located within the eastern two-thirds of BMGR-West. These assets include AUX-2, the Moving and Cactus West target complexes, and target simulations and other facilities of the

TACTS Range. Most helicopter sorties within R-2301W occur at night. Helicopters are typically flown in R-2301W at altitudes between 50 and 1,500 feet AGL but most training sorties at BMGR-West are flown at altitudes below 500 feet AGL. Helicopters follow straight-line paths and do not hover.

Helicopter missions within BMGR-West that are flown either to the eastern slopes of the Baker Peaks and Copper Mountains or points farther east typically involve:

1. Activities associated with TACTS Range target simulations, including the facility called combat village within an eastern facing canyon of the Copper Mountains,
2. free flights over the Mohawk Valley east to the Mohawk Mountains,
3. transit flights across the Mohawk Valley to enter BMGR-East in order to use North, South, or East tactical ranges (TACs, Figure 1), and
4. flights across the Mohawk Valley and BMGR-East to reach destinations east of the BMGR, such as Davis-Monthan AFB in Tucson

Most helicopter flights to the east of the Baker Peaks and Copper Mountains occur during the final phases of the semi-annual WTI Courses, but some irregularly scheduled exercises also involve helicopter flights in this area. The objective of low-level flight, as conducted during WTI Courses, is for the aircrews of fixed-wing aircraft or helicopters to train in the use of terrain to mask their flight path from air defense radars. In the case of a WTI Course, the objective is for aircrews to approach targets in North, South, or East TACs using the advantages provided by terrain masking.

Four low-level corridors, two for helicopters and two for fixed-wing aircraft, have been established through previous consultations to accommodate low-level overflights of the Cabeza Prieta NWR during WTI courses (Figure 1). These corridors are currently activated only during WTI. The helicopter corridors may be used for up to eight days during each course, but five days may be more typical. The fixed-wing corridors are typically used on nine days per course. During the 2002 courses, the helicopter and fixed-wing aircraft corridors were used for three and nine days, respectively. This use typically occurs during a roughly two-week time span. During the Fall 2000 WTI Course, low-level flights occurred during a nine-day time span. The corridors were used over a 16-day time span during the Spring 2001 Course.

The helicopter corridors are 2 nautical miles in width and have a floor and ceiling of 50 and 1,500 feet AGL, respectively. The fixed-wing aircraft corridors are 4 nautical miles in width and have a floor and ceiling of 200 and 1,500 feet AGL, respectively. Helicopters frequently used in a WTI Course include the AH-1, CH-46, UH-1, and CH-53. Airspeeds of 60 to 90 knots (nautical miles per hour) at night and 100 to 130 knots during the day are typical for helicopters at 50 feet AGL. Fixed-wing aircraft typically used in a WTI Course include the AV-8B, F/A-18, F-5, F-16, and EA-6. Airspeeds flown by fixed-wing aircraft below 1,500 feet AGL vary between 400 and 500 knots depending on the fixed-wing aircraft type. Helicopters in low-level flight follow the contours of the earth and maintain a generally constant altitude

above the ground. The higher speeds and more limited maneuverability of fixed-wing aircraft in low-level flight limit the degree to which these aircraft are flown in reference to the underlying contours of the ground. Because of the northwest to southeast trending orientation of the mountain ranges within the Cabeza Prieta NWR, fixed-wing aircraft are typically flown across the refuge such that they clear the successive mountain ridgelines at 200 feet AGL. Thus, these aircraft are typically at altitudes of 600 to 1,800 feet AGL as they cross the valley bottoms. Low-level fixed-wing aircraft follow straight-line paths and do not hover (AV-8B aircraft are currently the only fixed-wing aircraft capable of vertical and short take-offs and landings).

The amount of WTI training use that the low-level corridors over the Cabeza Prieta NWR receive can vary considerably from course to course. Depending on the course scenario, WTI students could emphasize or minimize low-level tactics in developing and executing war-fighting missions plans that blend their collective skills and experiences and aircraft capabilities.

Helicopters require 25 to 35 minutes to transit the low-level corridors overlying the Cabeza Prieta NWR because of their low airspeeds. The cumulative flight time per WTI course for these aircraft over the refuge remains low, however, because the total number of overflights per course is usually between 20 and 40. Helicopter tactics call for flight formations of two to eight ships. WTI helicopter use of the Cabeza Prieta NWR corridors on up to eight days during one course, has occurred, but corridor use during five days is typical. Only one multiple-ship overflight of the refuge occurs per day. Assuming four aircraft per flight, 30 minutes of transit time per flight, and 20 overflights per course, the total cumulative overflight time of the refuge by helicopters for each course is 2.5 hours. The total annual helicopter overflight time for two WTI Courses typically varies between 5 and 10 hours.

The lower limit for helicopters overflight time over the refuge can be less than an hour and has been zero in cases when WTI students selected only routes north of the refuge in response to some course scenarios. If used at all, the two helicopter corridors over the refuge would generally receive the same volume of use. As much as 50 to 100 percent of helicopter flight time of a WTI Course over the Cabeza Prieta NWR can be at night.

Between 120 and 240 overflights of the refuge by individual fixed-wing aircraft could occur during a course. Standard combat tactics, however, call for fixed-wing aircraft to group into multiple ship flights that customarily maintain a loose formation with about a one-mile spread. Four aircraft per flight is most common, but flights with up to eight ships occur in some circumstances. All of the aircraft of a flight traverse the corridors over the refuge simultaneously. Consequently, the cumulative time during a WTI Course that fixed-wing aircraft occupy the low-level airspace over the Cabeza Prieta NWR is one-half to one-eighth of that indicated by the number of individual overflights. A typical time required for a multiple ship flight of four to eight aircraft at 450 knots to transit the refuge, which is about 50 nautical miles long, is six to seven minutes.

Fixed-wing low-level overflight use of the refuge for WTI courses typically occurs at a rate of between five and ten flights, of four to eight aircraft, per day for six days. At the rate of five flights per day for six days, the Cabeza Prieta NWR would be overflown by flights of four to eight aircraft 30 times per WTI Course. Assuming the transit time for each flight took seven minutes, fixed-wing aircraft would be present within the low-level corridors overlying the Cabeza Prieta NWR for 210 minutes or 3.5 hours per course. At the rate of 10 flights per day for six days (the maximum per course), the low-level corridors would be occupied for 7.0 hours. The total annual fixed-wing overflight time for two WTI Courses varies between 7 and 14 hours. About 15 percent of the fixed-wing overflights during a WTI course are at night. The distribution of flights on the two fixed-wing corridors would be roughly equal.

The terms and conditions of the November 16, 2001, opinion required that between March 15 and July 15 of each year, all helicopters using R-2301W, except those participating in WTI, will remain west of 113 degrees, 53 minutes, on designated transit routes, or above 1,000 feet AGL. The north-south line of longitude at 113 degrees and 53 minutes falls roughly along the eastern margins of the Baker Peaks and the Copper Mountains, which is the western extent of the current distribution of Sonoran pronghorn. Training activities involving helicopter flights conducted in association with the TACTS Range target simulations on the eastern side of the Copper Mountains north of Cabeza Prieta NWR are west of 113 degrees and 53 minutes west longitude and are not constrained by the terms and conditions of the November 2001 opinion. These activities, which may occur during or outside of WTI Courses, may involve helicopter landings in the vicinity of these TACTS Range facilities. Free flights over the Mohawk Valley east to the Mohawk Mountains between 15 March and 15 July are limited to the Spring WTI course. At other times of the year, these flights may occur as part of the Fall WTI course, which typically occurs in October, or flights may occur during other occasionally scheduled exercises. Helicopter landings between the Mohawk Mountains and the Mohawk Sand Dunes may occur either as a part of the WTI courses or during other exercises. Transit flights to the east of 113 degrees and 53 minutes west longitude will not be scheduled from after the close of the Spring WTI to July 15. Such transit flights are also unlikely to occur between July 15 and the beginning of the Fall WTI course in October. All such transit flights are restricted to the two designated low-level flight corridors for Mohawk-San Cristobal valley transit flights or to altitudes above 1,000 feet AGL.

Flights of up to eight helicopters are typically involved in the preceding training activities. From 15 March through 15 July, helicopter flights transiting the Mohawk and San Cristobal valleys only occur during the Spring WTI timeframe. The total helicopter flight time spent transiting the Mohawk and San Cristobal valleys during Spring WTI generally averages about 15 hours, though it can be as much as 25 hours.

**Ordnance Deliveries and Surface-Based Operations within North, South, and East TACs**

The proposed action includes air-to-ground ordnance delivery training as a component of the semi-annual WTI courses on authorized targets within North, South, or East TACs located in

BMGR-East (Figure 1). This activity would also incorporate surface-based operations, including forward air control and battlefield realism enhancement conducted by small parties of ground personnel deployed to existing designated observation posts located in these TACs. All ordnance delivery and surface-based operations would be conducted in accordance with Air Force Instruction (AFI) 13-212 V1 Luke Supplement 1. This AFI provides detailed use regulations for airspace, ranges, and other facilities within BMGR-East. Compliance with these regulations is mandatory for all BMGR-East users. Among the mandatory procedures specified in this AFI are biological monitoring requirements that were established in 1997 to provide at least a daily margin of certainty that Sonoran pronghorn are not present within the impact areas of individual target complexes of North and South TACs before these targets are authorized for use (Appendix A of MCAS-Yuma 2003).

North, South, and East TACs would be used to support nine training evolutions during each WTI Course for a total of 18 evolutions annually for the two courses. One evolution, or individual training exercise, typically occurs per day so the TACs would be used on about 18 days per year. The three TACs would customarily be scheduled to be available for WTI course training evolutions for an aggregate of about 108 hours annually. East TAC would be used for about half of the training evolutions and North or South TACs, whichever is available to be scheduled, will be used for the other evolutions. Thus, North and South TACs would each typically be used for four or five WTI course training evolutions annually for an aggregate of about 54 scheduled training hours, which would be 2.8 percent of the total time that these ranges were activated for training in fiscal year (FY) 2002. (North and South TACs were activated for 1,950 and 1,860 hours, respectively, in FY 2002.) Actual ordnance delivery activities only occur during a small proportion of the time that a TAC is scheduled. Only inert ordnance, and no live high explosive bombs, would be delivered within North and South TACs during the semiannual WTI courses. The volume of inert munitions typically delivered within North and South TACs combined by the semiannual WTI Courses would be about 2.5 percent of the total volume of inert air-to-ground munitions delivered—including all inert bombs, rockets, missiles, cannon and machine gun rounds, and illumination rounds—within these ranges annually based on FY 2002 ordnance expenditure data estimated by the Air Force to be approximately 1.2 million rounds of all types (U.S. Air Force 2002). Broken into rounds delivered by strafing as compared to all other inert munitions, the annual WTI course expenditures in North and South TACs would be about 2.6 percent of roughly 1.1 million rounds delivered by strafing and about 0.7 percent of the remaining roughly 80,000 rounds of all other types of inert ordnance.

All target sets identified as authorized targets in AFI 13-212 V1 Luke Supplement 1 would be available for ordnance delivery for WTI use except for individual targets that are closed because of the presence of Sonoran pronghorn, as reported by the biological monitoring teams, or for other reasons. The three TACs combined provide over 70 target complexes with 37 of these located in North and South TACs. The target complexes have an aggregate total of almost 600 individual targets, of which about 420 are located in North and South TACs. Although all open targets within a scheduled TAC are available for WTI course use, only a small percentage are actually engaged during any one training evolution.

Surface-based operations within North, South, and East TACs typically occur during four of the nine training evolutions that use these ranges during each WTI course. Tactical Air Control Parties, composed of three or four troops, provide forward air control of aircraft delivering ordnance on targets selected for attack. Tactical Air Control Parties would use lasers or 81 mm mortars operated from the observation posts to mark targets for air attack. The 81 mm mortars would fire white phosphorus illumination rounds to mark targets. The targets marked and attacked would be those authorized for use in accordance with AFI 13-212 V1 Luke Supplement 1. Tactical Air Control Parties would access the observation posts within North, South, and East TACs either by helicopter insertion or by vehicle on existing roads. The observation posts within North TAC are located in the Crater Range vertically and geographically outside of the current range of the Sonoran pronghorn. The observation posts within South TAC are located on outlying foothills of the Growler Mountains vertically outside of the current range of the Sonoran pronghorn. Tactical Air Control Parties typically would be present in the TACs to support two of the nine training evolutions that would customarily be conducted in BMGR-East during a single WTI course. The Tactical Air Control Parties typically would be on the ground for six to eight hours during each evolution.

Personnel providing battlefield realism enhancement support within North, South, and East TACs would deploy to established mobile threat emitters sites in these ranges by vehicles driven on existing roads. These personnel would employ mobile electronic threat emitters, which simulate air defense radars, and Smokey Surface-to-Air Missile (SAM) rockets—a small, lightweight disposable rocket composed of cardboard, foam, and solid fuel that is used to simulate the launch boost phase of an air defense surface-to-air missile by producing a column of rising smoke to approximately 1,500 feet AGL. Smokey SAMs are about 4-by-12 inches in size and weigh only a few ounces once their fuel is expended. Battlefield realism personnel would be present in the TACs during four of the nine training evolutions that would customarily be conducted in BMGR-East during a single WTI course. The battlefield realism parties typically would be on the ground for six to eight hours during each evolution.

Tactical Air Control Parties and battlefield realism parties would both be present during the two training evolutions in which Tactical Air Control Parties participate, which include the final WTI course evolution. During the final WTI course evolution, up to 33 ground personnel would be present at the observation posts and mobile threat emitter sites in the active TAC.

Lasers would be used within North, South, and East TACs during the semi-annual WTI courses to designate targets selected for attack. Both airborne and ground-based lasers would be employed. All lasers would be used in accordance with AFI 13-212 V1 Luke Supplement 1.

Eye-safe lasers in the Marine Corps inventory have limited utility and are not appropriate for WTI course training purposes. Since WTI training is focused on integrating airborne and ground-based lasers with weapons systems, tactical lasers would be used exclusively. Tactical lasers, which are Class IV lasers, present a hazard to unprotected eyes if the viewer is looking directly into the laser aperture inside the nominal ocular hazard distance or is inside that hazard distance for energy reflected off a specular (i.e., a highly reflective surface such as glass) hazard. Since

North, South, and East TACs are certified for laser use, the occurrence of specular reflectors would be extremely rare and specular hazards can be discounted as being unlikely. Lasers are treated like direct-fire weapons and would not be engaged unless the selected target is clearly visible and free of persons and observable wildlife. Airborne lasers would be employed in the air-to-ground mode only. Tactical Air Control Parties may also use tactical lasers for target designation. Lasers would be activated only during each active engagement of a selected target. The focus of the laser would remain on the target until the engagement is completed after which the laser emission would be terminated.

The normal operating hours for BMGR-East weapons ranges are 0700 to 2300 hours, Monday through Friday. In accordance with AFI 13-212 V1 Luke Supplement 1, East TAC, which is outside of the current range of the Sonoran pronghorn, is the preferred range for live ordnance deliveries at night. If East TAC is not available, North or South TACs may be scheduled for nighttime live ordnance deliveries in accordance with applicable current operating instructions, including environmental protection requirements. Weekend use of BMGR-East TACs is also supported in accordance with all applicable current operating instructions.

**Proposed Conservation Measures**

The MCAS-Yuma proposes a number of measures to reduce adverse effects of the proposed action on listed species and the environment. Measures specifically designed to protect the flat-tailed horned lizard and its habitat are reviewed in the Service's April 17, 1996, biological and conference opinion, and will not be repeated here. The following are part of the proposed action:

Conservation Measures for Sonoran Pronghorn

1. The Marine Corps will continue its active participation in the Barry M. Goldwater Executive Committee (BEC) and the Intergovernmental Executive Committee (IEC), which meet several times a year, to 1) promote and facilitate communications and coordination among agencies involved with land and resource management on the BMGR or that perform specific missions on the range, and 2) promote and facilitate communications with interested members of the public. Among other advantages for managing natural and cultural resources on the BMGR, the BEC and IEC will facilitate and promote communications about threats to Sonoran pronghorn and planned and ongoing recovery actions for this species. These forums will also provide opportunities to review the performance of completed recovery actions, review agency compliance with regulatory requirements, exchange data and information relevant to the recovery of the Sonoran pronghorn, and identify and coordinate resources that may be used to benefit this species.

2. Since 1988, the Marine Corps has restricted its ground-based training and support activities within the BMGR to designated roads and locations that are of the minimum size necessary to accomplish the missions of the units involved in these activities. These restrictions were enacted in accordance with agreements reached through informal consultations with the Service to avoid or minimize potential effects to Sonoran pronghorn or its historical or currently-used habitat. At present, the Marine Corps' footprint within the current range of the pronghorn consists of several

dispersed ground support areas and TACTS Range facilities that comprise about 0.2 percent of the current range of this species. The Marine Corps will continue to restrict its ground-based activities to designated roads and locations, to the extent practicable relative to its national defense mission, in order to avoid or minimize effects to Sonoran pronghorn and to current and historical Sonoran pronghorn habitat. Military and support vehicles will continue to be restricted in current or historical habitat of the Sonoran pronghorn to existing roads with three exceptions: 1) when operating in designated ground support areas or areas developed as TACTS Range facilities or features; 2) in case of an emergency; or 3) when there is a bona-fide management need. Emergencies include operations such as search and rescue for downed aircrews or lost civilians. Bona-fide management needs will be limited to aircraft crash cleanup; access to develop new, approved facilities; natural resource restoration and revegetation; and other natural resource work or surveys where access by road or foot is impossible or impractical. Roads designated for military use and the locations of ground support areas will be clearly marked with non-obtrusive posts and signs in the field and on maps issued to troops and support personnel. MCAS- Yuma will establish a system for monitoring military compliance with the restrictions for limiting vehicle use to designated roads and ground support areas.

3. The Marine Corps will continue to design its developments/facilities—such as the features incorporated into its threat emitters that prevent the emitted radio energy from intersecting the ground at levels that could harm terrestrial wildlife or people—in a manner that would avoid or minimize effects to Sonoran pronghorn or current or historical habitat of the Sonoran pronghorn to the extent compatible with its military mission.

4. The low-level flight corridors for fixed-wing aircraft and helicopter overflights of the Cabeza Prieta NWR were first established in 1988, in accordance with agreements reached through informal consultations with the Service, to avoid or minimize potential effects to Sonoran pronghorn from flight training activities. The helicopter flight corridors were consolidated and realigned in 1997 and again in 2001, through formal consultations with the Service, to reflect updated information on Sonoran pronghorn distribution within its current range. Also as a result of the 2001 consultation, the Marine Corps began restricting low-level helicopter overflights of Sonoran pronghorn habitat, excluding flights conducted during WTI Courses, within BMGR-West and BMGR-East to designated corridors designed to avoid or minimize potential effects to this species. The Marine Corps will continue to restrict low-level overflights conducted during WTI Courses and other specified exercises to existing designated corridors consistent with the conservation measures and terms and conditions of the November 16, 2001 opinion and will work with the Service and Arizona Game and Fish Department to realign or otherwise revise these corridors if needed in the future to reflect changing mission requirements or updated information on the Sonoran pronghorn.

5. The Marine Corps will continue to brief all military users (including aircrews, ground troops, and support personnel) of the BMGR and its associated airspace under its command or scheduling authority on federally listed threatened and endangered species that may be affected by their training or support activities. Vehicle speed limits and temporary areas to be avoided will be identified in order to avoid or minimize potential effects to Sonoran pronghorn. Aircrews will

be informed of the provisions of the ESA concerning harassment of threatened and endangered species. As part of the overall training program, all personnel will be informed that intentional disturbance or harassment of threatened or endangered species is a violation of the ESA and could result in prosecution. Regulations will be published and military personnel will be educated to ensure limits of authorized use are understood. These briefings will continue to avoid or minimize potential effects to Sonoran pronghorn or its historical or current habitat.

6. The Marine Corps will continue to require that all discarded matter (including but not limited to human waste, trash, garbage, oil drums, fuel, ashes, equipment, concrete, and chemicals) that is generated by ground troops and support personnel or by the development, operation, or maintenance of facilities on the BMGR be removed or disposed of in a manner consistent with Federal and State regulations. Ground support areas and TACTS Range facilities will be maintained in a sanitary condition. Base camps and other troop concentration areas will continue to be supported by the placement of commercial dumpsters for trash and garbage collection and by commercial portable toilets with holding tanks. Commercial waste management contractors will continue to be employed to remove the dumpsters and toilets, with their contents, from the range for disposal in a manner consistent with Federal and State regulations. These measures will continue to avoid potential contamination of historical and current Sonoran pronghorn habitat.

7. The Marine Corps will continue to require that, when training outside of ground support areas, small tactical units will move on foot to off-road training areas, carry out all their self generated trash from these locations, and bury human waste on site. Ground support personnel that operate, maintain, or service BMGR-West facilities or that conduct law enforcement or natural or cultural resource management activities will also continue to follow these procedures. These measures will avoid potential contamination of historical and current Sonoran pronghorn habitat.

8. The Marine Corps will continue to require that vehicles that are parked for a length of time and stationary field equipment from which hazardous materials may be spilled or leaked be placed over temporary containment aprons constructed, as necessary, of plastic sheeting or of plastic sheeting and sandbags. Storage areas for petroleum products and other chemicals used during construction activities or military operations will continue to be located or protected so that potential spills will not contaminate soils, enter surface drainages, or impact ground water. Hazardous or toxic waste generated by ground-based activities will be disposed of in a manner consistent with Federal and State guidelines. A hazardous materials response plan is in place at MCAS-Yuma and a trained response team is prepared to respond immediately to any spills at the air station or in the field. These measures will continue to avoid or, if necessary, provide cleanup of contamination within historical and current Sonoran pronghorn habitat.

9. The Marine Corps will continue to require that coordination with the responsible agencies will be initiated within 24 hours of an aircraft crash event to determine appropriate site cleanup and restoration procedures, including those necessary to clean up hazardous materials spills and

restore the effects of other site cleanup and access activities. These measures will continue to provide necessary cleanup and restoration activities within historical and current Sonoran pronghorn habitat.

10. The Marine Corps will continue to require that training and support activities avoid areas with highly erodible soils to the extent practicable in accordance with the requirements of military training and support missions. If areas with highly erodible soils cannot be avoided, training and support activities will be limited to the minimum area needed and confined to established roadways when feasible. Further, in the event that new roadways or ground support areas are established or new facilities are constructed, these activities will be implemented, to the extent practical, so as to not alter natural drainages, accelerate erosion, or create ponding conditions. These measures will continue to avoid or minimize potential effects to historical and current Sonoran pronghorn habitat.

11. The Marine Corps will manage closed Marine Corps ground support areas in current Sonoran pronghorn habitat to promote revegetation by native plant communities.

12. In accordance with the November 2001 opinion, the Marine Corps will continue to support closure of the Mohawk Valley area of BMGR-West to public use from 15 March to 15 July of each year to reduce the potential for human disturbance of Sonoran pronghorn during the period that is critical to early fawn survival.

13. Through the ongoing development of the BMGR INRMP, the Marine Corps will continue to work toward the permanent closure of roads within the current habitat of the Sonoran pronghorn that are not needed for administrative agency use. Public review of the draft EIS for ~~of~~ the proposed INRMP has been completed and preparation of the final EIS is proceeding. The Marine Corps will continue to work with its agency partners—the Air Force, the Service, BLM, and AGFD—in the development of this plan. The proposed action for the INRMP would also close additional BMGR roads within historical Sonoran pronghorn habitat. The Record of Decision for the INRMP is scheduled to be finalized in 2003. Roads to remain open under all of the draft EIS alternatives to support military and agency missions will be signed as open beginning as soon as possible. Additional roads, if any, selected in the Record of Decision to remain open will be signed as open beginning as soon as possible following that decision. Roads, if any, selected in the Record of Decision to be closed will be signed or blocked with physical barriers, as needed, to ensure closure following that decision. The Marine Corps will publish maps, based on the Record of Decision, for all military and public users of BMGR-West that identify the roads open for their use. The Marine Corps will also construct an interpretive kiosk at the entrance to BMGR on the road from Tacna as specified in the November 2001 opinion. Text for the kiosk will be prepared in coordination with this office and will describe the regulations for public use of the range selected in the Record of Decision for the proposed INRMP.

14. The Marine Corps will maintain, at a minimum, its current staffing at two full time law enforcement officers dedicated to BMGR-West. The Marine Corps will also continue its cooperative relationships with the Service, U.S. Border Patrol, Air Force, AGFD, and other agencies to enhance the overall effectiveness of law enforcement on the range. These measures will facilitate implementation of visitor use regulations, help to deter cross international border traffic, and reduce the potential for intentional or negligent harm to Sonoran pronghorn or its habitat.

15. The Marine Corps will continue to provide this office and the Cabeza Prieta NWR with an annual monitoring report that provides information on the prior year's implementation progress for these conservation measures and terms and conditions in this opinion. The report will also include the date and location of any Sonoran pronghorn observed by Marine Corps personnel, including observations of injured or dead Sonoran pronghorn. Reports that may be produced in association with implementation of the conservation measures or this opinion will be appended to the annual monitoring report. The annual report will be submitted by March 1 of each year. Reports of dead or injured Sonoran pronghorn will be reported within 24 hours to the Recovery Lead at the Cabeza Prieta NWR and this office, as well as the AGFD lead in Yuma, since they would likely be the closest to the injured or dead animal.

16. All use of BMGR-East, BMGR-East airspace, and weapons ranges by the Marine Corps will continue to be in accordance with all applicable operating instructions established by the Air Force, including those governing environmental protection. MCAS-Yuma will also continue to cooperate with Luke Air Force Base in ongoing evaluations of potential adverse effects to Sonoran pronghorn from ordnance delivery and unexploded ordnance at target sites on the North and South tactical ranges. If appropriate, the results of these evaluations will be used to revise existing or develop new mitigating measures. This conservation measure has been implemented in regard to monitoring of the tactical ranges during high explosives delivery, but no evaluations have been completed, and revised or new mitigation measures have not yet been developed.

17. In coordination with other Federal agencies, MCAS-Yuma will continue an ongoing study of the potential effects of chaff on Sonoran pronghorn with an emphasis on the possible toxic conditions of chaff contamination in waters located on the BMGR and Cabeza Prieta NWR. If adverse effects are identified, the report on the study will include recommendations for reducing or eliminating adverse effects of chaff on Sonoran pronghorn. In coordination with the Service, MCAS-Yuma will implement operationally feasible recommendations within two years of the date of the final report.

18. The Marine Corps will continue to support development of the forage enhancement and semi-captive breeding programs for Sonoran pronghorn recovery. These Recovery Plan programs, which are currently being implemented within the Cabeza Prieta NWR and BMGR-East, are supported in part by funds provided by the Marine Corps. The Marine Corps will support development of a forage enhancement site or sites within BMGR-West in accordance with the priorities of the Sonoran Pronghorn Recovery Team. The purpose of forage

enhancement and semi-captive breeding programs is to help offset the severe, adverse, and interactive effects of drought and habitat loss, curtailment, and modification on Sonoran pronghorn from historical actions. These programs are designed to increase fawn recruitment and adult survival during periods when high-quality forage, water, and protection from predators are needed to offset the effects of drought on the quality and availability of forage and availability of water within the habitat of these animals.

19. The Marine Corps will continue its support of the ongoing Sonoran pronghorn DNA study to determine the genetic relationship of this subspecies to other pronghorn subspecies in the United States and Mexico.

20. The Marine Corps will continue to support its fair share of the management, research, and other recovery actions identified by the Sonoran Pronghorn Recovery Plan and the Sonoran Pronghorn Recovery Team to promote recovery of the subspecies. These projects may be conducted in coordination with other agencies.

Conservation Measures for the Lesser Long-Nosed Bat and Cactus Ferruginous Pygmy Owl

1. The Marine Corps will continue to restrict low-level overflights (i.e., flights below 1,500 feet AGL) of the Cabeza Prieta NWR to those conducted during WTI courses within existing designated corridors. This measure will continue to avoid or minimize potential effects to lesser-long nosed bat and cactus ferruginous pygmy owl.

2. The Marine Corps will report any known collisions between its aircraft and lesser-long nosed bats or cactus ferruginous pygmy owl—including the aircraft type and date and, if known, flight altitude, direction, time, and location—to this office and the Cabeza Prieta NWR. This measure will alert the Marine Corps and the Service to specific flight activities that have adversely affected individual lesser-long nosed bats or cactus ferruginous pygmy owl. Reports of bird air strike collisions include the species information (when the aircrew is able to make an identification) and the data will be maintained in a central database.

Conservation Measures for Peirson's Milkvetch

1. The Marine Corps will continue to require that training and support activities avoid the former Gran Desierto Area of Critical Environmental Concern to the extent possible consistent with the training and support missions. This measure will continue to avoid or minimize effects to potentially suitable Peirson's milkvetch habitat.

2. The Marine Corps will report the date and location of any Peirson's milkvetch observations by Marine Corps personnel or contractors to this office.

Conservation Measures - All Species

1. In accordance with its responsibilities under the MLWA of 1999 and the Sikes Act, the Marine Corps will continue to work with its agency partners—the Air Force, the Service, BLM, and AGFD—to complete development of and to implement the proposed INRMP for the BMGR. The proposed INRMP, which incorporates ecosystem management principles, is designed to establish a long-term resource stewardship program for the BMGR that will provide for protection, conservation, and rehabilitation of natural resources, including Sonoran pronghorn and Sonoran pronghorn habitat, with the use of the range to ensure the preparedness of the Armed Forces. The proposed INRMP will also provide for sustainable public use of the range consistent with its military purposes. The proposed INRMP will fully support the requirements of the Sonoran Pronghorn Recovery Plan and the actions of the Sonoran Pronghorn Recovery Team. The Record of Decision for the INRMP is scheduled for implementation in 2003.

2. The Marine Corps has designated a management representative and point of contact within the Range Management Department, MCAS-Yuma, with the duty to ensure compliance with the proposed conservation measures for listed species by all users of the BMGR under its command or scheduling authority. This representative has the authority to halt activities that may be in violation of such measures. A single point of contact will receive and investigate reports of unauthorized use of the airspace and land areas within the range. MCAS-Yuma will continue to provide a point of contact within the Range Management Department for addressing Service concerns about issues pertaining to listed species, including concerns about overflights or other issues pertaining to the Cabeza Prieta NWR.

STATUS OF THE SPECIES

**Sonoran Pronghorn**

**A. Description, Legal Status, and Recovery Planning**

The Sonoran subspecies of pronghorn (*Antilocapra americana sonoriensis*) was first described by Goldman (1945) from a type specimen taken near the Costa Rica Ranch, Sonora, Mexico by Vernon Bailey and Frederic Winthrop on December 11, 1932, and is currently recognized as one of five subspecies of pronghorn (Nowak and Paradiso 1983). Recent molecular genetic analysis of the Sonoran pronghorn and other subspecies of the American pronghorn did not provide a clear genetic basis for designation of the Sonoran pronghorn as a distinct subspecies (Rhodes *et al.* 2003). However, the analysis showed a clear genetic differentiation of the Sonoran pronghorn from pronghorn populations in central and eastern Arizona. The authors found that any evaluation of the taxonomy of the Sonoran pronghorn should not only evaluate genetic information, but should also rely on extensive morphological and ecological analyses; which to date have not been completed.

The Sonoran pronghorn is the smallest subspecies of *Antilocapra americana*. The subspecies was listed throughout its range as endangered on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966. Three sub-populations of the Sonoran pronghorn are extant: 1) a U.S. sub-population in southwestern Arizona, 2) a sub-population in the Pinacate Region of northwestern Sonora, and 3) a sub-population on the Gulf of California west and north of Caborca, Sonora. The three sub-populations are geographically isolated due to barriers such as roads and fences, and in the case of the two Sonora sub-populations, by distance. Critical habitat has not been designated for the pronghom.

The 1982 Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 1982) was revised in 1998 (U.S. Fish and Wildlife Service 1998a). The recovery criteria presented in the revised plan entailed the establishment of a population of 300 adult pronghorn in one self-sustaining population for a minimum of five years, as well as the establishment of at least one other self-sustaining population in the U.S. to reclassify the subspecies to threatened.

Actions identified as necessary to achieve these goals include the following: 1) enhance present sub-populations of pronghorn by providing supplemental forage and/or water; 2) determine habitat needs and protect present range; 3) investigate and address potential barriers to expansion of presently used range and investigate, evaluate, and prioritize present and potential future reintroduction sites within historical range; 4) establish and monitor a new, separate herd(s) to guard against catastrophes decimating the core population, and investigate captive breeding; 5) continue monitoring sub-populations and maintain a protocol for a repeatable and comparable survey technique; and 6) examine additional specimen evidence available to assist in verification of taxonomic status.

In February 2001, the D.C. Federal District Court ordered the Fish and Wildlife Service to reassess Sonoran pronghorn recovery criteria and to provide estimates of time required to perform recovery actions detailed in the 1998 plan. In response, a supplement and amendment to the 1998 Final Revised Sonoran Pronghorn Recovery Plan was prepared (U.S. Fish and Wildlife Service 2001). We concluded that, given the nature of the current threats, unknown elements of pronghorn life history and habitat requirements, uncertainty of availability of suitable reintroduction sites and animals for transplants, internal and external resistance to pro-active management actions on wilderness and other areas of public lands, and continuing uncertainty regarding the long-term stability and status of sub-populations in Mexico, the data do not yet exist to support establishing delisting criteria. Tasks necessary to accomplish reclassification to threatened status (as outlined in the 1998 plan) should provide the information necessary to determine if and when delisting will be possible and what the criteria should be.

**B. Life History**

Sonoran pronghorn inhabit one of the hottest and driest portions of the Sonoran Desert. They forage on a large variety of perennial and annual plant species (Hughes and Smith 1990, Hervert *et al.* 1997b, U.S. Fish and Wildlife Service 1998a), and will move in response to spatial limitations in forage availability (Hervert *et al.* 1997a). Although it is theoretically possible for

pronghorn to meet water requirements through forage consumption (Fox *et al.* 1997), after subtracting water required for excretion, respiration, and evaporation (approximately 50 percent), predicted water intake from forage was not adequate to meet minimum water requirements for 14 of 20 simulated diets (Fox *et al.* 2000). Sonoran pronghorn will drink surface water if it is available (U.S. Fish and Wildlife Service1998a).

Pronghorn consume a wide variety of plants. Fecal analysis indicated Sonoran pronghorn consume 69 percent forbs, 22 percent shrubs, 7 percent cacti, and 0.4 percent grasses (U.S. Fish and Wildlife Service 1998a). During drought years, Hughes and Smith (1990) reported cacti were the major dietary component (44 percent). Consumption of cacti, especially chain fruit cholla (*Cylindropuntia fulgida*, Pinkava 1999), provides a source of water during hot, dry conditions (Hervert *et al.* 1997b). Other important plant species in the diet of the pronghorn include pigweed (*Amaranthus palmeri*), ragweed (*Ambrosia* sp.), locoweed (*Astragalus* sp.), brome (*Bromus* sp.), and snakeweed (*Gutierrezia sarothrae*) (U.S. Fish and Wildlife Service1998a).

Sonoran pronghorn rut during July-September, and does have been observed with newborn fawns from February through May. Parturition corresponds with annual spring forage abundance. Fawning areas have been documented near the Mohawk Dunes and the bajadas of the Sierra Pinta, Mohawk, Bates, Growler, and Puerto Blanco mountains, as shown in Figure 4. Does usually have twins, and fawns suckle for about 2 months. Does gather with fawns, and fawns sometimes form nursery groups (U.S. Fish and Wildlife Service 1998a). Hughes and Smith (1990) recorded an average group size of 2.5 animals; however, group size observed by Wright and deVos (1986) averaged 5.1, with the largest group containing 21 animals. Group size likely varies with population size. At that time the U.S. sub-population was roughly about 100 animals (Arizona Game and Fish Department 1981, 1986).

The results of telemetry studies in 1983-1991 indicated that Sonoran pronghorns non-randomly use their habitats (deVos 1998). Pronghorn move from north to south or northwest to southeast, and upslope as summer progresses. Movements are most likely motivated by the need for thermal cover provided by leguminous trees and water available in succulent cacti such as chain fruit cholla (Hervert *et al.* 1997b), that are more abundant on bajadas and in the southern portion of the pronghorn's range. Home range size of Sonoran pronghorn ranged from 24.9 to 468 $mi^2$ for males and from 15.7 to 441 $mi^2$ for females (Wright and deVos 1986).

Causes of pronghorn mortality are often difficult to determine; however, some radio-collared Sonoran pronghorn have been killed by coyotes, mountain lions, and bobcats. Some of these mortalities may have been influenced by dry periods, which predisposed pronghorn to predation (U.S. Fish and Wildlife Service 1998a). Hervert *et al.* (2000) found that the number of fawns surviving until the first summer rains was significantly correlated to the amount of preceding winter rainfall, and negatively correlated to the number of days without rain between the last winter rain and the first summer rain. Three radio-collared pronghorn died in July and August of

2002 with no obvious cause of death. Given that 2002 was one of the driest years on record, the proximate cause of these mortalities was likely heat stress and/or malnutrition resulting from inadequate forage conditions due to drought [(J. Hervert, Arizona Game and Fish Department, pers. comm. 2002)].

**C. Habitat**

Turner and Brown (1982) described seven subdivisions of Sonoran Desert scrub, two of which encompass the habitat of Sonoran pronghorn in the U.S. and the Pinacate Region of Sonora (Felger 2000). These are the Lower Colorado River Valley and the Arizona Upland subdivisions. Creosote (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*) are dominant perennials of the Lower Colorado River Valley subdivision. Plant species along major water courses include ironwood (*Olneya tesota*), blue palo verde (*Parkinsonia floridum*), and mesquite (*Prosopis velutina* and *P. glandulosa*). Species in the Arizona Upland include foothill palo verde (*Parkinsonia microphyllum*), catclaw acacia (*Acacia greggii*), chain fruit cholla, teddy bear cholla (*Cylindropuntia bigelovii*), buckhorn cholla (*C. acanthocarpa*), and staghorn cholla (*C. versicolor*).

The habitat of the pronghorn in the U.S. consists of broad alluvial valleys separated by block-faulted mountain and surface volcanics. In December 1984, 40 percent of the pronghorn observed during a telemetry flight were in the Growler Valley, from the Aguila Mountains to the International Border. Arizona Game and Fish Department (1985) reported that pronghorn use flat valleys and isolated hills to a greater degree than other topographic features.

Drainages and bajadas are used by pronghorn during spring and summer. Washes flow briefly after rains during the monsoon season and after sustained winter rains. The network created by these washes provides important thermal cover (shade) for pronghorn during the hot summer season. Bajadas are used as fawning areas in the spring. Pronghorn were observed using palo verde, ironwood, and mesquite for cover during weekly Arizona Game and Fish Department telemetry flights, which began in 1994 (Hervert *et al.* 1997b). Pronghorn were observed in playas in April and May of 1988 and 1989 when forbs were abundant, later vacating these areas when desiccation of annuals occurred (Hughes and Smith 1990). In years with sufficient winter and spring precipitation, some playas produce abundant annual plant growth.

Some of the sandy areas within pronghorn habitat such as Pinta Sands, the Mohawk Dunes west of the Mohawk Mountains, and the west side of the Aguila Mountains, provide a greater variety of seasonal vegetation when precipitation events occur. The openness of these areas appears to be attractive for pronghorn as the annuals, grasses, and shrubs provide good forage, particularly in the spring. These areas have long been considered significant pronghorn habitat in the U.S. Carr (1974) reported seeing pronghorn frequently in the Pinta Sands area. Due to the more arid nature of valley and dune habitats, annuals dry and cure, with decreased palatability for pronghorns as summer approaches. Also, these habitats lack sufficient woody vegetation to satisfy pronghorn requirements for nutrition and thermal protection. These factors limit the

temporal suitability of these areas and most pronghorn move to bajadas and washes in the southeastern portion of the range by early summer.

**D. Distribution and Abundance**

*United States*

Prior to the identification of the subspecies known as the Sonoran pronghorn (Goldman 1945), specimens of pronghorn taken within its range were identified as other subspecies (Arizona Game and Fish Department 1981). Historically, the Sonoran pronghorn ranged in the U.S. from approximately the Santa Cruz River in the east, to the Gila Bend and Kofa Mountains to the north, and to Imperial Valley, California, to the west (Mearns 1907, Nelson 1925, Monson 1968, Wright and deVos 1986, Paradiso and Nowak 1971; Figure 2).

During an international boundary survey conducted from 1892 through 1894, pronghorn were found in every open valley along the international boundary from Nogales, Mexico to Yuma, Arizona (Carr 1971). In 1893, Mearns (1907) reported seeing a herd of 12 pronghorn near border monument 143 in the Baboquivari Valley and small numbers in the Santa Rosa Valley near monument 161 on what is now the Tohono O'odham Nation. Nelson (1925) stated that in 1923, local people reported that a few pronghorn were still ranging in the Santa Rosa Valley. Carr (1970) noted the "sighting of eight antelope near Pisinimo on the "Papago Indian Reservation" (Tohono O'odham Nation) which most likely drifted north from Mexico," and that "there have been numerous rumors of antelope in the Papago country"; however, no recent reliable observations are known. Carr (1970) also stated that there "is a considerable amount of good Sonoran antelope habitat on the Papago Indian Reservation and particularly in the Great Plains area. However, Indian hunting and grazing practices prohibit a lasting resident antelope population." Fencing on rangelands probably also created barriers to pronghorn movement on the Reservation and elsewhere. In 1894, pronghorn were abundant near monuments 178 and 179, and westward to Tule Well (Mearns 1907). In February 1894, Mearns observed them in the Lechuguilla Desert, as well. In the Colorado Desert (presumably west of the Gila and Tinajas Altas mountains), Mearns (1907) reported that pronghorn were not abundant. He observed pronghorn tracks in California at Gardner's Laguna, 6 miles south of monument 216, and 37 miles west of the Colorado River; and then again at Laguna Station, 7 miles north of monument 224 and 65 miles west of the Colorado River.

While Mearns (1907) suggested that pronghorn may have been common in some areas in the late 1800s, evidence suggests that the sub-population declined dramatically in the early 20th century. Sub-population estimates for Arizona, which only began in 1925, have never shown the pronghorn to be abundant (Table 1).

Repeatable, systematic surveys were not conducted in Arizona until 1992. Since 1992, Sonoran pronghorn in the United States have been surveyed biennially (Bright *et al.* 1999, 2001) using aerial line transects (Johnson *et al.* 1991). Sub-population estimates from these transects have

been derived using three different estimators (Table 2); currently the sightability model (Samuel and Pollock 1981) is considered the most reliable estimator (Bright *et al.* 1999, 2001). Table 2 presents observation data from transects and compares estimates derived from the three population models from 1992 through 2002.

Bright *et al.* (2001) defined the present U.S. range of the Sonoran pronghorn as bordered by Interstate 8 to the north, the International Border to the south, the Copper and Cabeza mountains to the west, and SR 85 to the east (see Figures 1 and 3). This area encompasses 2,508 $mi^2$ (Bright *et al.* 2001). Based on pronghorn location records from 1994-2001 (Figure 3), locations of pronghorn from 1983-1995, and observations by Carr (1972) and Hall (1981), pronghorn are believed to have occurred most frequently in the recent past in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo Mountains (Daniel's Arroyo area). Wright and deVos (1986) stated that observations in the Growler Valley were frequent and that the Mohawk Valley, San Cristobal Valley, and BMGR supported herds of 10 to 20 animals during most of the year. Also mentioned was a regularly observed herd of 7 to10 pronghorn in the Cameron tank area on BLM lands near Ajo.

Occasional sightings of pronghorn are recorded outside of the range defined by telemetry locations in Figure 3. For instance, a possible pronghorn sighting occurred east of Aztec and north of Interstate 8 in 1990 (U.S. Fish and Wildlife Service 1998a). Two adult pronghorn were observed in 1990 (U.S. Fish and Wildlife Service 1998a) in the northern San Cristobal Valley approximately 5 miles southeast of Mohawk Pass in the Mohawk Mountains. In 1987, a Border Patrol agent reported a pronghorn on the Tohono O'odham Nation; this sighting was not confirmed.

Although observations of pronghorn were common along and east of SR 85 many years ago, observations east of SR 85 in recent years have been very rare. The paucity of recent observations east of the highway indicates that this heavily-used road currently poses a barrier to eastward movement. On June 12, 1996, however, an adult doe pronghorn was observed running west off the right-of-way at the approach of a vehicle on the north end of the Crater Range (R. Barry, Luke AFB, pers. comm. 1996). There also exists an unconfirmed report of four Sonoran pronghorn attempting to cross SR 85 in August 1993 approximately one mile north of the Organ Pipe Cactus NM visitor center. A juvenile crossed the highway (two lanes) to the east, but with the approach of a vehicle, ran back across the road to rejoin a group of three pronghorn (T. Ramon, Organ Pipe Cactus NM, pers. comm. 1993). In July 2002, a radio-collared pronghorn crossed SR 85 and continued on to the base of the Ajo Mountains where it later died in August 2002. In September 2002, a second radio-collared pronghorn crossed SR 85. This animal spent most of its time in the vicinity of Ajo Mountain Scenic Loop road, just off the southwestern end of the Diablo Mountains. After 8 days, she crossed back to the west side of Highway 85, and moved to a locally green area in the Growler Valley west of the monument. These seemingly aberrant movement patterns were likely the result of nutritional stress brought on by the 2002 drought, discussed further below. On July 3, 2003, a pronghorn was again observed crossing SR 85 just north of the Organ Pipe Cactus NM's Visitor Center.

In recent years, the Tohono O'odham Nation has not been accessible to state and Federal biologists to survey for Sonoran pronghorn. A Border Patrol agent reported a pronghorn on the Nation lands in 1987 (U.S. Fish and Wildlife Service 1998a), and although unconfirmed, this is the last report of Sonoran pronghorn on the Nation. There are no recent records of pronghorn south of the Nation in Sonora. Carr (1970) reported that hunting and grazing on the Nation was not compatible with maintaining a viable population of pronghorn. Phelps (1981) reported that pronghorn had not been observed on the Nation for 10 years. These observations suggest that pronghorn are likely extirpated from the Nation and adjacent areas.

The sightability model population estimates from 1992 to 2000 showed a 45 percent decrease in sub-population size (Table 2). The estimates indicate a steady decline in sub-population size, with the exception of the 1994 survey. The 1994 estimate may be somewhat inflated due to inconsistencies in survey timing (U.S. Fish and Wildlife Service 1998a, Bright *et al.* 2001). The 1994 survey occurred in March (whereas those of other years occurred in December) and therefore the number may be slightly inflated because of the sightability of pronghorn at this time of year (J. Morgart, FWS, pers. comm. 2001). Different population models may result in divergent estimates. Therefore, the inclusion of estimates obtained prior to 1992 in the analysis of population trends is not reasonable.

Some researchers believe that the number of pronghorn observed on transects is more statistically valid for the evaluation of population trends than estimates generated by population models (Johnson *et al.* 1991, Hervert *et al.* 1997a). For instance, the number of pronghorn observed on transects decreased by 32 percent from 1992 to 2000 (Table 2). Contrary to the sightability model estimate, the number of pronghorn observed on transects showed a minor increase, while the total number of pronghorn sighted actually decreased in 1994 compared to the 1992 survey. Sightability model estimates declined from 282 in 1994 to 130 in 1996. High fawn mortality in 1995 and 1996 and the death of half (8 of 16) of the adult, radio-collared pronghorn during the 13 months preceding the December 1996 survey suggests that the decline was real. Five consecutive six-month seasons of below normal precipitation (summer 1994 through summer 1996) throughout most of the Sonoran pronghorn range, likely contributed, in part, to observed mortality (Bright *et al.* 2001, Hervert *et al.* 1997b).

Adult mortality has been high in recent years, with predator-related mortality being the most frequently identifiable proximate cause of death (one of the recovery actions identified by the recovery team is development of a narrowly-defined and rigidly controlled coyote removal plan). Thirty-five adult pronghorn have been radio collared by Arizona Game and Fish Department since 1994. Of these, 31 (88 percent) have since died. A total of 13 of these mortalities were attributed to predation, while the remaining died from unknown causes. Some of the 18 mortalities attributed to unknown causes were likely caused by predation (J. Hervert, pers. comm. 2002); however, unavoidable lag times between time of death and scene investigation caused evidence to be obscured. No evidence of predation of pronghorn was documented near water sources (Hervert *et al.* 2000). Capture myopathy (physiological condition of an animal, caused by fear, stress, and/or overexertion that sometimes manifests itself during or up to 14 days

after capture; left untreated the effects can range from temporary debilitation to death) may have played a role in up to five of the mortalities in 1994 (Hervert *et al.* 2000). In the majority of documented mortalities, bone marrow condition was assessed. Only one specimen was determined to be in poor to fair condition, while all others were determined to be in good condition.

Mortality of radio-collared adults in 2002 was exceptionally high. At the start of the year, seven radio-collared Sonoran pronghorn were at large in the U.S. sub-population. By December 2002, all but one of these had died. For most, drought stress was considered to be the proximate cause. For those animals that may have succumbed to predation, it was suspected that drought stress was again a factor, by making the animal more vulnerable to predation, due to an emaciated physical condition and being forced into predator habitats by drought. Three of these 2002 mortalities were females of prime breeding age (5-7 years old) with no identifiable cause of death. Given their relatively young age, lack of any signs of disease or predation, and the timing of their deaths during one of the most severe drought years ever recorded, these animals probably died of heat stress and/or malnutrition resulting from inadequate forage conditions due to drought (J. Hervert, pers. comm. 2002). The deaths of these prime-age individuals is indicative of how severe conditions were in 2002. Three sightings last summer of pronghorn in various parts of their range verified their declining condition. In July 2002, adult pronghorn were observed on Organ Pipe Cactus NM, Cabeza Prieta NWR, and the North TAC of BMGR. In all three cases, observers described the pronghorn as emaciated, with ribs visible, and rough-coated (M. Coffeen, FWS, pers. com. 2002). In August 2000, two pronghorn were spotted on the BLM's Cameron allotment about 2-3 miles south of Ajo by a Border Patrol agent. The agent reported the animals appeared "skinny" but were not emaciated or staggering.

The 2002 drought was one of the driest on record. As an example, annual rainfall at the Organ Pipe Cactus NM visitor center was only 2.54 inches in 2002 (T. Tibbitts, Organ Pipe Cactus NM, pers. comm. 2002); *average* annual rainfall for the visitor center is 9.2 inches (Brown 1994). The extreme drought conditions profoundly affected adult pronghorn, resulting in the highest adult mortality rate documented thus far. Since 1995, adult mortality has averaged 22 percent a year. Yearly mortality rates have fluctuated around this mean in direct relationship with precipitation. In 1997 and 1999, years with relatively good rainfall, there was only 12 and 10 percent adult mortality, respectively. In contrast, during 1996, a relatively severe drought year, a 38 percent adult mortality was documented. The 2002 population survey conducted in November and December revealed the U.S. sub-population had declined to the lowest level ever recorded. A total of 18 pronghorn were observed, in three groups (8, 9, and 1). Applying these data to the Arizona Game and Fish Department sightability model results in a population estimate of 21 animals (18-33, 95 percent confidence interval), or a 79% decline from 2000. Also, very few fawns survived in 2002 to replace these dying adults. Because of the poor condition and low survivorship of animals during the rut in late summer and early fall, there was some concern that surviving pronghorn may not have bred. However, several fawns have been detected in 2003. Adult pronghorn appear to be in good condition thus far, and the winter rains produced a good crop of ephemeral forage (J. Morgart, pers. comm. 2003).

Although drought was likely the proximate cause of the dramatic decline of the U.S. sub-population in 2002, anthropogenic factors almost certainly contributed to or exacerbated the effects of the drought. Historically, pronghorn likely moved to wetted areas and foraged along the Rio Sonoyta, Sonora, and the Gila and probably Colorado rivers during drought. These areas are no longer accessible for the U.S. population due to fences, Interstate 8, Mexico Highway 2, and other barriers. The rate of decline in the U.S. sub-population from 2000-2002 (79 percent) was also much greater than that observed in either the sub-population southeast of Highway 8 (18 percent decline) or the El Pinacate sub-population (26 percent) during the same period (see discussion of Mexican sub-populations in the next section). At least for the El Pinacate sub-population, observations of forage availability in the El Pinacate area from 2000-2002 and proximity to the U.S. population suggest the El Pinacate sub-population experienced the same severe drought that occurred on the Arizona side (T. Tibbitts, J. Morgart, pers. comm. 2003). Yet that sub-population fared much better than its U.S. counterpart. The high level of human activities and disturbance on the U.S. side, particularly in regard to undocumented alien traffic, smugglers, and law enforcement response, as compared to what occurs in the El Pinacate area, is a likely contributing factor in the difference in rate of decline observed north and south of the border. We do not have data on differences in demographics, predation rates, or other factors between Mexican and U.S. populations that may have also contributed to differences in rates of decline from 2000-2002. See the section entitled "Drought" in the Environmental Baseline and "Cumulative Effects" for further discussion.

In 1996, a workshop was held in which a population viability analysis (PVA) was conducted for the U.S. sub-population of Sonoran pronghorn (Defenders of Wildlife 1998). A PVA is a structured, systematic, and comprehensive examination of the interacting factors that place a population or species at risk (Gilpin and Soulé 1986). For the Sonoran pronghorn PVA, these factors included impacts of inbreeding, fecundity, fawn survival, adult survival, impacts of catastrophes, harvest, carrying capacity, and numbers and sex/age composition of the present population. Use of three models were discussed at the workshop, but the PVA was only completed with one of the models - Vortex (Hosack *et al.* 2002) - due limited funding. Based on the best estimates of demographic parameters at the time, the likelihood of extinction of Sonoran pronghorn was calculated as one percent in the next 25 years, 9 percent in the next 50 years, and 23 percent in the next 100 years. More severe threats include population fluctuation, periodic decimation during drought (especially of fawns), small present population size, limited habitat preventing expansion to a more secure population size, and expected future inbreeding depression. The authors concluded that "this population of the Sonoran pronghorn, the only one in the U.S., is at serious risk of extinction." The authors made these conclusions prior to the severe drought and decline in the species in 2002. On the other hand, Hosack *et al.* (2002) found that some management actions were possible that could improve the chances of population persistence significantly. Actions that would ameliorate the effects of drought or minimize mortality of pronghorn were of particular importance for improving population persistence.

Furthermore, the PVA suggested that the current pronghorn population is extremely sensitive to fawn mortality, with the likelihood of extinction increasing markedly when fawn mortality

exceeds 70 percent. Thus, a 30 percent fawn crop (30 fawns/100 does) each year is necessary to ensure the continuance of the U.S. sub-population. This level of reproductive success has only been achieved in two of the last nine years. Fawn survival is correlated with precipitation (Hervert *et al.* 1997b). With above average precipitation in 1998, 33 fawns per 100 does were produced (Bright *et al.* 2001). In 2001, precipitation levels in the pronghorn range were the highest seen in many years. Pronghorn numbers increased from 99 in December 2000 to approximately 140 individuals in December 2001 (based on an estimated increase of 50 individuals by recruitment, minus an estimated adult mortality rate of 11 percent). However, as discussed above, during the severe drought in 2002, all the gains from the previous year were lost. Although an estimated 50 fawns were recruited into the sub-population in 2001, it appears few of these young and still-maturing animals survived the severe drought conditions of 2002. However, a dead pronghorn thought to be a 2001 fawn was discovered in 2002. The animal was obviously killed by a bobcat, but appeared to be in good condition, with lots of fat in the body cavity. The 2002 fawn crop was estimated to be from one to five (J. Morgart, pers. comm. 2002), consistent with trends of low fawn crops in low precipitation years.

The Sonoran pronghorn's previously poor status, coupled with dramatic declines in both recruitment and adult survival during 2002, have resulted in the serious imperilment of the U.S. sub-population. Actions taken by Federal and state agencies in the immediate future will determine whether the Sonoran pronghorn will continue to survive in the United States. We, in close cooperation with the Arizona Game and Fish Department, Department of Defense, and other partners are initiating a series of emergency projects, such as providing water and forage enhancement projects, as well as embarking on longer term recovery actions, including developing a semi-captive breeding facility, to increase the likelihood that the U.S. sub-population will persist (see *Emergency Recovery Actions* in the Environmental Baseline for additional information).

*Mexico*

Historically, Sonoran pronghorn ranged in Sonora from the Arizona border south to Hermosillo and Kino Bay, west to at least the Sierra del Rosario, and east to the area south of the Baboquivari Valley on the Tohono O'odham Nation (Nelson 1925, Carr 1974, Monson 1968). The distribution in Baja California Norte is less clear, but observations by Mearns (1907) indicate they occurred in the Colorado Desert west of the Colorado River, as well.

Sonoran pronghorn are currently extant in two sub-populations in Mexico, including: (1) west of Highway 8 near the Pinacate Lava flow; and (2) north and west of Caborca and southeast of Highway 8. In 2001, a park ranger at Pozo Nuevo, El Pinacate y Gran Desierto de Altar Biosphere Reserve (El Pinacate), reported that pronghorn have been seen in recent years west of Volcan Pinacate to the Pozo Nuevo area, and reportedly use a cement cattle trough north of Pozo Nuevo (J. Rorabaugh, pers. comm. 2001).

Sub-populations of Sonoran pronghorn in Mexico had not been exhaustively surveyed until all suitable habitat within the current known range of the Sonoran pronghorn in Mexico was surveyed in December 2000 (Bright *et al.* 2001). Although the 1993 estimate was approximate, survey results suggested a decline in the sub-populations of 16 percent from 1993 to 2000 (Table 3). The December 2000 estimate was 346 individuals. This estimate, together with the 2001 U.S. estimate, provided a total estimated size of the U.S. and Mexico Sonoran pronghorn sub-populations in 2000-2001 of approximately 445 individuals (J.L. Bright *et al.*, Arizona Game and Fish Department, unpubl. data). Although the Sonoran pronghorn sub-populations in Mexico declined approximately 16 percent from 1993 to 2000, the decrease was not experienced equally across pronghorn range. Sonoran pronghorn habitat in Mexico is bisected by Highway 8. The sub-population southeast of Highway 8 remained stable or even increased slightly between 1993 and 2000 (Table 3). Forage conditions in 2000 were notably better in this area than the rest of Sonoran pronghorn range in Mexico and the U.S. (J. L. Bright *et al.*, Arizona Game and Fish Department, unpubl. data). The sub-population west of Highway 8 ranges throughout suitable habitat on and surrounding Volcan Pinacate, and is adjacent to the U.S. sub-population. Mexico Highway 2 (and to a lesser extent the international boundary fence) acts as a barrier to movement between El Pinacate and U.S. sub-populations. The El Pinacate sub-population declined by approximately 73 percent between 1993 and 2000 (Table 3). Dry periods and associated poor forage conditions, likely exacerbated by extensive livestock grazing, may have figured prominently in the significant decline observed in the El Pinacate sub-population. Pronghorn moving across Highway 8 to the southeast may also be an explanation for the changes in these sub-populations' sizes. Between 1993 and 2001, Highway 8 was widened and improved, increasing traffic and probably increasing its effectiveness as a barrier to pronghorn movement.

The two Mexico sub-populations were resurveyed in December 2002. A grand total (both El Pinacate and southeast of Highway 8) of 214 pronghorn in 32 groups were seen for a tentative population estimate of 280. (Note this may underestimate the sub-population due to animals that apparently moved between survey blocks between counts.) This represented a decline from the total number seen (266 - decline of 20 percent) and estimated (346 - decline of 19 percent) in December 2000. A total of 19 pronghorn were observed in the El Pinacate area for an estimate of 25. This is down from 34 estimated in 2000 (decline of 26 percent). In regard to the sub-population southeast of Highway 8, 195 pronghorn were observed, which extrapolates to an estimate of 255. This is also down somewhat from the 2000 estimate when 249 were observed, with an estimate of 311 (decline of 18 percent). Based on the 2002 surveys, the total number of pronghorn in the U.S. and Mexico is estimated at 301, a decline of 32 percent from 2000 (Bright *et al*. upubl. data).

## E. Threats

*Barriers that Limit Distribution and Movement*

Sonoran pronghorn require vast areas of unencumbered open range to meet their annual needs for survival and reproduction. This includes the ability to freely travel long distances between

localized, seasonally sporadic rainfall events in search of forage. Highways, fences, railroads, developed areas, and irrigation canals can block these essential movements. Highway 2 in Mexico runs parallel to the southern boundary of Cabeza Prieta NWR and divides the range of the pronghorn between the U.S. and El Pinacate sub-populations. This highway supports a considerable amount of fast-moving vehicular traffic, and is fenced along its length, so is likely a substantial barrier to Sonoran pronghorn. In 1999, Dr. Rodrigo Medellin of Instituto de Ecologia reported that Sonora, Mexico is planning to widen and improve Highway 2 to four lanes, which would further reduce the likelihood of pronghorn crossing the highway.

Both Cabeza Prieta NWR and Organ Pipe Cactus NM maintain boundary fences along the border. At the southern boundary of Cabeza Prieta NWR, a seven-strand livestock fence has been a substantial barrier to pronghorn; however, some large gaps now exist in the fence, apparently as a result of theft of the fence posts and wire. The fence is periodically repaired. Modifying the fences along the U.S./Mexico border to allow pronghorn passage could aid in maintaining genetic diversity if sufficient pronghorn movement occurred. It may, however, also lead to increased pronghorn fatalities from motorized traffic on Highway 2. Mexico has been involved in discussions regarding the fences, as any modifications could potentially affect pronghorn sub-populations in both countries. Sonoran pronghorn habitat in Mexico is also bisected by Highway 8 between Sonoyta and Puerto Peñasco. This highway is bordered in part by a livestock fence and receives considerable tourist traffic. A less-traveled highway runs from Puerto Peñasco to Caborca.

Between Gila Bend and Lukeville, Arizona, SR 85 appears to be a significant barrier to pronghorn dispersal eastward from their current range. Traffic volume and average speeds have increased substantially over the last 30 years as international trade and tourism have increased. The Arizona Department of Transportation increased the posted speed limit on SR 85 from 55 to 65 miles per hour (mph) in 1997, and 85$^{th}$ percentile traffic speed has increased from 68-71 mph in the same period (Organ Pipe Cactus NM 2001). This highway corridor is unfenced in Organ Pipe Cactus NM, allowing potential free movement of pronghorn and other wildlife, but has livestock fencing on both sides for most of the remaining mileage on BLM, DoD, and private lands between Interstate 8 and Organ Pipe Cactus NM. Interstate 8, the Wellton-Mohawk Canal, agriculture, a railroad, and associated fences and human disturbance near the Gila River act as barriers for northward movement of pronghorn. De-watering of reaches of the Sonoyta River and some portions of the lower Gila River, and barriers to pronghorn accessing the Gila River, such as Interstate 8 and the Wellton-Mohawk Canal, have caused significant loss of habitat and loss of access to water (Wright and deVos 1986). Agricultural, urban, and commercial development at Sonoyta, Puerto Peñasco, and San Luis, Sonora; in the Mexicali Valley, Baja California Norte; and at Ajo, Yuma, and along the Gila River, Arizona, have removed habitat and created barriers to movement. BLM grazing allotment fences in the Ajo area have been modified to allow safe passage of pronghorn. Although fences can be designed to encourage safe passage, pronghorn are less likely to move across any fence line, regardless of design, than through an area without fences (J. Morgart, pers. comm. 2002). The BLM proposes to lay down the fences on portions of

the Cameron allotment during the summer, this proposal is scheduled to be implemented during fiscal years 2004-2006.

Historically, pronghorn occurred in the Lechuguilla Desert and in low numbers in the Colorado Desert to the west of the Gila and Tinajas Altas mountains (Mearns 1907). No apparent barrier to movement from their current range to the Lechuguilla Desert exists. Interstate 8, Mexico Highway 2, and the Gila and Tinajas Altas mountains form a substantial barrier to movement between the Lechuguilla Desert and the Yuma Desert; however, pronghorn could potentially use Tinajas Altas pass as a corridor through the mountains.

*Human-caused Disturbance*

A variety of human activities occur throughout the range of the pronghorn that have the potential to disturb pronghorn or its habitat, including livestock grazing in the U.S. and Mexico; military activities; recreation; poaching and hunting; clearing of desert scrub and planting of bufflegrass in Sonora; dewatering and development along the Gila River and Rio Sonoyta; increasing undocumented immigration and drug trafficking across the international border and associated law enforcement response; and roads, fences, canals, and other artificial barriers.

Studies of captive pronghorn, other than the Sonoran subspecies, have shown that they are sensitive to disturbance such as human presence and vehicular noise. Human traffic, such as a person walking or running past pronghorn in an enclosed pen, a motorcycle driving past, a truck driving past, a truck blowing its horn while driving past, or a person entering a holding pen, caused an increased heart-rate response in American pronghorn in half-acre holding pens (Workman *et al.* 1992). The highest heart rates occurred in female pronghorn in response to a person entering a holding pen, or a truck driving past while sounding the horn. The lowest heart rates occurred when a motorcycle or truck was driven past their pen. Pronghorn were more sensitive to helicopters, particularly those flying at low levels or hovering, than fixed wing aircraft. Other investigators have shown that heart rate increases in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson *et al.* 1968, Cherkovich and Tatoyan 1973, Moen *et al.* 1978).

A pronghorn can canter effortlessly at 25 mph, gallop without straining at 44 mph, and run flat out at speeds of 55-62 mph (Byers 1997). During an aerial reconnaissance, one herd of Sonoran pronghorn was observed 12 miles away from the initial observation location 1.5 hours later (Wright and deVos 1986). Hughes and Smith (1990) found that pronghorn immediately ran 1,310-1,650 feet from a vehicle, and that military low-level flights (<500 feet AGL) over three pronghorn caused them to move about 330 feet from their original location. Krausman *et al.* (2001) examined effects of military aircraft and ground-based activities on Sonoran pronghorn at the North and South TACs and concluded that behavioral patterns were similar with and without presence of military stimuli. Military activities, both ground-based and aerial, were associated with some changes in behavior (e.g., from standing to trotting or running, or bedded to standing) but the authors concluded that these changes were not likely to be detrimental to the animals.

Eighty-seven (4.1 percent) of the 2,128 events with ground-based stimuli resulted in pronghorn changing their behavior to trotting or running; a total of 866 (41 percent) resulted in some change in behavior. Krausman *et al*. (2001) documented 149 direct overflights and 263 other overflights (in which the aircraft passed ≥328 feet to the side of the animal). Pronghorn changed their behavior 39 and 35 percent of the time during direct and other overflights, respectively. Krausman *et al*. (2001) did not address the pronghorn's response to low-level helicopter flights. A study is being developed to quantify effects of helicopter flights by the Border Patrol on Sonoran pronghorn (J. deVos, Arizona Game and Fish Department, pers. comm. 2002). No conclusions could be drawn about effects to fawns due to poor fawn productivity during the Krausman *et al.* study. During times of drought, disturbances that cause pronghorns to startle and run would energetically have a more significant effect. Such energetic expenditures, particularly during times of stress, may lead to lower reproductive output and/or survival of individual animals (Geist 1971).

*Habitat Disturbance*

Livestock grazing has the potential to significantly alter pronghorn habitat and behavior (Leftwich and Simpson 1978, Kindschy *et al.* 1982, Yoakum *et al.* 1996). This is especially true in the arid Sonoran Desert. Cattle and other domestic livestock were first brought to northwestern Sonora, Mexico, in 1694 (Wildeman and Brock 2000). Overgrazing well into the 19th century by Spaniards and their descendants caused widespread habitat changes throughout much of the Sonoran Desert, particularly in more settled areas such as central Sonora, Mexico (Sheridan 2000).

American ranchers were running livestock by the early 1900s in much of the area that would later become Organ Pipe Cactus NM (Rutman 1997) and Cabeza Prieta NWR (Cabeza Prieta NWR files). Because there was no international boundary fence until 1947, livestock from both the U.S. and Mexico ranged freely across the border (Rutman 1997). Rutman (1997) estimates 1,000 head of burros and horses were present in 1942 on the southern half of Organ Pipe Cactus NM, and as many as 3,000 cattle were present on Organ Pipe Cactus NM at one time. Cattle were removed from Organ Pipe Cactus NM, Cabeza Prieta NWR, and the BMGR in 1979, 1983, and 1986, respectively (U.S. Fish and Wildlife Service 1998a, Rutman 1997). Grazing continues to be an important use of currently used pronghorn habitat on BLM lands south of Ajo, former pronghorn habitat on the Tohono O'odham Nation and the Altar Valley, and in current and former habitats in Sonora. Wright and deVos (1986) stated that poor habitat conditions (caused in part by livestock grazing) still appeared to be the leading cause in the decline in Sonoran pronghorn numbers. In Sonora, livestock grazing occurs in ejidos (community ranches or farms) and other ranch lands throughout much of the range of the pronghorn. Cattle range farther in years with abundant annual growth and are more limited to areas near water during hot and dry periods and seasons.

Mining occurred historically throughout much of the U.S. range of the pronghorn. Miners probably hunted pronghorn and disturbed habitat locally. Mining is currently not a significant

threat to Sonoran pronghorn in the U.S. No mining occurs now on the BMGR or Organ Pipe Cactus NM. Cabeza Prieta NWR has one active mining claim. The open pit and associated tailings piles at the Phelps Dodge copper mine at Ajo eliminated habitat in that area (MCAS-Yuma 2001, Organ Pipe Cactus NM 2001), but the mine is no longer in operation. During pronghorn surveys in Mexico in 2002, increasing effects from mining activities were noted in habitats used by the sub-population located southeast of Highway 8.

Illegal crossings by undocumented immigrants and drug smugglers in the U.S. range of the pronghorn have increased dramatically in recent years. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (Organ Pipe Cactus NM 2001), and an estimated 150,000 people entered the monument illegally from Mexico (Milstead and Barns 2002). Illegal border-related activities and Border Patrol response have resulted in widespread habitat degradation and increased human presence in remote areas. Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and the BMGR (Klein 2000).

*Small Population Size and Random Changes in Demographics*

A possible minimum viable population for pronghorn is 50 animals (Reed *et al.* 1986, Scott 1990). At populations of less than 100, population viability declines at an increasingly steep rate. To maintain genetic diversity over the long term, a population of at least 500 is desirable (Defenders of Wildlife 1998). The U.S. sub-population is now estimated at 21 after the 2002 drought. At an estimated 25 in 2002 the El Pinacate sub-population is also well below the possible minimum viable population. Thus, 2 of the 3 pronghorn sub-populations are seriously endangered. At 280 animals, the third sub-population (southeast of Highway 8) may be too small to maintain genetic diversity. Loss of the U.S. sub-population would dramatically reduce our ability to manage or recover this subspecies. Populations at low levels may experience random variations in sex ratios, age distributions, and birth and death rates among individuals, which can cause fluctuations in population size and possibly extinction (Richter-Dyn and Goel 1972). The sex ratio as of December 2002 was skewed in favor of females (male:female ratio of 6:15, J. Morgart, pers. comm. 2003]), which may be advantageous in regard to reproductive potential. However, the small number of males may mean that some females may not encounter and breed with a male. In the future, a scenario in which males outnumber females by a similar margin is just as likely. In very sparse populations, males may have trouble finding females, reducing productivity (Ehrlich and Roughgarden 1987). Small populations are also sensitive to variations in natural processes, such as drought and predation (Hecht and Nickerson 1999).

In 2000, we were concerned that, because of limited recruitment over the last seven years, an estimated 56 percent of the sub-population was more than six years of age. Pronghorn rarely live

more than nine years (Bright *et al.* 2001). However, the pronghorn that survived severe conditions in 2002 are likely younger animals (J. Hervert, pers. comm. 2003).

*Disease*

Sonoran pronghorn can potentially be infected by at least one bacterial (leptospirosis) and two viral (bluetongue and epizootic hemorrhagic disease) diseases. Bluetongue virus and epizootic hemorrhagic disease virus together produce a hemorrhagic disease syndrome. Pronghorn are susceptible to an additional two bacterial (Arcanobacterium and Fusobacterium) and four viral (parainfluenza, St. Louis encephalitis, vesicular stomatitis, and malignant catarrhal fever) diseases. Blood testing has shown pronghorn exposure to these diseases by increases in antibody titers over time. A number of other viral diseases, in particular, are known to affect North American ungulates and antelope and gazelle worldwide, including but not limited to, infectious bovine rhinotracheitis, bovine viral diarrhea and bovine syncytial virus (Williams and Barker 2001). The specific names, etiologies, signs, symptoms, reservoirs/hosts/transmission modes, controls, and applicable literature for those diseases specific to pronghorn are noted in Table 4.

Animals in general are subject to increased disease susceptibility when either very young, very old and debilitated, and/or stressed. The manner in which a particular disease is spread can also be a factor in disease risk. Noting Table 4, the diseases relevant to pronghorn can be transmitted indirectly through vectors, such as infected midges or ticks, or directly via aerosolized or direct contact of infected fluids or tissues. All the diseases in Table 4 are serious diseases of cattle, as well, and often lead to mortality. Cattle within the current range of the pronghorn have not been tested for the diseases listed in Table 4.

The most serious of the diseases listed in Table 4 are the two viruses, bluetongue virus (BTV) and epizootic hemorrhagic disease virus (EHDV), which together produce hemorrhagic disease (HD) syndrome. HD, in particular, can be spread by infected cattle via fecal contamination. Bovine feces are moist and voluminous, and at watering sources where animals congregate in large numbers, this fecal material is trampled into the soil, causing a substrate and odor that attract insects that are vectors capable of spreading the HD viruses from one animal to another nearby. Pronghorn, deer, and other wild ungulates produce drier, less voluminous, pelleted feces, which are less likely to produce moisture or odors that attract vectors, such as flies or midges.

Overcrowding at essential congregating areas, such as watering sources, particularly in times of drought is another factor that sets up an optimal situation for such disease transmission. Animals are competing for scarce resources and, particularly in times of severe drought, are stressed and debilitated.

Control of diseases in general can be managed in many cases by following often-used animal husbandry practices, including: 1) keeping hosts prone to infection (such as pronghorn and cattle) separated; 2) keeping vectors under control by ensuring that moist fecal material build-up at

crucial areas (such as watering sources), does not occur; and, 3) keeping overcrowding, overconcentration, stressful competition and direct contact among animals to a minimum.

## 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 which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform from which to assess the effects of the action now under consultation.

### Sonoran Pronghorn

### A. Action Area

The "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Within the U.S. portion of the Sonoran pronghorn's range, pronghorn interact to form one sub-population in which interbreeding may occur. The U.S. sub-population is effectively separated from sub-populations in the El Pinacate Region and on the Gulf Coast of Sonora by Mexico Highways 2 and 8, and the U.S.-Mexico boundary fence. Activities that may affect animals in any portion of the U.S. range of the pronghorn may affect the size or structure of the U.S. sub-population, or habitat use within the U.S. range. The action area for this biological opinion is defined as the current range of the pronghorn within the U.S. (Figure 3), plus areas of BMGR-West (from the Copper and Cabeza Prieta mountains west to the western boundary of the BMGR in the Yuma Desert) and BMGR-East (East TAC and aircraft routes to East TAC) not currently occupied by pronghorn but in which MCAS-Yuma activities are proposed. Although this entire area is affected, at least indirectly, by the proposed action, potential effects of the proposed action are most likely to occur where MCAS-Yuma activities occur, which is primarily in BMGR-West, but also at the TACs, Stoval Field, Aux-11, and flight corridors across BMGR-East and Cabeza Prieta NWR (Figure 1).

Management of the action area is almost entirely by Federal agencies. As discussed above, the BMGR (roughly 1.6 million acres) is managed by Luke Air Force Base and MCAS-Yuma primarily for military training. Organ Pipe Cactus NM manages 329,000 acres in the southeastern corner of the action area for scenic, ecological, natural, and cultural values. Cabeza Prieta NWR lies along the border west of Organ Pipe Cactus NM and encompasses 860,000 acres. Cabeza Prieta NWR is managed to protect, maintain, and restore the diversity of the Sonoran Desert. Most of the refuge and Organ Pipe Cactus NM are designated as wilderness. The BLM manages lands near Ajo for recreation, grazing (four livestock grazing allotments totaling 191,740 acres, and one allotment totaling 21,876 acres), and other multiple uses in accordance with the Lower Gila Resource Management Plan.

**B. Terrain, Vegetation Communities, and Climate in the Action Area**

The action area is characterized by broad alluvial valleys separated by block-faulted mountains and surface volcanics. The Yuma Desert on the western edge of the BMGR is part of a broad valley that includes the Colorado River. It is bordered on the east by the Gila and Tinajas Altas mountains. To the east of these mountains are a series of basins and ranges; from west to east these include the Lechuguilla Desert; the Cabeza Prieta and Copper Mountains; the Tule Desert and Mohawk Valley, including the Mohawk Dunes and Pinta Sand Dunes; the Sierra Pinta, Mohawk, and Bryan mountains; the San Cristobal Valley; the Aguila and Granite mountains; the Growler Valley; the Crater Range, Growler, Bates, and Agua Dulce mountains; and the La Abra Plain and Puerto Blanco Mountains west of SR 85, eastward to the base of the Ajo Mountains. Elevations range from 180 feet in the southwestern corner of the BMGR to 3,294 feet in the Growler Mountains. Major drainages and mountain ranges run northwest to southeast. The mountains are of two major types: a sierra type, composed of metamorphic and granitic rock, and a mesa type, typically of basaltic composition. Major drainages flow mostly northward to the Gila River, although southern portions of Organ Pipe Cactus NM and the southern slope of the Agua Dulce Mountains drain south to the Rio Sonoyta, Sonora.

Climate is characterized by extreme aridity, mild winters, and hot summers. Approximately 2.7 inches of precipitation fall annually at Yuma, with slightly more than half of this occurring in the winter months (Brown 1994). Annual precipitation increases from west to east across the BMGR; at Aguajita/Quitobaquito, precipitation is 10.5 inches annually. Infrequent chubascos (tropical storms) bring heavy rains in September or October that can produce spectacular growth on warm-season perennial plants (Felger 2000).

The vegetation community of the western portion of the BMGR has been classified as the lower Colorado River Valley subdivision of Sonoran Desert scrub (Brown 1994). It is the largest and most arid subdivision of Sonoran Desert scrub. Vegetation in the valleys, particularly in the Yuma Desert, is dominated by the creosote-white bursage series of Sonoran Desert scrub (Brown 1994). This series occupies approximately three-fourths of the lowland or valley areas in the BMGR (Reichenbacher and Duncan 1989). In this series, creosote and white bursage are often co-dominants, with galleta grass (*Pleuraphis rigida*), dalea (*Psorathamnus emoryi*), coldenia (*Tequilia plicata*) and other locally abundant species. Distinctive floras are also found in dunes in the area, particularly in the Yuma Dunes west of the Tinajas Altas Mountains, at Pinta Sands, and at the Mohawk Dunes. Species such as dune buckwheat (*Eriogonum deserticola*), Mormon tea (*Ephedra trifurca*), bugseed (*Dicoria canescens*), dune spurge (*Euphorbia platysperma*), possibly the threatened Peirson's milkvetch (*Astragalus magdalenae peirsonii*), and wire lettuce (*Stephanomeria schotti*) are found in one or more of these dune habitats. These species are dune specialists typical of the Gran Desierto dunes in northwestern Sonora (Felger 2000).

In drainages, bajadas, and montane habitats (including the Mohawk, Cabeza Prieta, Granite, and the Sierra Pinta mountains), the mixed scrub series of the lower Colorado River subdivision (Brown 1994) is found. This community is more diverse than the creosote-bursage series and

includes species more representative of the Arizona Upland subdivision of Sonoran Desert scrub, such as palo verde, saguaro (*Carnegia gigantea*), ironwood, and desert lavender (*Hyptis emoryi*), among others. Frost-sensitive species such as elephant tree (*Bursera microphylla*), limber bush (*Jatropha cuneata*), and Mexican jumping bean (*Sebastiania biloculare*) are also found in this community, but are more representative of species and genera of the Central Gulf Coast subdivision of Sonoran Desert scrub found to the south in Sonora (Dames and Moore 1995, Brown 1994).

The Arizona Upland subdivision of Sonoran Desert scrub is found in the Growler, Puerto Blanco, Ajo and Bates mountains, and surrounding bajadas. Vegetation in this community takes on the appearance of a scrubland or low woodland of leguminous trees, shrubs, and cacti. The woodland component is most developed and species richness is greatest in drainages. In the action area, common trees of the Arizona Upland include palo verdes, ironwood, catclaw acacia, and velvet mesquite (*Prosopis velutina*). Dominant cacti include saguaro, chain fruit cholla, teddy bear cholla, and organ pipe cactus. Senita cactus (*Lophocereus schottii*), more common to the south in Mexico, is found in the southern portion of Organ Pipe Cactus NM and the Agua Dulce Mountains, Cabeza Prieta NWR. Vegetation on Cabeza Prieta NWR, Organ Pipe Cactus NM, and most of the BMGR is relatively undisturbed by human activities, although the increasing numbers of immigrants and smugglers, and law enforcement response, across these areas are resulting in elevated resource damage.

## C. Status of the Sonoran Pronghorn in the Action Area

*Distribution*

Figure 3 illustrates records of Sonoran pronghorn in Arizona from 1994-2001. Additional locations are available, but they are few in number due to the loss of all telemetered pronghorn by July 2002 (all observations since then have been incidental) and the U.S. sub-population is at its lowest level ever recorded. Based on these locations and observed locations of pronghorn from 1983-1993, pronghorn have occurred most frequently in the following areas: Pinta Sands, Growler Valley, Mohawk Valley, San Cristobal Valley, and between the Growler and Little Ajo mountains (Daniel's Arroyo area). All localities from 1994-2001 are south of Interstate 8, east of the Copper and Cabeza Prieta mountains, and west of SR 85 (Bright *et al.* 2001). Pronghorn historically crossed SR 85 to use bajada habitats in eastern portions of Organ Pipe Cactus NM, and may still attempt to do so as indicated by the presence of the two radio-collared pronghorn which moved into areas east of SR 85 during summer 2002, and an animal that crossed SR 85 in July 2003. Habitat north of Interstate 8 has not been surveyed to any extent for pronghorn, but habitat in the vicinity of the Gila River is highly fragmented. Interstate 8 and the Wellton-Mohawk Canal are probably barriers to movement of pronghorn. The current range of the U.S. population of the Sonoran pronghorn encompasses 1,764,568 acres, of which 1,579,588 acres are suitable habitat (excluded are mountainous areas with the current range). Of the suitable habitat, 14 percent is located in BMGR-West, 28 percent in BMGR-East and 39, 12, four, one, and one

percent are owned/managed by Cabeza Prieta NWR, Organ Pipe Cactus NM, BLM, Arizona State Land Department, and private individuals, respectively (MCAS-Yuma 2003).

On Cabeza Prieta NWR, pronghorn groups were most often observed on the southwestern edge of the Sierra Pinta Mountains and in the Pinta Sands, in the valley between the Sierra Pinta and Bryan mountains, the Antelope Hills between the Bryan and Agua Dulce mountains, the San Cristobal and Growler valleys, and near Daniel's Arroyo. At Organ Pipe Cactus NM, pronghorn were most often observed near Acuna and Bates wells, and west of the Bates Mountains and Cipriano Hills. On the BMGR, concentrations of animals were observed near HE Hill on South TAC, with scattered sightings through the San Cristobal Valley and into the Mohawk Valley. John Hervert (Arizona Game and Fish Department, pers. comm. 1996) has numerous locations of pronghorn in the northern portion of the Agua Dulce Mountains near Antelope Tank. Pronghorn may have used the Pinta Sands area to a greater degree in the early 1970s (Arizona Game and Fish Department 1981).

Pronghorn often seek the thermal cover found in the Arizona Upland subdivision of Sonoran Desert scrub during the hot, dry summer months. This cover is best developed in the southeastern portion of their range in Arizona. With the onset of summer rains or cooler temperatures, pronghorn may move to the more open valleys and flats, such as the Growler Valley and Pinta Sands. Rocky, mountainous terrain, such as the slopes of the Growler or Mohawk mountains, is not considered habitat for the Sonoran pronghorn (deVos 1990); however, pronghorn may be found on lower slopes and in associated washes (L. Thompson-Olais, FWS, pers. comm.1996).

*Drought*

Rowlands (2000) examined trends in precipitation for southwestern Arizona and Organ Pipe Cactus NM from 1895-1999. For southwestern Arizona, no trend in precipitation was found for the period, but low precipitation occurred around 1895 and during the 1950s. Periods of high precipitation occurred in 1915-1920 and in the 1980s. For Organ Pipe Cactus NM, there was a slightly increasing trend in monthly and annual precipitation over the period 1895-1999, a strong drought occurred in the 1950s, and a lesser drought occurred in the 1970s (e.g. Felger [1980] notes a 34-month period, from September 1969-August 1972, without precipitation in the Sierra del Rosario, Sonora). No discernable trend in precipitation in southwestern Arizona or Organ Pipe Cactus NM was found in the 1990s, which is when the current decline in the U.S. pronghorn population began. At four stations in southwestern Arizona, Hervert *et al.* (2000) note below normal precipitation in the winters of 1995/1996 (-2.78 inches) and 1996/1997 (-2.87 inches), and wet winters in 1994/1995 (+1.97 inches) and 1997/1998 (+4.29 inches). Annual plant production was exceptional in the winter of 1997/1998 and spring of 1998. The winter of 1992/1993 and spring of 1993 also saw a very good crop of annual plants. Because of increased precipitation, the eastern portions of the pronghorn's current range, including Organ Pipe Cactus NM, are most likely to support annual plant production, and thus are disproportionally important to the pronghorn.

Organ Pipe Cactus NM (2001) examined available data on precipitation and concluded that "although substantial year-to-year variations exist, the general trend in the later 20th century has been one of slightly increasing rainfall" at Organ Pipe Cactus NM. Since Rowland's analysis, we have had one year characterized by above-average rainfall and abundant ephemeral forage (2001) and a year with virtually no precipitation or ephemeral forage (2002). Consistent with the findings of Hervert *et al.* (2000) and Bright *et al.* (2001), reproduction and survival were high in 2001 and very low in 2002. Historically, pronghorn populations must have weathered many severe droughts in the Sonoran Desert, including many that were more severe and longer term than what occurred in 2002. Given that pronghorn populations survived the droughts of the 1890s, 1950s, 1970s, and others before those it is unreasonable to solely attribute recent declines in the U.S. pronghorn population to drought. Organ Pipe Cactus NM (2001) concluded, "If (individual) recent dry years have had an impact on Sonoran pronghorn, it is most likely because in recent decades Sonoran pronghorn have much more limited options for coping with even brief moderate drought. Because of restrictions on their movements and range, and increasing human presence within their range, pronghorn are less able to employ their nomadic strategy in search of relief. It is not that drought itself is an impact, but possibly that drought has *become* an impact, due to other factors confounding the species' normal ecological strategy."

*Emergency Recovery Actions*

A number of critically important emergency recovery projects have been recently initiated in an attempt to reverse the decline of the U.S. sub-population of the Sonoran pronghorn. These projects are designed to increase availability of green forage and water during dry periods and seasons within the current range of the pronghorn, thereby offsetting to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Rio Sonoyta. A semi-captive breeding facility will also provide a safe haven for pronghorn that hopefully will bolster the wild population. In March 2003, with funding from MCAS-Yuma and support from Bureau of Reclamation-Yuma Area Office, the Service, and Arizona Game and Fish Department, a well (Tiller Well) was drilled in Childs Valley on Cabeza Prieta NWR. In May 2003, infrastructure was put in place to pipe water to a forage enhancement plot and water trough about 1.5 miles from the well. About 6.5 acres are currently being irrigated, perennial vegetation has responded, and on June 9, pronghorn tracks were found in the plot, and the next day a pronghorn was observed in the vicinity of and moving towards the plot. In mid June a group of six (one adult male, 2 adult females, and 3 fawns) were observed near and on the plot (J. Morgart, pers. comm. 2003). Funding from MCAS-Yuma had originally been targeted for a forage enhancement plot in the Mohawk Valley of BMGR-West; however, the pronghorn recovery team requested that the funds be redirected to the Childs Valley site where it was thought pronghorn were more likely to immediately benefit from the project. MCAS-Yuma graciously agreed to redirect the funds.

Antelope Tank on the refuge has recently been redeveloped with a larger, more reliable and larger capacity, self-filling catchment system that should provide an important water source for pronghorn. Three temporary, emergency waters have been placed in remote areas of the refuge

and Organ Pipe Cactus NM. Also, two badly-degraded segments of the Camino del Diablo have been repaired with airport matting, allowing access to recovery project sites. Other projects that are in development include additional emergency waters, redevelopment of two older existing wells in important pronghorn habitat on Cabeza Prieta NWR, additional forage enhancement plots, roadside watering to encourage ephemeral forage growth, initiation of a semi-captive breeding facility on the refuge, and opening of negotiations with our counterparts in Mexico for acquiring pronghorn from Mexico for augmenting the U.S. and Mexico sub-populations. The semi-captive breeding facility, under construction on the eastern side of Cabeza Prieta NWR, will initially house five pronghorn in a kilometer square enclosure equipped with a forage enhancement facility and waters. The initial five animals are expected to be obtained from Mexico. The facility is based on a successful semi-captive facility in place for the peninsular subspecies of the pronghorn in Baja California. We anticipate that the facility will provide a safe and productive environment in which fawns will be produced for release into the wild population. These crucial projects, which we hope will pull the U.S. population back from the brink of extinction, have been cooperative efforts among the Service, Arizona Game and Fish Department, MCAS-Yuma, Luke Air Force Base, and Organ Pipe Cactus NM, with volunteer efforts from the Arizona Desert Bighorn Sheep Society, Arizona Antelope Foundation, and the Yuma Rod and Gun Club.

**D. Past and Ongoing Non-Federal Actions in the Action Area**

The Status of the Species section describes a variety of human activities that have affected the Sonoran pronghorn since initiation of livestock grazing over 300 years ago (Officer 1993). Most non-Federal activities that have affected the pronghorn are historical in nature, and pronghorn have been all but extirpated from private, state, and Tribal lands.

Before the Taylor Grazing Act of 1934, and land use designations such as Organ Pipe Cactus NM, the BMGR, and Cabeza Prieta NWR, unregulated cattle grazing was widespread in the current range of the pronghorn. Forage and precipitation is greater in the eastern portion of the current range, thus it is likely that grazing was more prevalent in BMGR-East, Cabeza Prieta NWR and Organ Pipe Cactus NM, than in BMGR-West (MCAS-Yuma 2001). However, cattle grazing presently occurs west of Volcan Pinacate and near the Sierra del Rosario in northwestern Sonora, which are as dry as much of BMGR-West; thus we suspect cattle grazing historically occurred throughout the current U.S. range. The degree to which cattle grazing may have affected soils and vegetation communities in this area is impossible to quantify. Humphrey (1987) compared vegetation in early photos taken at boundary monuments in the early 1890s with photos taken in the 1980s and could not discern any temporal differences in vegetation in what is now Organ Pipe Cactus NM, Cabeza Prieta NWR, and BMGR. However, the changes may have occurred before 1890. In reference to monument 172 at the southern end of the Quitobaquito Hills, Humphrey notes “the entire region near the spring has probably been grazed by domestic livestock since their introduction by the Spaniards in the early eighteenth century. Any grasses that might have grown there prior to that time had probably been grazed out long

before the monument was erected." Organ Pipe Cactus NM (2001) discusses possible effects of long-term grazing in pronghorn habitat, and apparent evidence and impacts of grazing still visible at Organ Pipe Cactus NM 25 years after cattle were removed.

Before the establishment of Organ Pipe Cactus NM, BMGR, and Cabeza Prieta NWR, mining occurred in many of the mountain ranges of the area. The copper mine at Ajo was operated by Phelps Dodge Corporation and others from 1911 to 1985. The open pit mine and its tailings eliminated pronghorn habitat east and southeast of Ajo. Smaller mining operations caused habitat disturbance locally, but most mines were in mountainous terrain outside of pronghorn habitat.

Hunting and poaching may have been an important factor historically in the decline of pronghorn populations early in the 20th century; however, the Sonoran pronghorn has been protected from hunting in the U.S. for more than 50 years. We are not aware of any recent poaching events (U.S. Fish and Wildlife Service 1998a); but finding evidence of poaching would be difficult across the remote landscape inhabited by this subspecies. Recreational hunting for a variety of other species occurs within the U.S. range of the pronghorn. Two bighorn sheep permits are currently issued annually that involve a December hunt within current Sonoran pronghorn range on BMGR-West. Presence of hunters in pronghorn habitat and discharge of firearms has the potential to disturb pronghorn; however, sheep hunting occurs at a time of year when temperatures are moderate, and hunters focus their activities in the mountains whereas pronghorn are in the valleys and bajadas.

Development of agriculture, including construction of canals, roads, towns, a railroad, and other activities along the Gila River excluded pronghorn from the riparian habitats, shade, forage, and water available along the river. Similarly, construction of Sonora Highway 2, the U.S./Mexico boundary fence, and towns and agriculture along the Rio Sonoyta, excluded pronghorn from these riparian habitats, as well. Flow in the Gila and Sonoyta rivers are now much reduced or restricted to return agricultural flows or periodic flood flows. These greenbelts may have been a source of water and forage, and probably acted as buffers, to enhance survival of pronghorn during drought periods (U.S. Fish and Wildlife Service 1998a).

Numbers of undocumented immigrants and smugglers have increased dramatically in the action area. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station increased steadily from 9,150 in 1996 to 20,340 in 2000 (U.S. Immigration and Naturalization Service 2001). In 2001, estimates of undocumented migrant traffic reached 1,000 per night in Organ Pipe Cactus NM alone (NPS 2001), and 150,000 for the year (Milstead and Barns 2002). Numbers of illegal crossings through the BMGR increased in the mid to late 1990s after Border Patrol stepped up their presence in border cities. Apprehensions in the BMGR by Border Patrol were 9,500, 11,202, and 8,704 in 1996, 2000, and 2001, respectively (MCAS-Yuma 2003). These illegal crossing and law enforcement response have resulted in route proliferation, off-highway vehicle (OHV) activity, increased human presence in backcountry areas, discarded trash, and vehicles abandoned by smugglers. Habitat degradation and disturbance of pronghorn almost certainly results from these illegal activities. Increased illegal activities have precipitated increased law enforcement presence, with additional associated adverse effects. However, without Border Patrol efforts the impacts from undocumented immigrants would be even greater.

Some discussions are occurring between Mexican and U.S. officials about the creation of a guest worker program whereby Mexican nationals could legally cross the border to work in the U.S. If such a program was initiated, it might greatly reduce illegal immigration and law enforcement response, with concomitant reductions in habitat degradation and suspected disturbance of pronghorn that have increased so dramatically in recent years.

**E. Past and Ongoing Federal Actions in the Action Area**

Because of the extent of Federal lands in the action area, most activities that currently, or have recently, affected pronghorn or their habitat are Federal actions. The primary Federal agencies involved in activities in the action area include the MCAS-Yuma, Luke Air Force Base, the Service, BLM, Organ Pipe Cactus NM, and Border Patrol.

Resource management on and near the BMGR is coordinated through the Barry M. Goldwater Executive Council (BEC), a group of Federal and state agency representatives with statutory authority and management responsibility for the BMGR, its resources, and adjacent Federal lands. Formalized in March 1998, the BEC provides a conduit for communication regarding resource management issues, conflicts, and planning on the BMGR. Membership on the council includes representatives from Luke Air Force Base, MCAS-Yuma, the Phoenix and Yuma field offices of BLM, Cabeza Prieta NWR and this office, Organ Pipe Cactus NM, Arizona Game and Fish Department, and Tucson and Yuma sectors of the Border Patrol. No single agency serves as the council lead, and the organization operates on a consensus basis. One subcommittee of the BEC is dedicated to Sonoran pronghorn. The MLWA of 1999 called for the establishment of a coordinating committee to act as an advisory group to land management agencies regarding management practices on the BMGR. This committee, the Intergovernmental Executive Committee (IEC), was convened in January 2002 and meets regularly.

Arizona Game and Fish Department, working in cooperation with a number of Federal agencies, has captured and radio-collared a total of 35 adult Sonoran pronghorn since 1994; 22 in 1994, nine in 1997/98, and four in 2000. Five pronghorn captured in 1994 died within 1-33 days post-capture. Three of these mortalities were from unknown causes, while two appeared predator-related (mountain lion and coyote). Since it is unusual to have this many animals die within 40 days post-capture, the direct or indirect effects of capture myopathy, was a suspected factor in their deaths. Capture and handling procedures were immediately modified and no losses related to capture myopathy have occurred in subsequent capture operations. A sixth animal died from a broken neck caused by capture operations in December 2000. Despite these detrimental effects, data collected through radio telemetry are ultimately of great benefit to the conservation of the subspecies. Telemetry data provide information regarding habitat use and requirements, movement patterns, and increase the validity of population estimates. No pronghorn have been captured or telemetered since 2000.

In the following discussion, we have categorized Federal actions affecting the pronghorn as: 1) those actions that have not yet undergone section 7 consultation (although in some cases

consultation has been completed on components of the Federal activity), and 2) Federal actions that have undergone consultation.

*Federal Actions For Which Consultation Has Not Been Completed*

Recreation, Natural Resources, and Cultural Resources Management on the BMGR

MCAS-Yuma and Luke Air Force Base currently manage visitor use on the BMGR in accordance with the Lower Gila South Resource Management Plan-Goldwater Amendment, described below. Recreational users of the BMGR can affect pronghorn in ways similar to military activities. Vehicles, campers, discharge of firearms by hunters and recreational shooters, hikers, and other visitors to the range can all cause pronghorn to flee or avoid areas of human use, such as campsites. The level of visitor use has grown in recent years and now averages about 8,000 permits annually. This use is concentrated in the fall, winter and early spring months, particularly on the weekends. MCAS-Yuma (2003) did not provide information on the distribution of visitation, but at least some of that use occurs outside the current range of the pronghorn in Area B, east of SR 85. The current range of the pronghorn on the BMGR is closed to the public from March 15 to July 15, the key period for fawning and fawn survival. Few people visit the BMGR from July 15 to the end of September due to extreme heat. At 8,000 permits on the BMGR annually, on any day in the cooler months many parties of recreationists are likely to be present on the range. If we assume most use occurs from October 1 to March 15, then 45-50 permits are issued on average for each day during that period. Several hundred permits may be issued on holiday weekends. Although rates of visitation are, at times, high, visitors are present at a time when forage conditions are likely to be good, due to winter precipitation, and temperatures are cool. Pronghorn in the cooler months are typically not stressed and are usually in good condition. Flight from vehicles, hikers, shooting and other human disturbance is unlikely to have significant deleterious effects at that time of year.

Natural and cultural resources management by MCAS-Yuma and Luke Air Force Base require range access for inventory, monitoring, and research by wildlife biologists, botanists, cultural resources specialists and others. As with other human activities, pronghorn may flee from vehicles and people on foot, and activities may temporarily displace pronghorn from foraging or fawning areas. However, biologists and cultural resource specialists attempt to avoid areas of pronghorn use, and presence of these resource specialists in pronghorn habitat is a relatively rare event compared to recreationists, military activities, U.S. Border Patrol, and other human activities.

The INRMP and ICRMP will further define limitations and opportunities for recreationists at BMGR, and management for wildlife, including pronghorn. Key to protecting pronghorn from recreational activities will be limiting vehicular access in key foraging and fawning areas, and maintaining the current seasonal public use closures. Driving in washes can be especially deleterious because pronghorn often bed down in these areas and are flushed out when vehicles pass by. The INRMP (which will likely include implementation of the ICRMP) will be the subject of consultation in the latter half of 2003.

Management at Cabeza Prieta NWR

Over 90 percent of Cabeza Prieta NWR was designated by Congress as wilderness in the 1990 Arizona Wilderness Act. To help maintain wilderness character, no vehicular traffic is allowed except on designated public use roads. Vehicles may be parked up to 50 feet from the center of the roads in areas previously used by other vehicles. All other off-road travel is prohibited. Visitors are encouraged to practice a "leave no trace" ethic. Recreational activities on the Cabeza Prieta NWR include backpacking, hunting, photography, camping, rock climbing, mountain biking, and driving on roads. Before entering, visitors must obtain a valid Refuge Entry Permit and sign a Military Hold Harmless Agreement.

Four-wheel drive vehicles are required on all routes except Charlie Bell Road where 2-wheel drive high-clearance vehicles may be driven. Driving in wet areas is prohibited and visitors are encouraged to not travel during wet conditions due to possible damage to refuge roads. In addition to the prohibitions mentioned above, the following activities are prohibited: dumping of litter, sewage, or liquid waste; firearms, except as authorized in writing by the Cabeza Prieta NWR manager; prospecting, removal, or disturbance of sand, rock, gravel, or minerals; rock hounding; excavating or removing objects of antiquity, cultural artifacts, or paleontological artifacts; trapping; collecting, possessing, molesting, disturbing, injuring, destroying, removal, or transportation of any plant, or animal, or part of the natural flora and fauna on the NWR (exceptions to the above are legally taken game); wood campfires; and unleashed pets.

The management plan for the Cabeza Prieta NWR includes an endangered species management component (U.S. Fish and Wildlife Service 1998b). Activities in this component include the use of remote sensors in coordination with the Border Patrol, an increase in monitoring, forage enhancement plots, a semi-captive breeding facility, and the possibility of the establishment of experimental waters for pronghorn. Specific objectives concerning management goals for the pronghorn were presented in a preliminary draft Comprehensive Conservation Plan (CCP) for the Cabeza Prieta NWR (U.S. Fish and Wildlife Service 1998b) and included coordination with Arizona Game and Fish Department to conduct aerial surveys, weekly telemetry flights, radio-collaring operations, digital vegetation mapping, food plot feasibility studies, installation of water developments with photomonitors to document pronghorn use, telemetry tracking using remote data loggers, and coordination with Mexican authorities on pronghorn populations south of the border. Work continues on the CCP; the draft EIS is expected to be completed in 2003. When the CCP is drafted, we will conduct section 7 consultation on that plan if listed species or critical habitat may be affected. In the interim, we conduct section 7 interagency consultation on individual actions when they are proposed.

Cabeza Prieta NWR provides habitat for the pronghorn and is actively working to conserve the species. However, the presence of humans within pronghorn habitat may constitute a major disturbance factor. Furthermore, human presence may restrict pronghorn access to cover and/or forage and effectively create a barrier to movement.

Tucson Sector of the Border Patrol

The Tucson Sector Border Patrol section 7 consultation is not yet complete (consultation number 02-21-99-I-0138). We have received three draft BA packages and expect to receive a fourth revised draft in the near future. This consultation encompasses all field activities conducted by the Border Patrol-Tucson Sector, as part of the program to detect, deter, and apprehend undocumented immigrants and drug traffickers. Also included will be the patrol operation, Operation Grip, initiated in 2003, which is being conducted on the Los Vidrios Trail area of the Agua Dulce Mountains on Cabeza Prieta NWR. As part of this operation, trailers, which serve as living quarters for Border Patrol agents, have been placed near Bates Ranch on Organ Pipe Cactus NM. Additionally, we are currently in consultation with Border Patrol on a proposal to place six emergency beacons within pronghorn habitat so that undocumented aliens in distress can call for help.

The Tucson Sector is comprised of nine stations. Activities within the Ajo Station have the greatest potential to adversely affect pronghorn. Adverse effects may result from patrol road activities, drag road activities, off-road operations, aircraft overflights, and the use and maintenance of sensors. Furthermore, the potential for disturbance to pronghorn due to human presence may increase in areas where agents live on site (i.e., Operation Grip). Border Patrol activities can be beneficial as well, in that they deter illegal border crossings, foot traffic, and off-road vehicles in pronghorn habitat associated with undocumented aliens and smuggling.

Patrol roads used by Border Patrol agents are typically public or private ranch roads. Although the Border Patrol is not the primary user of these roads, they do have the potential to encounter Sonoran pronghorn during patrols and cause them to flee the area. The Border Patrol monitors tracks of undocumented immigrants on drag roads (dirt roads that are regularly cleared by dragging tires behind a vehicle and then monitored for human tracks). Less than 10 miles of drag roads are used by the Ajo Station. Pronghorn appear to have an affinity for drag roads as the process of preparing the roads promotes forb growth (J. Hervert, pers. comm. 1999). Additionally, these roads may be utilized by pronghorn as bedding areas due to greater predator detection resulting from increased visibility (J. Hervert, pers. comm. 1999). Pronghorn attracted to these areas may be adversely affected by the presence of patrols and road preparation activities. Sensors are placed at strategic locations along the U.S.-Mexico border on established roads or trails within known travel corridors to detect illegal activities. The Ajo Station uses and maintains approximately 85-90 sensors during daily operations. Sensor installation and/or maintenance activities could disturb pronghorn if they are in the immediate area. However, these disturbances should be infrequent and short in duration.

Off-road activities include agents on foot, the use of OHVs, including four-wheel drive vehicles, dirt bikes, and all-terrain vehicles. These activities may disturb pronghorn and disrupt normal behavioral activities. Motorized off-road activities also degrade pronghorn habitat. In addition to off-road activities, one routine helicopter patrol route is flown from Why along a

southwesterly route to the Agua Dulce Mountains. Additional helicopter activities may occur throughout the range of the pronghorn, and helicopters may hover and land. Areas where low-level helicopters are used have the highest potential for disturbance to pronghorn. Evidence from other subspecies of pronghorn and other ungulates suggests that pronghorn may exhibit elevated heart rates, may flee, and could alter habitat use in response to low-level helicopter flights (Workman *et al.* 1992).

Yuma Sector Border Patrol Beacon Stations

After initiating emergency consultation, the Yuma Sector Border Patrol installed six emergency beacon stations (panic buttons) on the BMGR as a means to reduce mortality of illegal immigrants. The installation of the stations resulted in little habitat disturbance; however, the presence of the electronic stations may increase human presence in these areas (undocumented immigrants, and maintenance and rescue crews) and therefore represents an additional disturbance factor for pronghorns. To date, the beacon stations have been activated several times. Yuma Sector Border Patrol has requested reinitiation of consultation on their ongoing activities, including the operation and maintenance of these beacons. We expect to complete a biological opinion by the end of September 2003.

Smuggler/Drug Interdiction

We are aware of U.S. Customs, Drug Enforcement Authority, and Arizona Army National Guard smuggler or drug interdiction activities in pronghorn habitat, including vehicle and helicopter activities. However, none of these agencies have provided information to us about the extent or types of activities they conduct, and no consultation has occurred on these activities. National Guard helicopter operations may no longer be occurring in pronghorn habitat; however, we aware of low-level helicopter flights as late as February 2001. Due to a lack of information, we cannot evaluate the extent to which these activities may affect Sonoran pronghorn or their habitats. However, vehicles and low-level helicopter flights can cause pronghorn to run, which can have adverse physiological effects, particularly when the animals are stressed, such as during drought (see Effects of the Proposed Action).

*Federal Actions Addressed in Section 7 Consultations*

As part of our comprehensive discussion of all past and present actions affecting pronghorn within the action area, we describe below all biological opinions issued to date that may affect the pronghorn.

Four opinions addressed projects with minor effects to the pronghorn. Two opinions (consultation numbers 02-21-83-F-0026 and 02-21-88-F-0006) covered capture and collaring of pronghorn for research purposes, with no incidental take of pronghorn anticipated. Consultation number 02-21-88-F-0081 involved installation of a water source in the Mohawk Valley for pronghorn, with no incidental take anticipated. Consultation number 02-21-89-F-0008 addressed

change in aircraft use by Luke Air Force Base on the BMGR, including change in aircraft type from the F-15A/B to the F-15E, and an increase in nocturnal flights (F-15E Beddown Project). We anticipated take of pronghorn in the form of harassment as a result of aircraft overflights. Reasonable and prudent measures to minimize take included: 1) development of long-term studies to determine the effects of overflights on the pronghorn, 2) if effects of overflights are identified, Luke Air Force Base would work with us to eliminate them, and 3) work involving pronghorn would be carried out in accordance with appropriate state and Federal permits. This project was later incorporated into the biological opinion on Luke Air Force Base' activities on the BMGR, discussed below. Intra-Service consultation for recent emergency conservation activities conducted by Cabeza Prieta NWR and AGFD, including water tanks, forage enhancement plots, and the proposed semi-captive breeding facility, concluded that no incidental take of pronghorn was anticipated. No incidental take is known to have occurred as a result of these emergency actions.

Nine biological opinions evaluated major projects with greater effects to pronghorn:

Border Patrol Activities in the Yuma Sector, Wellton Station, Yuma, Arizona

This biological opinion (consultation number 02-21-96-F-0334), issued September 5, 2000, addressed all Border Patrol activities along the United States/Mexico border in Yuma County from the Colorado River to about the area of Pinta Sands at the south end of the Sierra Pinta Mountains. The Yuma Sector has requested reinitiation of consultation; we expect a revised opinion will be produced by the end of 2003. Border Patrol activities within the Yuma Sector/Wellton Station included helicopter and ground patrols; drag road preparation and assessment of road maintenance; remote sensor installation and maintenance; apprehensions and rescues; and assistance to other sectors and agencies. To reduce adverse effects on pronghorn, the Border Patrol agreed to implement the following measures: 1) purchase new, quieter MD600N helicopters to replace existing OH-06As; 2) contact the Arizona Game and Fish Department weekly for an update on weekend telemetry flights to avoid areas of pronghorn concentration; 3) modify helicopter flights to avoid fawning areas during the three peak months of the fawning season (April-June); 4) make confidential monthly reports to the manager of Cabeza Prieta NWR detailing the law enforcement actions and wildlife observations made during the previous month; 5) finalize the Memorandum of Understanding between the Border Patrol and Cabeza Prieta NWR to address objectives that will minimize potential conflicts including limiting routine patrols and off-road use in wilderness and providing a framework for cooperation; and 6) conduct an annual interagency meeting with Cabeza Prieta NWR, this office, and BLM to present the annual report and discuss ways to improve coordination.

Disturbance to pronghorn was anticipated as a result of on-the-ground Border Patrol operations, and direct injury or mortality of pronghorn as a result of collision with Border Patrol vehicles or by low-level helicopter flights abruptly approaching and startling pronghorn, which may result in injury or energetic stress, particularly during drought. Pronghorn may also be adversely affected by noise and visual impacts of helicopter overflights. The increased energy expenditure caused by sudden or loud noises may lead to lower reproductive output and/or survival. The potential

for detrimental effects to pronghorn may be greatest during the peak months of the fawning season (April-June). Habitat disturbance due to off-road vehicle travel would also result. During reinitiation of this consultation in 2003, we intend to ensure that helicopter flights do not occur over or near the semi-captive breeding facility, which should be completed in late 2003.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. We anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years. The following reasonable and prudent measures were provided: 1) minimize injury of pronghorn; 2) monitor and study reactions of pronghorn on BMGR to Border Patrol activities; and 3) provide a means to determine the level of incidental take that results from Border Patrol activities. Several conservation recommendations were also provided.

The Border Patrol submitted an annual report of their activities in 2001, in which they stated that they were in the process of implementing the reasonable and prudent measures, terms and conditions, and conservation recommendations that were part of the proposed action. They have not replaced the OH-06A helicopters with quieter models, as the agreed to during consultation in 2000; however, they are investigating other single turbine helicopters with low noise profiles. We are not aware of any incidental take attributable to Border Patrol activities in the Yuma Sector's Wellton Station resulting from the proposed action.

BLM's Lower Gila South Management Area

Three biological opinions address BLM's Lower Gila South Management Area. The Lower Gila South Resource Management Plan-Goldwater Amendment (consultation number 02-21-90-F-0042), proposed specific and general management guidance for non-military activities on the BMGR. Of particular importance for pronghorn was proposed management of recreation. Use of the BMGR is by permit only. The number of BMGR recreational use permits issued by the BLM field offices increased dramatically in the late 1990s, with a total of 893, 2545, and 3528 permits issued in 1998, 1999, and 2000, respectively. Permits are also issued by the USAF, Marine Corps, and Cabeza Prieta NWR. Permits are valid for any part of the BMGR that is open to public recreation. The presence of an increasing number of humans creates a disturbance risk to pronghorns, and OHVs may constitute a mortality factor. The OHV roads and heavily used vehicle-camping areas degrade habitat and may disturb pronghorn, as well as create barriers to pronghorn movement. No incidental take was anticipated. The non-jeopardy biological opinion, issued April 25, 1990, was programmatic, requiring BLM to consult when site-specific projects are proposed. To date, no site-specific formal consultations have been conducted. In November 2001, BLM's management of the range ceased and will be replaced by the BMGR INRMP (see section entitled "Recreation, Natural Resources, and Cultural Resources Management" herein).

The Lower Gila South Habitat Management Plan (HMP) (consultation number 02-21-89-F-0213) provided management guidance for both specific and general actions in southwestern Arizona. Four actions were addressed in the HMP, including an exchange of 640 acres near Ajo,

rehabilitation work on two catchments, and assessment of livestock removal from pronghorn habitat. Exchange of land out of public ownership may facilitate development or other uses that would preclude use by pronghorn. No incidental take was anticipated. The non-jeopardy opinion was issued on May 15, 1990.

The biological opinion for the Lower Gila South Resource Management Plan and Amendment (consultation number 02-21-85-F-0069) addressed programmatic management of lands in southwestern Arizona, including livestock grazing, wilderness, cultural resources, fire, minerals and energy, recreation, wildlife management, wood cutting, Areas of Critical Environmental Concern, and other land uses. The biological opinion concluded that OHV restrictions and designations of Areas of Critical Environmental Concern would benefit pronghorn, but wood cutting, recreation, grazing activities, mining, and designation of utility corridors would adversely affect pronghorn. Incidental take of the pronghorn was anticipated, but not quantified. Any decline of forage quality or increase in the amount of fencing was judged to indicate that incidental take had been exceeded. Reasonable and prudent measures and terms and conditions to minimize take included: 1) modifying grazing allotment fences to allow passage of pronghorn, 2) improving habitat conditions for the pronghorn, and 3) minimizing human disturbance. We provided conservation recommendations to monitor pronghorn use of the area, assess pronghorn use at livestock waters, and consolidate lands through land exchanges. The non-jeopardy biological opinion was issued on March 27, 1998. In accordance with the opinion, BLM has monitored livestock grazing, and allotment fences have been modified to allow passage of pronghorn. Enforcement of vehicle and camping regulations has been increased south of Ajo.

In summary, the biological opinions for BLM's Lower Gila South Planning Area anticipated adverse effects to pronghorn and their habitat from livestock grazing, recreation, a land exchange, wood cutting, mining, and designation of utility corridors, resulting in an anticipated unspecified amount of take. We determined that the proposed actions were not likely to jeopardize the continued existence of the pronghorn. Removal of BLM management from the BMGR by the MLWA of 1999 has ended BLM actions on the BMGR in the Lower Gila South Management Area that may have affected pronghorn.

Organ Pipe Cactus National Monument - Widen North Puerto Blanco Road

The biological opinion for the Widen North Puerto Blanco Road project (consultation number 02-21-01-F-0109) addressed impacts to pronghorn from the proposed construction of new recreational infrastructure (although consultation on this project is completed, construction has not yet begun due to concerns about the pronghorn). The project was anticipated in concept in the November 16, 2001, opinion on Organ Pipe Cactus NM's General Management Plan, but it was recognized at the time that project-specific consultation would be needed. The project would widen the first 5.1 miles of North Puerto Blanco Road to allow for two-way travel, construct a vehicle turn-around, construct four interpretive pullouts with educational kiosks, and construct a parking area with picnic tables, a restroom facility, and educational kiosks at the terminus of the two-way segment. North Puerto Blanco Road would be widened from 14 feet to

20 feet, concrete low-water crossings would be installed in washes, and some steeper portions of the road would be paved for safety and erosion control.

The project is expected to result in effects to pronghorn from 11 acres of habitat loss, increased disturbance from recreational activities, and movement barrier effects from increased use of the road and recreational activities. Use of the new two-way road, pullouts, and terminus facility may curtail the movements of pronghorn into the area, effectively barring the species from a portion of their range. These effects are expected to be offset by Organ Pipe Cactus NM's program of annual road and backcountry closures and by delaying construction until the pronghorn's status has improved. Closing these facilities during the crucial fawning and summer dry seasons should largely eliminate these effects during periods when pronghorn are most likely to be in the monument and need access to these areas.

Organ Pipe Cactus NM proposed the following conservation measures to minimize effects to pronghorn: 1) institute a monitoring program such that any pronghorn detected in Organ Pipe Cactus NM will result in a 5-mile diameter buffer zone around the animal which will be closed to all activity, except for a minimal amount of administrative traffic; 2) limit backcountry permits to areas east of SR 85 and south of North Puerto Blanco Drive from March 15 to July 15; 3) close North Puerto Blanco Drive annually to public use from March 31 to July 15, and close the Bates Well Road and Pozo Nuevo Road to public use from March 15 to July 15; 4) continue to place temporary waters in backcountry areas during the dry season for pronghorn; 5) delay timing of construction of the project until after the fawning and summer dry seasons (March 15-July 15); and 6) construction will also be delayed until significant rainfall occurs and most pronghorn move out of the Monument to other areas of their range. We determined that the project was not likely to jeopardize the continued existence of the pronghorn. The non-jeopardy biological opinion was issued October 29, 2002. Based on discussions with Park staff, proposed conservation measures are being implemented.

SR 85 Roadway and Drainage Improvements Project, Organ Pipe Cactus NM

On May 8, 2003, we issued a biological and conference opinion for the roadway and drainage improvements to SR 85 through Organ Pipe Cactus NM. The action agency was Organ Pipe Cactus NM. The project included placement of a pavement overlay on the existing roadway width (26 feet) for the length of the project (MP 80.50 to MP 57.80), as well as overlay at existing intersections with Organ Pipe Cactus NM crossroads and the Port-of-Entry at Lukeville. Also proposed were a 6-foot-wide roadway shoulder to be built up to match the elevation of the new roadway pavement, replacement of existing ford concrete walls at 24 low-water wash crossings, modification at the Organ Pipe Cactus NM Visitor Center that would combine the entrance and exit at the site of the existing exit, as well as the construction of right and left turn lanes and a southbound acceleration lane to serve the new entrance/exit, construction of two interpretive waysides for use by motorists, including visitors to Organ Pipe Cactus NM, construction of a concrete box culvert in Cherioni Wash (MP 70.29) to eliminate the existing dip-crossing, and other roadway improvements associated with these features. Included in the

proposed action were a number of conservation measures to minimize effects to listed species. These included: salvage of vegetation and revegetation of 8.27 acres, installation of gates on the two SR 85 waysides so they can be closed to public use during the pronghorn fawning period (March 15 - July 15), vegetation clearing adjacent to SR 85 for visibility, a literature review of pronghorn-road interactions and recommendations for reducing the likelihood of pronghorn road mortality or injury, placement of temporary water sources in key areas at critical times for pronghorn, a monitoring program to assess effectiveness of temporary waters, continuation of participation in and financial support of the pronghorn emergency recovery projects, an annual report of pronghorn conservation efforts addressing annual progress for each of the measures listed here and in other current biological opinions on the pronghorn, contribution to the 51 recovery projects identified by the Sonoran pronghorn recovery team, timing of construction to avoid the pronghorn breeding season, and coordination with us and the Arizona Game and Fish Department to determine pronghorn presence in the Monument prior to construction. NPS will only begin construction after receiving written authorization from us to proceed, based on pronghorn telemetry or overflight survey information (note - no pronghorn are currently telemetered).

We concluded that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No take of pronghorn was anticipated. We included three conservation recommendations for pronghorn.

*5 Remanded Biological Opinions*

In response to *Defenders of Wildlife, et. al., v. Bruce Babbitt, et. al.* (Civil Action No. 99-927 [ESH]), Judge Ellen Huvelle of the United States District Court (Court) for the District of Columbia issued a Memorandum Opinion and Order on February 12, 2001. The Court found that we failed to address the impact of various Federal actions on the Sonoran pronghorn when added to the environmental baseline and failed to include in the environmental baseline the impacts of all Federal activities in the area that may affect, directly or indirectly, the pronghorn.

The Court ordered us to produce, in consultation with the defendants, revisions of the following biological opinions: Luke Air Force Base (August 1997), Army National Guard (ARNG) (September 1997), BLM (December 1997), MCAS-Yuma (April 1996), and Organ Pipe Cactus NM (June 1997). The Court further ordered that we, in consultation with the Federal agencies whose biological opinions have been remanded, must reconsider those portions of the opinions that have been found to be contrary to the dictates of the Act. This included the scope of the action area, analysis of the environmental baseline, and analysis of the effects of incidental take in context with a revised environmental baseline. The remanded biological opinions were issued on November 16, 2001. A reinitiated opinion on the BLM's grazing allotments was completed in September 2002. In the following discussion, we describe both the original and remanded/reinitiated opinions for these five consultations.

<u>BLM grazing allotments in the vicinity of Ajo, Arizona</u>

The original biological opinion (consultation number 02-21-94-F-0192), issued December 3, 1997, addressed effects to pronghorn resulting from issuance of grazing permits on five allotments, four of which are located near Ajo and Why (Cameron, Childs, Coyote Flat, and Why allotments); and the fifth near Sentinel (Sentinel allotment). All but portions of allotments east of Highway 85 were considered to be within the current distribution of the Sonoran pronghorn. According to the BLM, livestock use of the five allotments had been relatively low in the previous ten years; however, the effects of stocking the allotments at any level had not been analyzed. Monitoring of the Coyote Flat and Why allotments had not occurred. The BLM permittees had not fully stocked the Cameron, Why, Sentinel, and Childs allotments for a sustained period of time. The Coyote Flat Allotment had been billed for full stocking. According to the BLM, monitoring data had not shown overutilization of the vegetation or a change in vegetation composition. The BLM estimated that if allotments were stocked at permitted levels, forage utilization rates could approach 40 percent. Preliminary data from the BLM and the Arizona Game and Fish Department showed that there is little dietary overlap between pronghorn and cattle. Because of this, the amount of forage on allotments, and the likely utilization levels, we found that adequate forage for the pronghorn should be available. Maintenance of livestock waters, fences, and other improvements may temporarily disrupt pronghorn activity. Pronghorn may also become entangled in livestock fences.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn was anticipated to occur in the form of harassment or death due to grazing management activities during the 15-year proposed action. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) minimize impacts to pronghorn from grazing and 2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat. The opinion included the following conservation recommendations: develop allotment management plans for each allotment and monitor pronghorn use within Cameron, Coyote Flat, Sentinel, and Why allotments.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. A final biological opinion was issued on November 16, 2001. The Federal action considered in that opinion was the issuance of a 10-year grazing permit on the five allotments. However, because the BLM agreed to finalize their Rangeland Health Allotment Evaluations conducted during 2001, and to then reinitiate consultation regarding the continued grazing of these allotments, the 2001 biological opinion analyzed the effects of the proposed action only for the interim period. In this biological opinion we concluded that grazing activities within the interim period would not jeopardize the continued existence of the Sonoran pronghorn. Further, we concluded that these actions would not result in take of Sonoran pronghorn. The opinion included a number of conservation recommendations, as well.

The BLM reinitiated consultation on the Ajo allotments on April 23, 2002. The proposed action was the reissuance of 10-year grazing permits on the five allotments addressed in previous opinions. The BLM included a number of very comprehensive conservation measures to be implemented according to a prioritized schedule. These measures included: 1) BLM will only

authorize ephemeral grazing on the Cameron, Coyote Flats, Childs, and Why allotments in accordance with ephemeral use criteria in their Arizona Rangelands Standards and Guidelines and if both of the following conditions are met: a) In years where ephemeral plant production is geographically limited, ephemeral forage on the Ajo allotments is not an important part of ephemeral forage available to pronghorn, either in terms of forage quality or acreage of greenup, and b) the U.S. pronghorn population must be above 100 and increasing; 2) BLM will implement a forage enhancement project on the Cameron Allotment starting in fiscal year 2004, 3) BLM will develop a "drought policy" for the 5 allotments to more consistently guide authorization of grazing use in Sonoran pronghorn range when drought situations occur, 4) BLM will install ground-level drinking troughs for use by pronghorn, outside of the corrals, on 3 livestock wells in the Cameron Allotment, 5) During 2004-2006, BLM will install lay-down fences along portions of the southwestern boundaries of the Cameron Allotment to allow unimpeded passage of pronghorn. These portions of the fence will be laid down, beginning on May 1 of each year, with the reinstallation process to begin no sooner than August 31 and to be completed by September 15 of each year, 6) BLM will construct a fence to contain livestock in the northern part of the Cameron Allotment from May 1 to September 15 of each year, 7) BLM will provide this office with full descriptions, including photographs and diagrams, of all existing livestock water sources within the allotments west of SR 85. Based on the results of the study described below in 8, BLM will work with us to determine any necessary modifications to each water source to a) reduce the potential of the source to provide breeding habitat for biting midges (may require restricting access to some sources through fencing or breaching dams and allowing the sources to dry); b) provide safe access for Sonoran pronghorn; and c) ensure that such modifications do not result in adverse effects to other listed species in the vicinity (e.g., cactus ferruginous pygmy-owls may use the more vegetated water sources), and 8) BLM will initiate or cooperate in development of a study of the potential for disease transmission from livestock to pronghorn in the Ajo Allotments.

In the September 30, 2002, opinion, we concluded that the proposed action is not likely to jeopardize the continued existence of the pronghorn. This conclusion was based in part on full and prompt implementation of the conservation measures. To date, BLM has prohibited ephemeral grazing, developed a drought policy, surveyed fence lines, purchased some fencing materials, inventoried water sources west of SR 85, funded a pilot disease study, implemented seasonal route closures, contributed $15,000 towards survey and monitoring efforts, and made other progress in implementing the conservation measures. BLM's conservation measures would also eliminate any potential for take of pronghorn from the project. Four conservation recommendations were included in the opinion.

Thus far, compliance with the conservation measures has been good. BLM was to submit annual reports to us on implementation of their action, including the conservation measures. The first report was received in March 2003. Consistent with the opinion, a report inventorying all livestock waters on the allotments west of SR 85 (measure 7) was received by us in November 2002, and BLM initiated a study of disease transmission in the Ajo allotments with Arizona Game and Fish Department in 2003 (measure 8).

Marine Corps Air Station-Yuma in the Arizona Portion of the Yuma Training Range Complex

Consultation began on the Arizona portion of the YTRC in 1995. The original biological opinion (consultation number 02-21-95-F-0114), issued on April 17, 1996, addressed all proposed and authorized actions on the BMGR by MCAS-Yuma, including proposed changes to military flights over Cabeza Prieta NWR, ongoing flights over BMGR, and operation of various training facilities such as landing strips, a rifle range, targets, a parachute drop zone, a transmitter/telemetry system, and ground support areas. MCAS-Yuma conducts WTI courses twice a year (March-April and October-November - see Description of the Proposed Action).

Ground-based activities, such as those of troops and vehicles at ground-support areas were likely to adversely affect pronghorn habitat use. Over the entire project area, ground-support areas in potentially occupied pronghorn habitat would encompass approximately 32.4 $mi^2$. Numerous pronghorn have been located in recent years in R-2301W on the BMGR and the Cabeza Prieta NWR east of the Baker Peaks, Copper, and Cabeza Prieta mountains. In this area, ongoing and proposed military ground-based activities have the greatest potential for adversely affecting pronghorn. Military overflights do not cause habitat degradation, but pronghorn may respond with increased heart rates and flee from aircraft, particularly low-level helicopters. The increased energy expenditure associated with flight behavior may lead to lower reproductive output and/or survival. Additionally, pronghorn may avoid flight paths, which may result in an indirect loss of useable habitat. In areas where helicopters fly particularly low and create more noise and greater visual stimuli, disturbance to pronghorn would be expected to be greater. Ordnance delivery may also adversely affect pronghorn. Pronghorn use both the North and South TACs, and ordnance, live fire, and shrapnel could potentially strike and kill or injure a pronghorn. Furthermore, pronghorn could be killed or injured during an encounter with unexploded live ordnance on the ground. MCAS-Yuma proposed measures to reduce the direct and indirect impacts of the proposed action, including measures to reduce or eliminate take of Sonoran pronghorn and to minimize destruction and degradation of habitat.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take of one pronghorn per 10 years was anticipated in the form of direct mortality, and undetermined numbers of pronghorn were anticipated to be taken in the form of harassment by low-level fixed wing and helicopter flights, military vehicles, or other activities authorized, funded, or carried out by MCAS-Yuma. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) MCAS-Yuma will develop personnel and visitors educational/information programs and operational procedures; 2) to the extent practicable, military activities shall be located outside of pronghorn habitat; and 3) incidental take resulting from the proposed action will be monitored and reported to us. Three conservation recommendations were included in the opinion, as well.

In 1999, MCAS reported that no pronghorn habitat was modified, Range Management received no reports of Sonoran pronghorn encounters, and all air and ground crews were briefed on the requirements of the opinion. We are not aware of any incidental take of pronghorn attributable to

MCAS-Yuma YTRC activities. On March 18, 1998, an amendment was requested on the consultation by MCAS-Yuma. This request slightly changed the description of the equipment and personnel to be used in the Stoval Field exercise area. We determined that the changes would have no additional effects not already anticipated in the biological opinion.

The 1996 biological opinion was remanded to us by the Court on February 12, 2001. During consultation, MCAS-Yuma proposed 26 conservation measures aimed at the reduction of adverse effects of the proposed action on the environment, including impacts to the Sonoran pronghorn (Dames and Moore 1995; MCAS -Yuma 1995, 1997, 2001; letter from MCAS-Yuma to us dated October 15, 2001). We concluded that the proposed action would not jeopardize the continued existence of the Sonoran pronghorn. Further, we anticipated that no more than six Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be in the form of harassment. This incidental take provision will be reviewed concurrent with subsequent reviews of the BMGR INRMP, which will occur every five years. The following reasonable and prudent measure was provided to minimize take of pronghorn: MCAS-Yuma shall modify low-level helicopter use to avoid areas of significant pronghorn use to minimize adverse effects from helicopters on the pronghorn and its habitat, particularly areas important for fawns and their mothers. The opinion included several conservation recommendations, as well. We issued the final remanded biological opinion on November 16, 2001.

Organ Pipe Cactus NM General Management Plan

The biological opinion (consultation number 02-21-89-F-0078), issued June 26, 1997, addressed implementation of Organ Pipe Cactus NM's GMP. The purpose of the GMP is to guide management for the next 10-15 years. Plan elements included: 1) working with Arizona Department of Transportation to ensure continued travel and commerce on SR 85 while enhancing resource protection, 2) seeking designation of Organ Pipe Cactus NM as the Sonoran Desert National Park, 3) establishment of partnerships to share facilities, staff, and costs in Why and Lukeville, 4) increased wilderness and development of an interagency wilderness and backcountry management plan, 5) changes in trails at Quitobaquito, 6) changes in facilities in the Twin Peaks area, 7) increased primitive camping and designated trails, and 8) full implementation of the Organ Pipe Cactus NM Cultural Resources Management Plan.

To reduce adverse effects on pronghorn, Organ Pipe Cactus NM proposed the following: 1) pursue an agreement with Arizona Department of Transportation to establish a vehicle for continued communication regarding road-related issues, construct underpasses at known movement corridors to facilitate safe passage of pronghorn under the highway, and establish a program to explore other measures to better understand and subsequently reduce the impacts of SR 85 on pronghorn; 2) continue working with the Arizona Department of Public Safety to enforce the existing speed limit within Organ Pipe Cactus NM; 3) convert the bottom strands of Organ Pipe Cactus NM's north and south boundary fences to smooth wire to encourage pronghorn movements between Organ Pipe Cactus NM and surrounding areas; 4) educate

motorists about the plight of pronghorn using a variety of interpretive media in an effort to encourage lower speeds and increased awareness of wildlife use of the highway corridor; 5) continue to serve as a member of the Interagency Core Working Group for Sonoran pronghorn recovery and implement activities outlined in the recovery plan, including development of a monitoring program; and 6) monitor visitor use and restrict access where necessary to minimize the potential for disturbance to pronghorn.

Recreational activities at Organ Pipe Cactus NM include hiking, camping, horse-back riding, and biking. These activities can disturb pronghorn and degrade habitat. Maintaining and/or adding hiking trails at Organ Pipe Cactus NM is likely to maintain or increase visitor presence in pronghorn habitat, resulting in disturbance to pronghorns. All proposed facilities would be located within areas of existing development and would involve relatively small tracts of land surrounded by larger areas of undisturbed habitat. However, development of facilities that result in increased visitor use may adversely affect the pronghorn. Increased use of some frontcountry and backcountry areas has the potential to adversely affect pronghorn if it causes an alteration in behavior or habitat use. Increased visitation to Organ Pipe Cactus NM was also expected to result in increased traffic along SR 85, adding to the barrier effect of existing traffic patterns. Approximately 22 miles of SR 85 lie within Organ Pipe Cactus NM. We concluded that the highway is a deterrent to expanding pronghorn populations, and resulting modified behavioral patterns may lead to a reduction in genetic exchange and viability, and therefore a reduction in the ability of pronghorn to adapt to environmental change.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. Incidental take in the form of injury or death to one pronghorn associated with traffic on SR 85 was anticipated. The following reasonable and prudent measures were provided to minimize take of pronghorn: 1) work with agencies to implement actions to reduce effects of current and future traffic patterns on SR 85; 2) modify fences for pronghorns; 3) educate motorists on pronghorn vulnerability to traffic; and 4) monitor use and restrict access where necessary to minimize pronghorn disturbance. One conservation recommendation was included in the opinion. No incidental take of pronghorn associated with the proposed action has been documented.

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. The GMP had changed since the 1997 plan was released, most notably with regard to projects that were ongoing or had been completed, and the addition of new projects. To reduce adverse effects, Organ Pipe Cactus NM included 14 conservation measures for Sonoran pronghorn in its proposed action: 1) closing Pozo Nuevo Road to public use at its intersection with Puerto Blanco Drive from March 15 to July 15; 2) closing Bates Well Road to public use at the northern monument boundary from March 15 to July 15; 3) closing North Puerto Blanco Drive at a point approximately 5.1 miles from the Visitor's Center, and also at its intersection with Pozo Nuevo Road from April 1 to July 15; 4) implementing a pronghorn monitoring program and closing areas within a 5 mile diameter of known pronghorn locations, specifically targeting Puerto Blanco Road for potential closure between March 1 and March 31; 5) restricting backcountry use, from March 15 to July 15, to areas east of SR 85 and south of North Puerto Blanco Drive; 6) limiting future development to the area south of North Puerto Blanco Drive and east of Senita

Basin Road/Baker Mine Trail/Dripping Springs Mine Trail and limiting timing of construction to occur outside the pronghorn fawning and summer dry seasons (March 15 to July 15); 7) establishing a 3-year experimental pronghorn crossing zone on SR 85 from milepost 67 to 71, consisting of a temporary speed limit reduction to 35 - 45 mph from 0400 - 0900 hours seasonally, including a monitoring program to assess effectiveness; 8) removing the north boundary fence if BLM agrees to remove livestock from the Cameron and Coyote Flat allotments for a period of at least 20 years, including at least a 2 year advance notice of BLM's intention to return livestock to these areas; 9) placing temporary water sources in key areas, primarily during the dry season, and including a monitoring program to assess effectiveness of temporary waters; 10) continuing to support pronghorn radiotelemetry (if animals are again, radiotelemetered); 11) implementing erosion control measures utilizing a hydrologist/sedimentologist; 12) maintaining and expanding a non-native species removal program including removal of bufflegrass and Sahara mustard; 13) providing an annual report of pronghorn conservation efforts; and 14) contributing to the 51 recovery projects identified by the Sonoran pronghorn recovery team (Appendix 1 of the 2001 opinion) within National Park Service regulations, either by providing in-kind contributions or by commitment of funds. Consequently, we did not anticipate any incidental take of Sonoran pronghorn as a result of the proposed action. A number of conservation recommendations were included in the opinion.

The November 16, 2001, opinion was remanded for further revision to us by court order, dated January 7, 2003. The April 7, 2003, opinion came to the same conclusion on the pronghorn as the November 2001, opinion (i.e., the proposed action was not likely to jeopardize the continued existence of the pronghorn, and no incidental take of pronghorn was anticipated). Organ Pipe Cactus NM made some changes in the conservation measures after finalization of the opinion. An addendum to the opinion was issued by this office on June 11, 2003, clarifying the changes and stating that they did not alter our previous findings in the April 7, 2003, opinion.

Luke Air Force Base Use of Ground-Surface and Airspace for Military Training on the BMGR

The biological opinion (consultation number 02-21-96-F-0094), issued August 27, 1997, addressed military use of the airspace above and the ground space on BMGR-East by Luke Air Force Base. At the time of the consultation, about two-thirds of the BMGR was located on lands managed by the DoD and BLM, with the remaining third located within Cabeza Prieta NWR. Approximately 5 percent (7.6 percent, if not including Cabeza Prieta NWR) of the range had been impacted by military activities. Military activities within the area of overlap with the Cabeza Prieta NWR were limited to use of airspace and operation of four Air Combat Maneuvering Instrumentation sites. Military activities occurring within BMGR-East were managed by Luke Air Force Base and include: airspace use, four manned air-to-ground ranges, three tactical air-to-ground target areas, four auxiliary airfields, Stoval Airfield, and explosive ordnance disposal/burn areas. Primary potential effects of the action included habitat loss due to ground-based activities, harassment and possible mortality of pronghorn at target areas, and disturbance of pronghorn due to military overflights.

We determined that the proposed action was not likely to jeopardize the continued existence of the pronghorn. During each 10-year period of the project, take was anticipated in the form of

harassment that was likely to injure up to two pronghorn and in the form of death of at least one pronghorn. The following reasonable and prudent measures were provided to minimize take: 1) minimize impacts of activities on pronghorn; 2) minimize habitat loss, degradation, and fragmentation of pronghorn habitat; 3) monitor and study reactions of pronghorn on the BMGR to military activities; and 4) determine the level of incidental take that results from the project. Three conservation recommendations were provided in the opinion.

Implementation of the reasonable and prudent measures have been documented in their annual reports. We are not aware of any take of pronghorn confirmed attributable to Luke Air Force Base use of the ground-surface and airspace on the BMGR. A pronghorn found dead near a target may have been strafed, but it may also have died from other causes (see "Effects of the Proposed Action" herein for a full discussion of this incident).

The 1997 biological opinion was remanded to us by the Court on February 12, 2001. During the development of revised opinion, Luke Air Force Base made substantial commitments to minimize the effects of their activities on the Sonoran pronghorn, and additionally committed to implementing a variety of recovery projects recommended by the Sonoran Pronghorn Recovery Team. A total of 12 conservation measures were added to the proposed action. In a November 16, 2001, biological opinion, we concluded that the proposed action, including conservation measures, is not likely to jeopardize the continued existence of the Sonoran pronghorn. We further anticipated that no more than three Sonoran pronghorn would be incidentally taken as a result of the proposed action. The incidental take was expected to be one pronghorn in the form of death and two pronghorn in the form of harassment. The incidental take provision will be reviewed concurrent with subsequent reviews of the BMGR INRMP, which will occur every five years. To minimize impacts to Sonoran pronghorn, we provided the following reasonable and prudent measure: Luke Air Force Base shall expand efforts to monitor Sonoran pronghorn on the tactical ranges to minimize the likelihood of adverse impacts to the pronghorn from military training exercises. Additionally, several conservation recommendations were suggested

In the November 16, 2001, biological opinion, one term and condition was provided to implement the reasonable and prudent measure described above. Luke Air Force Base has since completed this term and condition by updating the range operating instructions to reflect the conservation measures in the proposed action. Luke Air Force Base also continues to support the recovery of the Sonoran pronghorn through the biological monitoring contract and management of their previously obligated funds. Also in the opinion, we discussed a number of conservation measures that Luke Air Force Base agreed to add to their proposed action. During FY 2002, Luke Air Force Base did not budget further funds for Sonoran pronghorn management; however, they are assisting Arizona Game and Fish Department in managing the currently obligated funds.

The opinion was remanded again in 2003 with this opinion and the ARNG WAATS opinion. In the August 6, 2003, opinion, we also found that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No incidental take was anticipated due to the low numbers of pronghorn in the U.S. sub-population. Luke Air Force Base recommitted to the conservation measures agreed to in the November 16, 2001, opinion. A number of conservation recommendations were included in the opinion.

Western Army National Guard Aviation Training Site Expansion Project

The non-jeopardy biological opinion for WAATS (consultation number 02-21-92-F-0227) was issued on September 19, 1997. The purpose of WAATS is to provide a highly specialized environment to train ARNG personnel in directed individual aviator qualification training in attack helicopters. The WAATS expansion project includes: 1) expansion of the existing Tactical Flight Training Area, which includes establishing four Level III touchdown sites, 2) development of the Master Construction Plan at the Silver Bell Army Heliport, and 3) establishment of a helicopter aerial gunnery range for use by the ARNG on East TAC of the BMGR. East TAC is outside the current range of the pronghorn.

This 1997 biological opinion did not address the pronghorn, but, in the Court's opinion, should have and was therefore remanded by the Court. Per the final EIS for WAATS, ARNG use of East TAC did not cause existing training to shift to North or South TACs because Luke Air Force Base eliminated F-15E training at BMGR, concentrating on F-16 air-to-air and air-to-ground training. Therefore, the EIS did not consider impacts to the pronghorn and none were anticipated. All activities that are part of the proposed action occur outside the current range of the pronghorn, with the exception of training at North TAC. Training at North TAC only occurs when East TAC is closed for annual maintenance and EOD clearances (4-6 weeks each year). Effects to pronghorn at North TAC are minimized by monitoring protocols established by Luke Air Force Base. Training at East TAC could preclude recovery of historical habitat if the many other barriers that prevent pronghorn use of East TAC were removed.

The final remanded biological opinion, issued November 16, 2001, found that the proposed action was not likely to jeopardize the continued existence of the Sonoran pronghorn. No incidental take was anticipated. The proposed action included eight conservation measures aimed at the reduction of adverse effects to Sonoran pronghorn and its habitat. The proposed measures minimized, but did not eliminate, habitat disturbance from the ARNG that would occur on North TAC. The WAATS opinion was remanded by the court in 2003 with this opinion and the Luke Air Force Base opinion. The August 6, 2003, opinion also found that the proposed action was not likely to jeopardize the continued existence of the pronghorn. No incidental take was anticipated. ARNG included the following conservation measures as part of their proposed action: 1) they proposed to study the effects of low-level helicopter flights on a surrogate pronghorn population at Camp Navajo, and 2) they committed to funding up to five percent of emergency recovery actions on the BMGR.

**F. Summary of Activities Affecting Sonoran Pronghorn in the Action Area**

Historically, livestock grazing, hunting or poaching, and development along the Gila River and Rio Sonoyta were all probably important factors in the well-documented Sonoran pronghorn range reduction and apparent population decline that occurred early in the 20th century. Historical accounts and population estimates suggest pronghorn were never abundant in the 20th century, but recently, the estimated size of the population in the action area declined from 179 (1992) to 21 (December 2002). At 21, genetic diversity is expected to erode, and the sub-population is in imminent danger of extirpation due to human-caused impacts, or natural

processes, such as predation or continued drought. Although the proximate cause of the decline during 2002 was drought, human activities limit habitat use options by pronghorn and increase the effects of drought on the sub-population. The U.S. pronghorn sub-population is isolated from other sub-populations in Sonora by a highway and the U.S./Mexico boundary fence, and access to the greenbelts of the Gila River and Rio Sonoyta, which likely were important sources of water and forage during drought periods, has been severed.

Within its remaining range, the pronghorn is subjected to a variety of human activities that disturb the pronghorn and its habitat, including military training, increasing recreational activities, grazing, increasing presence of undocumented immigrants and smugglers, and in response, increased law enforcement activities. MCAS-Yuma (2001) quantified the extent of the current pronghorn range that is affected by various activities and found the following: recreation covers 69.6 percent of the range, military training on North and South TACs covers 9.8 percent, active air-to-air firing range covers 5.8 percent, proposed EOD five-year clearance areas at North and South TACs and Manned Range 1 cover 1.0 percent, and MCAS-Yuma proposed ground support areas and zones cover 0.29 percent. In addition, livestock grazing occurs over 5.6 percent of the pronghorn's current range (Organ Pipe Cactus NM 2001, Bright *et al.* 2001); a total of 860 miles of roads occur in the current range (MCAS-Yuma 2001)(2,222 miles of roads exist within the BMGR, of which on BMGR-West 368 miles are within the current range of the pronghorn and 464 miles are within the historical range - MCAS-Yuma 2003), and foot and vehicle traffic by undocumented immigrants and smugglers occurs at an increasing frequency throughout the area. Organ Pipe Cactus NM (2001) identified 165 human activities in the range of the pronghorn, of which 112 were adverse, 27 were beneficial, 26 had both adverse and beneficial effects, and 4 had unknown effects. Organ Pipe Cactus NM (2001) concluded that in regard to the pronghorn, "while many projects have negligible impacts on their own, the sheer number of these actions is likely to have major adverse impacts in aggregate."

The current range of the pronghorn in the U.S. is almost entirely comprised of lands under Federal jurisdiction; thus authorized activities that currently affect the pronghorn in the action area are almost all Federal actions. However, illegal, unauthorized foot traffic and off-road vehicle activity have been and continue to be significant non-Federal threats to the pronghorn and its habitat. Prior to November 2001, in seven of 12 biological opinions issued by FWS that analyzed impacts to the pronghorn, we anticipated that take would occur. In total, we anticipated take of five pronghorn in the form of direct mortality every 10-15 years, and an undetermined amount of take in the form of harassment. Given the small and declining population of pronghorn in the U.S. at the time the opinions were written, take at the levels anticipated in the biological opinions would constitute a substantial impact to the population.

Changes made in the remanded biological opinions in 2001 and 2003, plus the findings in other recent opinions, reduced the amount or extent of incidental take anticipated to occur from Federal actions. In the November 16, 2001, opinion, we found that take would occur in 5 of 13 (the original 12 opinions plus the ARNG opinion that now considers effects on the pronghorn) biological opinions issued up to that point for the Sonoran pronghorn. We now only anticipate take of pronghorn in three opinions: 1) Border Patrol activities in the Yuma Sector, for which incidental take of one pronghorn in the form of harassment was anticipated in 10 years, 2) the

Lower Gila South Resource Management Plan and Amendment, in which an undetermined number of pronghorn were anticipated to be taken, and 3) Luke Air Force Base F-15E Beddown Project. However, we believe that conservation measures agreed to by BLM in the 2002 Ajo allotment grazing opinion largely minimizes or eliminates incidental take resulting from the Lower Gila South Resource Management Plan and Amendment. The Luke Air Force Base's F-15 Beddown Project is subsumed into Luke's August 6, 2003, opinion, in which no take is anticipated. This amount of take is much less than that anticipated in 2001 because we have worked together with the Federal action agencies to minimize the effects of ongoing and proposed activities on the Sonoran pronghorn. In addition, at about 21 animals in the U.S. sub-population, the likelihood of take due to Yuma Sector Border Patrol or BLM activities is now much less than we had anticipated when those opinions were written, because the pronghorn population is much smaller, greatly reducing the likelihood of interactions between pronghorn and these Federal activities (although the effect of any take on the viability of the U.S. sub-population is now much greater, due to small population size). With the exception of likely capture-related deaths during telemetry studies, we are unaware of any confirmed incidental take resulting from the Federal actions described here.

We believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors, including habitat degradation and disturbance within the pronghorn's current range resulting from a myriad of human activities, exacerbated by periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the action area.

**EFFECTS OF THE PROPOSED ACTION**

We now examine the effects of the proposed action in light of the present precarious status of the Sonoran pronghorn to determine whether implementing that action would be reasonably expected, directly or indirectly, to reduce appreciably the likelihood of the survival and recovery of the species. The proposed action includes the proposed conservation measures, which minimize and ameliorate the potential impacts of MCAS-Yuma's activities on the pronghorn.

The supplemental EIS (MCAS-Yuma 2001), which evaluated effects of MCAS activities on the pronghorn, evaluated activities within the current range of the pronghorn. MCAS-Yuma (2003) evaluated effects within the current range and the historical range east of the Gila and Tinajas Altas mountains. However, the historical range of the pronghorn in Arizona extended west to the Colorado River and east to the Santa Cruz River valley (Mearns 1907, U.S. Fish and Wildlife Service 1998). As a result, we describe and evaluate effects of MCAS-Yuma activities in current as well as all historical habitat in the action area (currently occupied habitat plus the Lechuguilla Desert and Yuma Desert and East TAC and aircraft routes to East TAC). The original 1996 biological opinion stressed that our analyses of effects to the pronghorn from military activities were often inconclusive or uncertain because a lack of information about how pronghorn respond to such activities. Our knowledge is still incomplete in this regard, but monitoring of the tactical ranges during military activities, better information on the effects of overflights, noise from practice and live ordnance delivery, and ground-based activities

(Krauseman *et al.* 2001), and a longer history of monitoring the pronghorn population and behavior have improved our ability to evaluate effects of the action.

Effects of ongoing and proposed activities on the Sonoran pronghorn can be segregated into effects of ground-based activities and effects of overflights. Ground-based activities can destroy or degrade forage and cover, and result in behavioral or physiological changes that may be detrimental (Geist 1971, Freddy *et al.* 1986, Workman *et al.* 1992). Some types of surface disturbance appear to attract pronghorn, if such disturbance results in increased forage, water, or visibility (Hervert *et al.* 2000). With the exception of ordnance delivery at targets and aircraft crashes, crash rescue or clean up activities, overflights do not directly affect pronghorn habitat. However, in response to military overflights, pronghorn may exhibit a startle response or may flush from cover (Krausman *et al.* 2001, Hughes and Smith 1990, Workman *et al.* 1992, Luz and Smith 1976). Pronghorn may alter their use of areas to avoid aircraft noise or disturbance (Bleich *et al.* 1990, Krausman *et al.* 1986), or may exhibit other physiological or behavioral responses that could be detrimental (Bowles 1995, Norrix *et al.* 1995, Stockwell and Bateman 1987, Berger *et al.* 1983). In addition, overflights may involve delivery of practice or live ordnance, chaff (small fibers that reflect radar signals and temporarily hide aircraft from radar detection), flares, and live rounds that may affect pronghorn directly or alter its habitat.

Our understanding of the effects of the proposed action has not changed dramatically since the November 16, 2001, biological opinion. What has changed is that the U.S. pronghorn sub-population has declined dramatically to roughly 21 animals and a number of crucial emergency recovery actions have been initiated in an attempt to offset the effects of drought and human disturbance, and to hopefully prevent the loss of the U.S. sub-population. The currently very small number of animals in the U.S. population greatly reduces the potential for interaction between pronghorn and military activities. Thus, the likelihood of adverse effects occurring to individuals or the population is much reduced (although any adverse effects that occur would have a proportionally greater impact on the population due to small population size). The emergency recovery actions are expected to create a less stressful environment, in that forage and water will be available even during drought, and thus wild pronghorn will be better equipped physiologically to withstand stress, such as human disturbance. In time, animals produced in the semi-captive breeding facility will augment the wild population. These factors are discussed in full below.

**Ground-Based Activities**

*Overview*

Behavioral responses of wild ungulates to human activities range from none to panic flight and abandoning areas of disturbance, while physiological responses may include a variety of effects that can influence survival and reproduction (Geist 1971). deVos (1989) investigated the relationship of telemetered pronghorn localities to the proximity of "concentrated military activities" on the BMGR. Pronghorn tended to be found relatively close to military activities, particularly in areas within 660 feet of military zones, and were less common than expected in areas 5,250 to 21,000 feet from military zones. This occurred despite the fact that many

pronghorn were initially captured on Cabeza Prieta NWR and Organ Pipe Cactus NM, at points distant from military activity, and would not be expected to occur near military zones.

Hervert *et al.* (2000) investigated use of military target areas by pronghorn, and found that pronghorn showed a preference for some military target areas. The first 0.6 miles around targets were most preferred by pronghorn, and the authors concluded that pronghorn may be attracted to the airfield and HE Hill on the North TAC. The authors surmised that pronghorn may be attracted to these areas because of available water, forage, and greater visibility. They documented pronghorn drinking from water collected in a bomb crater in this area. The authors found that pronghorn may be attracted to areas with plywood targets, but appeared to avoid metal convoy target areas. Plywood targets were typically located on bajadas, and association with these targets may have been incidental to pronghorn preference for this habitat type.

Krausman *et al.* (2001) investigated effects of military overflights and ground-based activities on the pronghorn at North and South TACs. This is the only comprehensive study of the effects of military activities on the Sonoran pronghorn. The North and South TACs support some of the most intense military use on the BMGR, and, within the current range of the pronghorn, are where most live fire practice and live ordnance delivery occur. The ranges are used heavily by pronghorn; 21 (about 20 percent of the U.S. population) used the two TACs during the study by Krausman *et al.* (2001). Krausman *et al.* (2001) observed 2,128 ground-based events, 443 overflight events, and 594 occurrences of other air stimuli (flares, bombs, smoke) on the BMGR. In response to all stimuli, on days without stimuli, pronghorn foraged more and bedded less than on days with stimuli; the opposite was true for fawns. Krausman *et al.* (2001) only considered a change in behavior to trotting or running in response to stimuli as biologically significant. Eighty-seven (4.1 percent) of the 2,128 events with ground-based stimuli resulted in pronghorn changing their behavior to trotting or running. A total of 866 events (41 percent) resulted in some change in behavior. Movements of more that 33 feet associated with ground-based stimuli were observed only once, in which a female moved during multiple stimuli, including 2 vehicles and military aircraft.

Krausman *et al.* (2001) also monitored noise levels at the BMGR. In regard to all forms of military activities, the authors concluded that: 1) behavioral patterns of pronghorn were similar with and without presence of military stimuli, 2) behavioral patterns of pronghorn exposed to military activity were similar to that of pronghorn not exposed to regular military activity, and 3) auditory characteristics are similar for ungulates that have and have not been exposed to sound pressure levels characteristic of military activity. Military activity was associated with changes in the behavior of pronghorn, but these changes did not likely influence animals in a detrimental manner. The authors found that because of low fawn productivity and recruitment, they could not draw specific conclusions about fawn behavior in the presence of military activity. Fawns were involved in 2 of the 6 instances in which pronghorn moved more than 33 feet. Fawns appeared to respond to military stimuli as do their mothers, which may be more sensitive to anthropogenic stimuli than other pronghorn.

Any activity that is detrimental to fawns is important to the conservation of the pronghorn because low fawn recruitment appears to limit population size. Hervert *et al.* (2000) investigated fawn survival on the BMGR versus Organ Pipe Cactus NM and Cabeza Prieta NWR, and found no difference in daily mortality rates of fawns between the BMGR and the other two areas. The authors concluded that their data do not support a hypothesis that fawn survival is affected by military training activities. However, military overflights and other ground activities (e.g., recreation, Border Patrol, undocumented immigrants) occur in all three areas to varying degrees; thus it is not possible to evaluate the effects of human activities, including military activities, on fawn survival, or to tease out the effects of ground-based or other types of military activities from other factors that may affect fawn survival.

With the recent decline of the pronghorn population from 99 in 2000 to about 21 animals in 2002, the likelihood that pronghorn will be affected by military activities has declined similarly. Because they are now so scarce on the BMGR, it is now much less likely that a pronghorn will be adversely affected by any one military activity. As animals are moved into the semi-captive breeding facility, that likelihood will decline further. Pronghorn are probably much more inclined to be adversely affected by ground-based military activities at times when they are stressed by lack of forage and water, such as occurred in 2002 (M. Coffeen, pers. comm. 2003). During these stressful times, running from vehicles or exclusion from foraging areas could contribute to increased mortality or decreased physical condition of individual animals. When forage enhancement projects and water developments are completed, they should provide pronghorn with a buffer against drought and allow them to better survive stressful periods, such as what occurred in 2002. At the same time, if animals are in better condition due to forage enhancement and available water, they will be less affected by human interactions and disturbance.

*Ground-based Activities in the Yuma Desert*

Figure 3 displays pronghorn localities from 1994-2001. All proposed and ongoing activities in the Yuma Desert, west of the Gila and Tinaja Altas mountains, including the Cannon Air Defense Complex, rifle range, Munitions Treatment Range, AUX-2, Cactus West and Moving Sands targets, parachute drop zone, and four proposed ground support areas are outside of the current range of the pronghorn, and thus would not affect the survival of the pronghorn or occupied habitat. The Yuma Desert is within the historical range of the pronghorn and might be considered as a reintroduction site in the future as part of a recovery program, or pronghorn could expand into this area on their own (U.S. Fish and Wildlife Service 1982), although neither of these activities are likely to occur in the foreseeable future. However, the area is considerably more arid than the areas currently occupied, and pronghorn were probably not common in the Yuma Desert historically (Mearns 1907). Nevertheless, disturbance, such as foot and vehicle traffic at ground support areas, grading and use of targets, activities at AUX-2, the EOD operating area, and rifle range, could degrade habitat by removing cover and forage, and pronghorn could avoid these areas because of the presence of humans, noise, vehicles, or other disturbance, if pronghorn were translocated into or recolonize the area. However, these

activities would affect a small proportion of the area west of the Gila and Tinajas Altas mountains (less than one percent of the approximately 315 $mi^2$ of potentially suitable habitat in this area) and, as a result, have a minimal effect on the recovery potential of the pronghorn.

*Ground-based Activities in the Lechuguilla Desert and other areas West of the Current Range of the Pronghorn and West of the Gila and Tinajas Altas Mountains*

Ground support areas; Stinger Team operating areas; TACTS targets, instrument sites, airfields, and threat emitters; small tactical unit foot patrols, personnel parachute drops, and roads in the area from the Baker Peaks area, east slope of the Copper and Cabeza Prieta Mountains to the east slope of the Gila and Tinajas Altas mountains, including the Lechuguilla Desert, all occur west of the current range (Figure 1) and all pronghorn localities shown on Figure 3 (a few unconfirmed sightings in the 1990s of pronghorn were recorded west of the Cabeza Prieta Mountains). A greater potential exists for pronghorn to occur in this area as compared to the Yuma Desert (U.S. Fish and Wildlife Service 1994a), but if pronghorn use the area, it is not as important as other areas to the east and southeast (see Figure 3). The reason for the apparent current absence of pronghorn from this area is unknown, but could be related to differences in forage or cover availability. This area is subjected to more ground-based and aerial military activities than portions of Cabeza Prieta NWR and Organ Pipe Cactus NM that are frequently used by pronghorn. A road that runs along the east side of the Gila and Tinajas Altas mountains to Tinajas Altas is also used heavily by recreationists. The greater level of military activity in the Lechuguilla Desert, combined with recreational use, could conceivably contribute to this relatively low use by pronghorn.

The greatest impact from ongoing and proposed ground-based military activities in the Lechuguilla Desert would likely result from activities in ground-support areas. Base camps, mobile radar sites, communications facilities, and anti-aircraft missile sites at support areas all contribute to localized habitat disturbance caused primarily by heavy vehicle and equipment tracks and foot traffic of up to hundreds of troops (MCAS-Yuma 1995). All or parts of 27 ground support areas (sites 21-25, 27, 30, 31, 33-37, 39, part of 48, part of 49, 50, 54, 55, 57, 59, and 60-65) occur in this area and cover approximately 7,180 acres of potential pronghorn habitat. This is about 4 percent of the available potential habitat in this area. MCAS-Yuma (2003) reports that sites 21, 23-25, 27, 30, 31, 34-36, 54, 57, and 59 are not identified for any specific use at this time. The other sites are used during WTI and other occasionally scheduled exercises. Sites 50 and 65 are often used as a major base camp. WTI activities occur in March, early April, October, and November. In the spring, females and fawns are sensitive to disturbance; however, in the fall fawns have matured and temperatures are moderated, reducing stress on pronghorn and the likelihood that they would be adversely affected by ground activities. The level of use and habitat disturbance in each ground support area varies. Activities in these areas include off-road vehicle use, placement of equipment, tents and other facilities of a bivouac, and troops walking the site. Trash, contaminants, and human waste are strictly controlled and are removed from the site. In ground support areas, activities would likely focus on previously disturbed areas, but over time additional new disturbance would

occur incrementally. Ultimately, and over time, up to the entire 7,180 acres could be disturbed by one or more activities. While activities are occurring, presence of people and vehicles are likely to exclude pronghorn. When exercises are not occurring, disturbed areas where vegetation has been removed could attract pronghorn, but if cryptobiotic crusts are destroyed and soils are heavily compacted due to vehicle and equipment use, these areas may not be capable of providing adequate annual forage to benefit pronghorn (Bainbridge and Virginia 1990, Belnap 2002; in contrast to disturbance on the TACs that appears to stimulate growth of annuals, Hervert *et al.* 2000). Continued use of disturbed areas will preclude potential for restoration.

Other proposed and ongoing ground-based activities in the Lechuguilla Desert are expected to cause minimal disturbance to pronghorns and their habitat. Roads and TACTS threat emitters, range tracking instrumentation stations, and electronically scored targets contribute additional localized areas of disturbance. The Stinger Teams would operate along existing routes, but could disturb small areas of habitat when they pull off the road. Vehicles and troops could result in some pronghorn flushing from cover and moving some distance away (Workman *et al.* 1992, Wright and deVos 1986). But because pronghorn are absent or very rare in this area, the probability of teams encountering them is very low. Flushing or disturbance of pronghorn as a result of other activities, such as military and recreational vehicle use of roads, use of TACTS airfields, and construction and maintenance of the TACTS threat emitter sites is similarly low. Threat emitters have been installed so that hazardous radiation will not reach ground levels and thus will not affect pronghorn (MCAS-Yuma 2003 and 2001).

*Ground-based Activities in the Current Range of the Pronghorn East of the Baker Peaks, and Copper and Cabeza Prieta Mountains*

Numerous pronghorn have been located in recent years in R-2301W on the BMGR and Cabeza Prieta NWR east of the Baker Peaks, and the Copper and Cabeza Prieta mountains (Figure 3). In this area, ongoing and proposed military ground-based activities have the greatest potential for adversely affecting pronghorn. Table 7 of MCAS-Yuma (2003) summarizes land uses within the current range of the Sonoran pronghorn. Ground-based activities by MCAS-Yuma, including Stoval Airfield, ground support areas, range maintenance support areas, threat emitters, and TACTS range facilities have resulted in surface disturbance over 3,314 acres, most of which has occurred in the ground support areas. This acreage is 0.21 percent of suitable habitat within the current range of the pronghorn. Additional disturbance occurs on roadways in BMGR-West and areas of ordnance delivery at the TACs in BMGR-East. Effects of ordnance delivery are fully evaluated later in this document.

Activities in ground support areas would likely cause the greatest habitat disturbance and potential for disturbing pronghorn. According to MCAS-Yuma (2003), all or parts of 10 ground support areas, including 40, 41, 43, 44, 45, 46, part of 48, part of 49, 66, and 67 lie in the current range of the pronghorn. These areas encompass 2,917 acres, or about 0.18 percent of the suitable habitat within the current range of the U.S. population of the pronghorn.

Disturbance at ground support areas within the current range of the pronghorn could be considered greater than this. The range of the pronghorn could be considered to extend to Baker Peaks (see Bright *et al.* 2001). No recent records exist for the base of Baker Peaks, but pronghorn have occurred nearby and no apparent barriers to movement into the areas exist. If such an extension of the range is made, then ground support areas 39, all of 48 and 49, 54, 55, and 60-65 would be considered within the current range of the pronghorn as well, and the disturbance within the current range of the pronghorn would be 0.35-0.40 percent of the current range. As with other ground support areas, use and associated disturbance in each area will vary. MCAS-Yuma (2003) reports that low to moderate levels of disturbance is present at areas 41, 43, 44, 45, 46, and 67, and that it is unlikely that the full surface area of most of the ground support areas will be affected by foreseeable military use. We expect that an incremental increase in habitat degradation is anticipated over time and previously disturbed areas would not recover. As described for sites outside the range of the pronghorn, habitat disturbance is expected to reduce the capability of these areas to produce annual forage for pronghorn. Ground support activities may also cause disturbance to individual animals or discourage use of the area (Workman *et al.* 1992). In addition to the support areas just described, Stoval Field is also located in the current range of the pronghorn (Figure 1). Stoval encompasses about 330 acres, of which approximately 40 acres are covered with macadam-paved runways and aprons. The forward arming and refueling point and C-130 activities at Stoval occur on the paved surfaces. In total, about 3,300 acres of ground support areas available for Marine Corps use are located inside the current range of the Sonoran pronghorn, which is about 0.21 percent of that current range.

Ground support areas 43, 44, 45, 46, and 67, in the southern portions of the Mohawk Valley are in an area that has been frequented by Sonoran pronghorn. Military activities in these areas is relatively light in comparison to other ground support areas. MCAS-Yuma anticipates that use in these 5 areas will be for emitting electronic threats or to track aircraft. These activities typically involve up to 12 personnel using equipment mounted on up to four vehicles at one, all, or any combination of sites. Typically, a site is used from 8-12 hours per day; a deployment may last up to 36 hours. Between March 15 and July 15, a key period for fawn survival, use of these support areas is confined to the Spring WTI course, which typically ends by March 31, but may extend into the first week of April, and occurs for about 6 days. From July 15 to March 15, use usually occurs on an additional 12 days, which are typically during the Fall WTI. These activities are sedentary and produce minimal noise, which should be of minimal disturbance to pronghorn. However, pronghorn are expected to move away from vehicles and personnel during these training activities. Repeated off-road use into the ground support areas will cause an incremental degradation of habitat over time. MCAS-Yuma has committed to monitoring the sites in accordance with their INRMP, and will report the results of that monitoring in an annual report to the Service.

Ground-based activities outside of the ground support areas and east of the Baker Peaks and Copper and Cabeza Prieta mountains include Stinger Team operations along roads, TACTS range threat emitters and their maintenance, a transmission line along an existing road, use of

existing roads, foot patrols by small tactical units in the vicinity of Combat Village in the Copper Mountains, and TACTS range instrument sites and their maintenance. The effects of these activities on pronghorn habitat are, for the most part, expected to be minimal and will likely cause minimal disturbance to pronghorn, because they are very localized, and in the case of Stinger Team, LAAD operations, small tactical units, and maintenance operations, are temporary and periodic in nature. Of greatest concern would be Stinger Team operations in the southern or southeastern portion of the Mohawk Valley. In comparison to the Lechuguilla Desert, pronghorn are more likely to be encountered on roads and other project sites, thus the potential is greater for disturbing animals or for causing habitat disturbance that may currently affect pronghorn survival.

Six fixed threat emitters are located in the vicinity of recent pronghorn locations in the southwestern portion of the Mohawk Valley. Each fixed threat emitter site is a fenced facility that encloses about 0.2 acres each (1.2 acres for all six). Generators in use at mobile and fixed TACTS range threat emitter sites produce 81 decibels of noise at 10 feet and 40 decibels at 80 feet (MCAS-Yuma 2003). The generators are operated for about 40 hours per month (MCAS-Yuma 2001). The effect of this generator noise on pronghorn is unknown; however, 40 decibels is not loud - it is equivalent to noise in a typical quiet office setting (MCAS-Yuma 2003). Generators are refueled about once every 20 days. About three days are required to refuel all of the fixed threat emitter sites in the Baker Peaks and Copper Mountain area, including the six sites in the current range of the pronghorn.

Of the 17 mobile threat emitters, six are located within the current range of the pronghorn; the other 11 are located west, southwest of Baker Peaks or are in the Lechuguilla Desert (Figure 1). The mobile threat emitter sites are located on concrete pads, the sites are about 0.2 acre each, for a total of 1.2 acres within the current range of the pronghorn and 2.2 acres for all 17. During Spring of 2001, one of the six threat mobile emitters in the current range of the pronghorn was operated for seven hours per month; the other five were operated for 14 hours per month, each. These numbers are expected to be typical of future use. Generators at each active site produce noise levels similar to that described for the fixed threat emitters. As with the fixed emitter sites, mobile units need to be refueled periodically, and trucks are used to place and remove the threat emitters.

Truck and foot traffic in the Mohawk Valley during periodic refuelings of threat emitters and placement and removal of mobile threat emitters may result in temporary pronghorn flushing or dispersing away from work areas and access roads. These activities are most likely to have biologically significant effects to pronghorn in the spring fawning period from March 15 to July 15. Threat emitters have been installed so that hazardous radiation will not reach ground levels and thus will not affect pronghorn (MCAS-Yuma 2003 and 2001).

Two forage enhancement plots are planned along an east-west road in the Mohawk Valley near the boundary with Cabeza Prieta NWR. These areas, when in use, are expected to attract pronghorn. They will only be watered when forage is not otherwise available, thus they may

become crucial foraging areas for pronghorn. There is some potential that Stinger Teams operating along this road during the March-April WTI could disturb pronghorn in these forage enhancement plots or flush them temporarily to other areas. Based on fawn locations from 1995-2001, important areas for fawns and their mothers exist in the southeastern portion of the Mohawk Valley on BMGR and around the southern end of the Mohawk Dunes (Figure 4). Fawns and their mothers may be particularly sensitive to disturbance in the spring (Krausman *et al.* 2001).

If winter and spring rains have been spatially concentrated in portions of the Mohawk Valley subject to military activities, pronghorn could be excluded from important foraging areas that otherwise might help fawns and their mothers through the critical late spring and early summer period when forage is scarce before the onset of the monsoons. However, precipitation increases from west to east across the BMGR and typically when conditions become dry pronghorn move from the Mohawk Valley east and south where forage is most likely to occur. Nevertheless, the Mohawk Valley may occasionally provide forage into the late spring and may be important during that period. For instance, in 2002, the Mohawk Valley was one of the few places within the current range of the pronghorn that greened up during the spring months.

*Use of Roadways*

Many of the activities described above involve use of roads in BMGR-West, and to a small degree in BMGR-East (access to Stoval Field and AUX 11). Vehicles may cause pronghorn near the road to flush and run a short distance (Krausman *et al.* 2001). We are not aware of any Sonoran pronghorn that have been struck by vehicles on the BMGR or other unpaved roads elsewhere within the range of the species. We believe such an event is unlikely because: 1) only 21 pronghorn currently exist in the U.S. population (although it is expected to increase over time), 2) most roads are not capable of supporting high speed traffic, 3) all military users of the range are informed of the presence of pronghorn and the need to minimize effects to the species, and 4) MCAS-Yuma has imposed a speed limit of 25 miles per hour in suitable habitat within the current range of the pronghorn, and will identify areas to be temporarily avoided to minimize effects to pronghorn. Because of runoff from road surfaces, some road shoulders support annual plants in areas where forage may otherwise be scare (R. Pearce pers. comm. in MCAS-Yuma 2003). This forage may help pronghorn through stressful drought periods, but may also expose them to increased risk of collisions with vehicles or flush responses.

*Summary of Effects of Ground-based Activities*

MCAS-Yuma conducts a variety of ground-based activities, primarily in BMGR-West, but also at Stoval Field, AUX 11 in BMGR-East. Many of these activities occur in the Lechuguilla Desert and the Yuma Desert outside of the current range of the pronghorn, but within historical, and perhaps, recovery habitat for the animal. These activities affect a relatively small portion of pronghorn habitat in these areas; including less than one percent of habitat in the Yuma Desert, and about four percent of habitat between the Gila and Tinajas Altas

Mountains and the Baker Peaks and Copper Mountains, including the Lechuguilla Desert. Ground-based activities by MCAS-Yuma in the current range of the pronghorn, including Stoval Airfield, ground support areas, range maintenance support areas, threat emitters, and TACTS range facilities result in surface disturbance within a larger aggregate area of 3,314 acres. This acreage is about 0.21 percent of suitable habitat within the current range of the pronghorn. Additional small amounts of surface disturbance occur in the current range of the pronghorn on roadways in BMGR-West and areas of ordnance delivery at the TACs in BMGR-East (discussed later in this document). Much of the activity within the current range of the pronghorn is concentrated near the Baker Peaks, which are located at the extreme northwestern edge of the pronghorn's current range.

Krausman *et al.* (2001) evaluated the effects of military activities on Sonoran pronghorn. They only considered a change in behavior to trotting or running in response to stimuli as biologically significant. Eighty-seven (4.1 percent) of the 2,128 events with ground-based stimuli resulted in pronghorn changing their behavior to trotting or running. A total of 866 events (41 percent) resulted in some change in behavior. Presence of troops or maintenance workers at areas of ground activities is transitory within the current range of the pronghorn; however, when people are present on the ground, they are likely to exclude use by pronghorn of localized areas. This is likely to have the greatest effects on pronghorn during the critical portion of the fawning season, from March 15 to July 15, or during times of drought when pronghorn are in poor physical condition. If winter and spring rains have been spatially concentrated in portions of the Mohawk Valley subject to military activities, pronghorn could be excluded from important foraging areas. In years with good winter/spring rainfall and abundant forage when pronghorn are in good physical condition, presence of troops and other personnel probably have minimal effects to pronghorn. The current small number of pronghorn in the U.S. sub-population much reduces the likelihood of interactions between pronghorn and military activities. Forage enhancement projects and water developments will improve the ability of Sonoran pronghorn to survive drought periods and decrease the effects of human disturbance on the sub-population during these otherwise stressful periods.

**Military Overflights**

*Overview*

Overflights by themselves do not cause habitat degradation, but ungulates may respond with increased heart rates and may flee from aircraft in a response similar to ground-based stimuli (Weisenberger *et al.* 1996; Krausman *et al.* 1986, 1998, 2001; Workman *et al.* 1992; Hughes and Smith 1990). Krausman *et al.* (2001) is the only comprehensive evaluation of effects of military activities on the Sonoran pronghorn. The authors documented 149 direct overflights and 263 other overflights (in which the aircraft passed $\geq$ 328 feet to the side of the animal). Pronghorn changed their behavior 39 and 35 percent of the time during direct and other overflights, respectively. Krausman *et al.* (2001) only considered a change in behavior to trotting or running in response to stimuli as biologically significant. Pronghorn broke into a

trot or run 3.7 percent of the time when exposed to direct overflights, and 1.6 percent of the time during overflights greater than 328 feet to one side of an animal. Pronghorn also ran during a crash of an F-16. Pronghorn trotted or ran in response to flares, bombs, and smoke 1.0 percent of the time. Of the nine instances where pronghorn changed their behavior to trotting or running, only two of these resulted in animals moving more than 33 feet, including the crash of an F-16 crash, and one instance of an overflight at greater than 1,000 feet AGL. In response to all ground and air stimuli, on days without stimuli, pronghorn foraged more and bedded less than on days with stimuli. The opposite was true of fawns. Krausman *et al.* (2001) concluded that military activity was associated with changes in the behavior of pronghorn, but these changes did not likely influence animals in a detrimental manner.

The authors acknowledged that their conclusions were inconclusive in regard to fawns, because of small sample sizes. Other questions remain unanswered as well. The authors observed few "low-level" (less than 1,000 feet AGL) flights; including 6 direct military overflights, 15 indirect military overflights (where the flight occurred more than 328 feet to the side of a pronghorn), and 14 other low-level direct and indirect overflights; thus the effects of this type of flight were not examined in any depth. Also, the authors did not distinguish between fixed-wing and helicopter flights. However, we suspect the authors observed few if any helicopter flights; most overflights in R-2301E are by fixed-wing aircraft greater than 1,500 AGL. Unfortunately, we can not discern from Krausman *et al.* (2001) how pronghorn responded to low-level helicopter flights.

Studies of the effects of low-level helicopter flights on other ungulates suggest pronghorn may react more to this type of stimulus than other types of overflights. Helicopters, particularly low-level hovering helicopters, elicit greater responses than fixed-wing aircraft or aircraft flying at higher elevation (Workman *et al.* 1992, Weisenberger *et al.* 1996, Luz and Smith 1976). Pronghorn would be expected to move greater distances and respond for a longer period of time to helicopters than to fixed-wing aircraft. In a study of disturbance effects to pronghorn in Utah, sonic booms by F-16 aircraft, subsonic aircraft flyovers, overflights by a low-level (50-100 feet AGL) Cessna 182, and low-level Huey helicopters caused elevated heart rates (Workman *et al.* 1992). Pronghorn exhibited the greatest response to a hovering Huey helicopter flown at 50 feet AGL (Workman *et al.* 1992). Pronghorn ran and looked for any way to escape hovering helicopters. Heart rates of pronghorn exposed to helicopter flyovers and hovering helicopters increased significantly. The noise and visual stimuli of a Huey helicopter flying over at 50-100 feet AGL caused the animals to bolt and run. The response of the pronghorn lasted from a few seconds to about one minute. Luz and Smith (1976) also found that pronghorn ran from a low-flying helicopter. Habituation by pronghorn, measured in terms of heart rate, to sonic booms, low-level overflights by F-16 aircraft, and flights by Huey helicopters was observed by Workman *et al.* (1992). However, pronghorn did not habituate to low-level hovering by a Huey helicopter. In addition, although heart rate declined with successive low-level helicopter flyovers, the behavioral response, to bolt and run from the

helicopter, did not change with additional flyovers. Low-level flyovers by a Cessna 182 elicited apparent habituation, as measured by heart rate, in one pronghorn but not another (Workman *et al.* 1992).

Disturbance and flight of ungulates caused by a variety of sources are known to result in numerous physiological effects that can be adverse, including elevated metabolism, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971). Mule deer disturbed by snowmobiles and humans on foot expended from 0.2 to 5.0 percent of their daily metabolizable energy in each encounter (Freddy *et al.* 1986). Frequent disturbance imposes a burden on the energy and nutrient supply of animals (Geist 1978), which may be exacerbated in harsh environments such as the BMGR, particularly during drought. Repeated stimuli commonly leads to habituation and reduced response (Harris 1943); however, animals should habituate reluctantly to stimuli that pose a threat (MacArthur *et al.* 1979). Despite these findings, overflights of bighorn sheep elicit only minor physiological response and a minor increase in stress (Krausman *et al.* 1998).

The U.S. pronghorn sub-population declined from 99 in 2000 to about 21. As a result, the encounter rate between aircraft and pronghorn will have declined similarly. Although encounters between pronghorn and aircraft are expected to be less than when the population was robust, each animal is more important (because there are fewer of them), making any adverse effects to an individual more important to the survival and recovery of the sub-population.

*Helicopter Overflights in R-2301W and R-2301E*

All helicopter flights are operated at 50 to 1,500 AGL (MCAS-Yuma 1995); although most are <500 feet AGL (R. Pearce, pers. comm. 2001). Helicopter flights occur year-round on BMGR-West, but over Cabeza Prieta NWR they only during WTI, and then, only in two designated corridors (Figure 1),.

Cabeza Prieta NWR

During a 5-8 day period of a typical WTI course, 20-40 overflights occur in the corridors over Cabeza Prieta NWR (MCAS-Yuma 2001). Flights consist of 2-8 helicopters (200 to 300 feet between aircraft) that traverse the corridors from west to east through to the North, South, and/or East TACs, where they may deliver ordnance to existing target areas. The helicopters return to MCAS-Yuma via northern routes outside the Cabeza Prieta NWR. Fifty to 100 percent of flights occur at night (MCAS-Yuma 1995, R. Pearce, pers. comm. 2003). A typical flight of four aircraft takes approximately 25-35 minutes to traverse the WTI course on the Cabeza Prieta NWR. Thus, at a frequency of one flight per day for five days, approximately 2.5 hours of flight time over the Cabeza Prieta NWR occurs per WTI course. Additional flight time for a total of up to five hours is sometimes needed, thus total annual flight time over the refuge for both WTI courses is approximately 5-10 hours (MCAS-Yuma 2001 and 2003).

Disturbance of pronghorn on Cabeza Prieta NWR as a result of military helicopter overflights would be nonexistent for approximately 10 months out of each year because military helicopters only fly over the Cabeza Prieta NWR during the WTI courses. However, during those courses, and in the flight corridors, pronghorn would be exposed to relatively frequent low-level flights over a 5-8 day period. The WTI flight corridors were designed to avoid fawning areas and areas of concentrated pronghorn use, based on localities from 1994-2001. So, although low-level helicopters are potentially disturbing to pronghorn, the location of this activity across the Cabeza Prieta NWR should minimize disturbance and stress to pronghorn. This is particularly important because the spring WTI occurs during the critical spring fawning season from March 15 to July 15.

Low-level Helicopter flights over the BMGR

During WTI, helicopters fly in corridors east of the Copper Mountains to reach tactical ranges or other destinations on BMGR-East (Figure 1). During spring 2001 WTI, total flight time by groups of helicopters east of the Copper Mountains (on and off the refuge) was 43 hours (does not include flight time along the Interstate 8 corridor north of the BMGR and the current range of the pronghorn). Helicopters or groups of helicopters spent 4.5 hours on the ground during spring 2001 WTI at ground support areas or in other environmentally approved sites, typically between the Mohawk Dunes and the Mohawk Mountains.

As indicated in the Description of the Proposed Action, use of BMGR by helicopters authorized by MCAS-Yuma occurs principally in January, February, March, September, and October, and is primarily associated with WTI courses. The terms and conditions of the November 16, 2001, opinion, which are included as part of the proposed action, required that from March 15 to July 15 of each year all helicopters using R-2301W, except those participating in WTI, will remain west of 113 degrees, 53 minutes (roughly the western extent of the current range of the pronghorn), on two designated transit routes, or above 1,000 feet AGL. Although the 2001 BO did not constrain flights across the Mohawk Valley to the transit corridors at times other than March 15 to July 15, in practice all such flights are conducted in the two corridors or at altitudes above 1,000 feet AGL (Ron Pearce, pers. comm. 2003). Transit routes were developed in coordination with this office to minimize effects to pronghorn while still providing for military training. Helicopters do not hover, except when landing (R. Pearce, pers. comm. 2001). Helicopter landings between the Mohawk Mountains and the Mohawk Dunes may occur either as part of the WTI courses or during other occasionally scheduled exercises. Flights of up to eight helicopters are typically involved in these training activities. Total helicopter flight time transiting the Mohawk and San Cristobal valleys in the corridors during the Spring WTI generally averages about 15 hours, though it can be as much as 25 hours. Total free-flight time (not in corridors) by groups of helicopters in the Mohawk Valley annually averages about 5 hours, though it can go as high as 10 hours. Free flights during March 15 to July 15 over the Mohawk Valley are limited to the WTI courses. Total hours of low-level helicopter flight time during the Fall WTI is similar to the Spring WTI. Few low-level helicopter flights occur outside of WTI.

As discussed in the overview, helicopters are expected to elicit greater response from pronghorn than fixed-wing aircraft, and pronghorn are less likely to habituate to helicopter overflights (Workman *et al.* 1992). Although no studies have examined the effects of helicopter overflights on Sonoran pronghorn, based on work with other ungulates, Sonoran pronghorn would be expected to move greater distances and respond for a longer period of time to helicopters than to fixed-wing aircraft (Workman *et al.* 1992, Weisenberger *et al.* 1996, Luz and Smith 1976). Adverse effects of helicopter overflights may include elevated metabolism and corresponding energetic and nutrient stress, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971, 1978; Freddy *et al.* 1986), conditions that are likely to be exacerbated during drought, and for fawns and their mothers who are most sensitive to disturbance (Krausman *et al.* 2001). In general, areas or times of year with greater use by low-level helicopters will have the potential for the greatest disturbance to pronghorn. Also, in areas where helicopters land (probably with effects similar to hovering helicopters) or fly particularly low, and thus create more noise and heightened visual stimuli, disturbance to pronghorn would be expected to be greater (Weisenberger *et al.* 1996, Workman *et al.* 1992).

Helicopter flights over the Mohawk and San Cristobal valleys overlay an area of significant seasonal use by pronghorn (compare Figures 1, 3, and 4). Animals in this area would be subjected to low-level helicopter overflights of the timing and magnitude described above. Data on fawn locations from 1995-2001 indicate that areas of the southeastern portion of the Mohawk Valley, just south of the Mohawk Dunes, and an area in the central Mohawk Valley are important areas for fawns (Figure 4). Based on telemetry locations, in the San Cristobal Valley, use by fawns and their mothers is concentrated in the north-central part of the valley, with scattered locations to the south. Fawns and their mothers may be more sensitive to human disturbance than other pronghorn (Krausman *et al.* 2001); thus low-level helicopter flights in these areas are of particular concern. However, the corridors established in the November 2001 opinion largely avoid these critical fawning areas. So, non-WTI flights during the critical fawning period of March15 to July 15 should have much reduced effects on pronghorn at that time. WTI helicopter flights; however, would not be constrained to the corridors. Landing sites could also occur near the southern end of the Mohawk Dunes, which would be especially disturbing to any fawns and their mothers in the area.

In conclusion, helicopter flights at 50–1,500 feet AGL occur over pronghorn habitat in the Mohawk and San Cristobal valley and in corridors through Cabeza Prieta NWR. Effects of low-level helicopter flights on Sonoran pronghorn have not been studied; however, based on studies of other ungulates, pronghorn are expected to react more intensely to helicopters, particularly low-level, or landing helicopters, than fixed-wing aircraft. Responses may include running from aircraft, which may be energetically stressful and cause a variety of adverse physiological effects that are likely exacerbated during times of drought, or critical periods for fawns. Established helicopter flight routes for WTI across the Cabeza Prieta NWR and non-WTI flights across the Mohawk and San Cristobal valleys largely avoid areas of pronghorn

concentrations and important fawning areas, thereby reducing likelihood that pronghorn will be significantly affected by these flights.

*Fixed-Wing Aircraft Overflights*

An average of approximately 11,000 fixed-wing aircraft sorties occur annually in airspace R-2301W, including Cabeza Prieta NWR. This figure represents a reduction from an annual rate of over 30,000 in the late 1980s. Thus, a reduction in overflights, coupled with a similar reduction in the use of ground support troops, has occurred during the current period of pronghorn decline (MCAS, *in litt.* 2001). However, since the mid-1990s the number of sorties occurring over the current U.S. distribution of the Sonoran pronghorn has remained relatively unchanged. Comparison of sortie rates in this subarea reveals only a two percent decrease from 1996 to 2000 (MCAS-Yuma 2001). Fixed-wing sorties occur much more frequently over pronghorn habitat, as opposed to helicopter flights, and occur throughout the year.

Of the fixed-wing sorties which currently occur, 18 percent are low-level (200 to 1,500 AGL) flights. Most flights occur during the day and are fairly evenly distributed among months of the year. Low-level flights over the Cabeza Prieta NWR occur only during WTI courses and only in two corridors four nautical miles in width (Figure 1). Typically, 5-10 flights of 4-8 aircraft occur per day for six days during each WTI course; 85 percent of those occur during daylight hours. Aircraft transit time through the Cabeza Prieta NWR averages 7 minutes, thus total flight time over the Cabeza Prieta NWR by groups of aircraft is 3.5-7.0 hours per WTI course, and 7.0 to 14.0 hours per year. Distribution of flights in the two corridors is roughly equal. Fixed-wing aircraft typically fly between 600 and 1,800 feet AGL through the valleys of the refuge, and as low as 200 feet AGL over the mountains (MCAS-Yuma 2003).

Approximately 6,000 fixed-wing sorties occur annually in R-2301W west of the Gila and Tinajas Altas mountains in the TACTS range (MCAS-Yuma 2001). Most of these flights are probably audible and may be visible to pronghorn. A few supersonic flights would produce sonic booms that could disturb pronghorn (Workman *et al.* 1992). Low-level fixed-wing flights authorized by MCAS-Yuma over the Cabeza Prieta NWR are confined to two 4-mile wide corridors and only will occur during the WTI courses. The importance of Cabeza Prieta NWR for the pronghorn is disproportionate to the rest of R-2301W (Figure 3). The western portions of the corridors, from the Cabeza Prieta Mountains west to the boundary of Cabeza Prieta NWR, and routes aircraft would take to travel from MCAS-Yuma to Cabeza Prieta NWR, are outside of the current range of the pronghorn. The central and eastern portions of the southern corridor passes over the Pinta Sands area, the southern end of the Sierra Pinta range, an area between the Antelope Hills and the Bryan Mountains, and a portion of Growler Valley, all of which are frequented by pronghorn. The eastern portion of the northern corridor crosses the following areas that yielded significant numbers of pronghorn localities from 1983 to 2001: the Growler Valley, Charlie Bell Pass, the base of the Granite Mountains, and the west side of Childs Mountain. Behaviors of some pronghorn exposed to low-level fixed-wing

overflights in these corridors may be temporarily disrupted or some animals may flee short distances (Hughes and Smith 1990; J. Hervert, pers. comm. 1996; Workman *et al.* 1992); however, biologically significant responses to fixed-wing aircraft are expected to be rare (Krausman *et al.* 2001). Disruption of behaviors and fleeing from aircraft are most likely to affect pronghorn adversely during drought when forage and water are scarce and individuals may be in poor physical condition. However, implementation of forage enhancement projects and water developments should reduce effects of drought on the U.S. sub-population.

Low-level flights during the Spring WTI course have the greatest potential to disturb fawns and their mothers. Fawn locations from 1995-2001 (Figure 4) indicate the following areas under the low-level fixed-wing corridors on Cabeza Prieta NWR are most important for fawns and their mothers: 1) southern end of the Sierra Pinta Mountains, 2) Childs Valley and west side of Childs Mountain, and 3) northern end of the Sierra Pinta Mountains. Low-level flights are not constrained to corridors outside of Cabeza Prieta NWR, and such flights could affect fawns and their mothers in the Mohawk and San Cristobal valleys, as well. Krausman *et al.* (2001) did not observe enough encounters between low-level fixed-wing aircraft and fawns and their mothers to draw conclusions about how such flights. However, fawns and their mothers may be more sensitive to human disturbance than other pronghorn.

In conclusion, fixed-wing aircraft flights are a common occurrence over R-2301W, although low-level (<1,500 feet AGL) flights make up only 18 percent of such flights. Most low-level fixed-wing flights occur to the west of the current range of the pronghorn. Evidence suggests that effects of fixed-wing aircraft on pronghorn behavior are not as great as overflights by helicopters. As discussed in the overview, pronghorn may flee from aircraft or elicit other behaviors, but Krausman *et al.* (2001) noted few biologically significant responses to fixed-wing aircraft (primarily flights above 1,000 AGL) and concluded that such overflights, and other military activity they observed did not influence Sonoran pronghorn in a detrimental manner. The greatest potential for adverse effects to pronghorn are in regard to low-level fixed-wing flights in areas important for fawns and their mothers, which may be more sensitive to human disturbance than other pronghorn. These effects are likely to be greatest in times of drought.

*Aircraft Crashes and Crash Rescue and Cleanup*

Aircraft crash infrequently in pronghorn habitat. Aircraft have crashed three times in the last 10 years in currently occupied pronghorn habitat in BMGR-West. None of these crashes have occurred in Cabeza Prieta NWR. MCAS-Yuma has lost no aircraft within the current range of the pronghorn in BMGR-East (MCAS-Yuma 2003). Krausman *et al.* (2001) witnessed pronghorn response to a crash of an F-16. On February 16, 2000, five pronghorn were observed running at the moment of impact of an F-16 on the South TAC. The pronghorn were not visible before the crash, but ran more than 30 feet after the event. Pronghorn could potentially be hit by an aircraft or pieces of an aircraft during a crash, but this is highly unlikely. The noise and visual stimuli of a crashing aircraft is likely to be disturbing to pronghorn, and as witnessed by Krausman *et al.* (2001), they may flush or leave the area.

Rescue operations and crash cleanup, involving emergency vehicles, trucks, and foot traffic are also expected to result in a flush response or pronghorn leaving the area. Habitat disturbance at the crash site is typically less than an acre (MCAS-Yuma 2003). If natural fuels, such as dried annual plants, occur in abundance at the point of impact, a fire may result. However, because of generally low fuel loads in the desert scrub of the BMGR, a wildfire is not likely to carry far.

**Ordnance, Flare, and Chaff Delivery; Strafing, and Laser Targeting**

Aircraft delivery of ordnance, flares, and chaff; strafing; and laser targeting occur on the BMGR and may affect pronghorn and their habitat. During WTI courses, aircraft authorized by MCAS-Yuma fly through the R-2301W airspace and deliver live and inert ordnance on established targets in the North, South, and East TACs. North and South TACs are within the current range of the pronghorn; East TAC is in the historical range. Soils and vegetation on the targets are highly disturbed from a long history of use by the military. Continued use will maintain this disturbed state. However, pronghorn are attracted to these disturbed areas, likely due to annual plant production in the disturbed soil, water that collects in craters or holes, and enhanced visibility (Hervert *et al.* 2000). Pronghorn frequently use the North and South TACs and ordnance or shrapnel could potentially strike and kill or injure a pronghorn. Pronghorn could potentially be killed or injured during an encounter with unexploded live ordnance on the ground. However, explosive ordnance disposal experts at Luke Air Force Base regard the potential that pronghorn could disturb ordnance to an extent that it exploded to be extremely remote (Hank Domme, Munitions Disposal Specialist, Luke Air Force Base, pers. comm. with B. Tunnicliff, URS Corporation, 2003).

No mortality or injury of pronghorn as a result of ordnance delivery or unexploded ordnance has been documented. However, on July 19, 1999, remains of a pronghorn were found about 0.6 miles from a strafing target at the North TAC. There was evidence of bullet impact pock marks near the pronghorn (M. Coffeen, Service, pers. comm. 2001), despite the distance from the target. The date of the incident (outside of WTI) suggests that if the animal was strafed, it was not the result of MCAS-Yuma activities. The carcass was sent to the Service's National Wildlife Health Center (NWHC) for necropsy. The lab reported that no lead residue and no metal fragments were found in the remains (Lynn Creekmore, NWHC, pers. comm. 1999). The animal, although probably dead only a week before it was found, had already been heavily scavenged, which made it impossible to determine cause of death. This animal may have been killed by strafing, but could have died from other causes, as well. Male pronghorn had been observed in the area sparring for several days before the male pronghorn remains were found (B. Wirt, Luke Air Force Base, pers. comm. 2001). The animal may have died during sparing with another animal. Nonetheless, pronghorn in and near target areas are at risk of death or injury. Pronghorn commonly use the North and South TACs, and are attracted to water and, during favorable growing conditions, ephemeral forage in these areas (Hervert *et al.* 2000); thus considerable opportunity exists for interaction between pronghorn and military activities on the TACs. During 374 hours of observing pronghorn on the North and South TACs,

Krausman *et al.* (2001) noted 594 instances of flares, bombs, smoke, and strafing. Although we do not know what percentage of these instances were bombs or strafing, no injury or mortality of pronghorn were recorded.

In regard to high explosive ordnance delivery (but not strafing or practice bombs), Luke Air Force Base has developed operating instructions for the pronghorn on North and South TACs (AFI 13-212, Luke Air Force Base, Sup 1; see Appendix A of MCAS-Yuma 2003). These instructions are implemented during any high explosive delivery of ordnance, including WTI. The instructions require at least two monitors per tactical range during the daylight hours. The ranges are monitored visually and by telemetry daily (for animals with transmitters - currently no pronghorn are telemetered) for two hours before delivery begins (an additional one hour of monitoring is conducted if the Maverick target is also scheduled). If there is a break in ordnance delivery of more than 2 hours, additional monitoring occurs. If a pronghorn is detected within 3.1 miles of either HE Hills or at the live Maverick target, no high explosive ordnance deliveries will be authorized on the affected range. Also, no deliveries of any kind (live or inert training munitions) will be made within 1.86 miles of the animal's location for the rest of the day. No monitors are present at night, but live deliveries are only allowed if there is not a 2 hour or greater gap between ordnance deliveries (during which pronghorn may move onto targets) and afternoon monitoring cannot be completed prior to 30 minutes after sunset or the end of civil twilight, whichever is earlier. Also, East TAC is the preferred range for nocturnal ordnance delivery. This monitoring has not documented any injury or mortality of pronghorn on the tactical ranges, and it may have prevented such injury or mortality. However, if only strafing or inert ordnance is scheduled for a particular day, no monitoring is required. Thus, no measures are in place to minimize possible take on days in which no high explosive ordnance delivery occurs. MCAS-Yuma does not deliver high explosives to North or South TACs. Thus, monitoring would only occur during MCAS-Yuma's use of North and South TAC on those days when other DoD units were scheduled to deliver high explosives. We have no information how often such monitoring occurs. However, on those days that monitoring occurs, the likelihood of pronghorn being killed or injured due to strafing or inert ordnance delivery by MCAS-Yuma would be minimized.

Delivery of ordnance by MCAS-Yuma aircraft at the TACs in BMGR-East contribute to the need for periodic explosive ordnance clean up and removal, which consists of considerable annual ground activities and disturbance. However, MCAS-Yuma ordnance delivery is only a small part of overall ordnance delivered to the TACs. Annual explosive ordnance cleanup would occur with or without activities by MCAS-Yuma. As a result, it is not considered to be an interrelated or interdependent activity pursuant to 50 CFR 402.02; and the effects of such clean up are not among the effects of the proposed action. Effects of explosive ordnance cleanup, as well as operation of the TACs, will be considered in consultation with Luke Air Force Base, who manages the TACs and explosive ordnance cleanup.

The effects of chaff and flares were evaluated by U.S. Air Force Air Combat Command (1997). The report concluded that chaff is unlikely to have any adverse effects to terrestrial wildlife,

although adverse effects were possible in aquatic systems. If chaff fell in water, the effects of pronghorn using that water are unknown. A study is currently underway to evaluate the effects of chaff-contaminated water sources on pronghorn at the BMGR. If adverse effects to pronghorn are identified, the report will include recommendations for reducing or eliminating such effects. The primary effect of flares is increased incidence of fire. On BMGR-West, fuel loads are very low, making the likelihood of a flare-caused fire very low. However, in some years with abundant ephemeral vegetation, particularly in disturbed areas where nonnative annual plants are abundant, flares could ignite fires. If ignited, fires would not likely carry far due to discontinuity of fuels.

Three TACTS Range targets located in BMGR-West, west of the Copper Mountains are designated for attack with lasers mounted on aircraft. The lasers are not eye safe and may cause eye injury or blindness if an observer looks directly into the laser light. The three complexes encompass about 10 acres, but the laser hazard area around the targets is greater (see Figure 1). This area is outside the current range of the pronghorn. However, if pronghorn moved into this area, potentially an animal in the hazard area could hear an approaching aircraft, look up at the aircraft and be hit by a laser that could injure or blind the animal. The area affected by a laser beam is very narrow and it is unlikely that a pronghorn would be directly in the path of a laser or be injured or blinded. No pronghorn are known to have been affected by laser targeting.

**Conservation Measures**

MCAS-Yuma has proposed many measures that minimize effects of the proposed action on the Sonoran pronghorn (see "Conservation Measures" in the Description of the Proposed Action). As discussed above, MCAS-Yuma has limited most low-level aircraft flights (particularly helicopter flights) to specific corridors that avoid key areas of concentrated pronghorn use and fawning areas. A military user-education program that includes information about regulations and protection for listed species, restricting vehicle use to existing roads except in specific areas or in the case of an emergency or bona-fide management need, monitoring of regulation compliance, construction practices that reduce erosion and limit disturbance of drainages, and pollution and hazardous materials clean up and containment measures would all act to reduce possible adverse effects to the pronghorn. MCAS-Yuma's commitment to eliminate public access in the Mohawk Valley from March 15 to July 15 is a key step to reduce human disturbance during a period that is critical for fawn survival. Designation of a management representative and point of contact (Ron Pearce, Range Management) for compliance with conservation measures sets up an administrative mechanism for reporting and accountability. Coordination through the BEC and IEC ensures that interagency concerns and resource management issues can be voiced, discussed, and resolved. Ground-based military activities are largely restricted to designated routes of travel and ground support areas, which collectively affect a very small percentage of the current range of the pronghorn. MCAS-Yuma has established a 25 mile per hour speed limit in the current range of the pronghorn. Regulations are in place to ensure that military users of the range minimally impact pronghorn habitat, including restricting vehicle use, containment and cleanup of hazardous materials, strict

containment and disposal of trash and waste, avoidance of ground disturbance in areas of highly erodible soils, management of closed ground support areas in the current range of the pronghorn for restoration of native plant communities, law enforcement presence, and other measures described herein and in MCAS-Yuma (2003). Monitoring and reporting of implementation of the biological opinion and conservation measures will allow the Service and others to track the effects of the action and determine whether those effects match what was anticipated herein. MCAS-Yuma has committed to "support its fair share of the 51 management and research projects developed by the Sonoran Pronghorn Recovery Team", and has contributed generously to ongoing recovery projects, such as the development of Tiller Well and associated forage enhancement plots.

The proposed measures minimize, but do not eliminate, habitat disturbance and disturbance of pronghorn that would result from activities in ground support areas, other ground-based activities, effects of low-level helicopter flights over the Mohawk and San Cristobal valleys and Cabeza Prieta NWR, recreational activities authorized by MCAS-Yuma, and delivery of ordnance at the North and South TACs. Historical and potential recovery habitat in the Lechuguilla and Yuma deserts and at East TAC would also be affected by ground-based activities, military overflights, and/or ordnance delivery.

**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 ESA.

Most lands within the current range of the pronghorn are managed by Federal agencies; thus most activities that could potentially affect pronghorn are Federal activities that are subject to the section 7 consultation. The effects of these Federal activities are not considered cumulative effects. Relatively small parcels of private and State lands occur within the currently-occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to Tacna. State inholdings in the BMGR were recently acquired by DoD. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and their effects are expected to continue into the foreseeable future. Historical habitat and potential recovery areas outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Of particular concern are increasing illegal border crossings by undocumented migrants and smugglers. Deportable migrant apprehensions by Border Patrol agents in the Ajo Station

increased steadily from 9,150 in 1996 to 20,340 in 2000. Apprehensions in the BMGR by Border Patrol were 9,500, 11,202, and 8,704 in 1996, 2000, and 2001, respectively (MCAS-Yuma 2003). In 2001, estimates of undocumented migrants traffic reached 1,000 per night in Organ Pipe Cactus NM alone (Organ Pipe Cactus NM 2001). Given these numbers and that Border Patrol apprehends only a fraction of illegal migrants and smugglers, undocumented illegal traffic through the BMGR probably exceeds recreational use even on the busiest of holiday weekends. Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant and smuggler traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and BMGR (Klein 2000). Vehicle barriers and effective patrols in the Algodones Dunes of Imperial County, California are probably responsible for a recent redirection to and increase of illegal vehicle crossings and vehicle abandonment in the BMGR (May 21, 2003, meeting notes of the Barry M. Goldwater Range Executice Council). These illegal crossings and law enforcement response have resulted in route proliferation, off-highway vehicle (OHV) activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires and increased chance of wildfire. Habitat degradation and disturbance of pronghorn almost certainly results from these illegal activities. We expect these activities to continue; however, some discussions are occurring between Mexican and U.S. officials about the creation of a guest worker program whereby Mexican nationals could legally cross the border to work in the U.S. If such a program was initiated, it might greatly reduce future illegal immigration and law enforcement response, with concomitant reductions in habitat degradation and suspected disturbance of pronghorn.

## CONCLUSION

After reviewing the current status of the Sonoran pronghorn, the environmental baseline for the action area, the effects of MCAS-Yuma's proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonoran pronghorn. No critical habitat has been designated for this species, therefore, none will be affected. In making our determination, we considered the following:

1. As reflected in the Environmental Baseline and cumulative effects sections above, the U.S. sub-population of pronghorn has been and is subjected to a myriad of human activities that have the potential to adversely affect the Sonoran pronghorn and its habitat. Such activities include livestock grazing, recreation, military activities on the BMGR, and an increasing influx of undocumented migrants and smugglers and corresponding response from the U.S. Border Patrol and other law enforcement agencies. Further, the range of the U.S. pronghorn sub-population is limited by highways, fences, canals, and towns that act a physical barriers to pronghorn movement and prevent them from accessing foraging areas and, during drought, greenbelts such as the Gila River and Rio Sonoyta.

2. The status of two of the three sub-populations of Sonoran pronghorn are in decline and in serious danger of extirpation. The U.S. sub-population is estimated at 21 animals, while the Pinacate sub-population is estimated at 25. At these levels, population viability is low and genetic variability is expected to erode. The southernmost sub-population, southeast of

Mexico Highway 8, also declined from 2000-2002, but at an estimated 255 animals, it is not in immediate danger of extirpation.

3. While drought was the proximate cause of the Sonoran pronghorn's decline during 2002, the high level of human activities and disturbance on the U.S. side, as described in the Effects of the Proposed Action, the Cumulative Effects, and the Environmental Baseline, has exacerbated the effects of drought. Increasing undocumented migrant traffic, smuggling and associated law enforcement response are of particular concern.

4. Emergency recovery actions have been initiated in an attempt to reverse the recent decline in the status of the U.S. sub-population. A semi-captive breeding facility will be completed this year in which pronghorn will be housed in a predator-free environment with abundant forage and water. It is hoped that pronghorn will successfully reproduce in the facility and provide animals to augment the wild population. A forage enhancement plot will be created inside the facility, and another in the same area is currently in operation. These will provide green forage for pronghorn during times of drought. Water sources are also being developed. These water sources and forage enhancement plots are expected to buffer the effects of drought, which have been the proximate cause of recent population declines. MCAS-Yuma has contributing funding for the forage enhancement plots.

5. The most significant potential adverse effects to the U.S sub-population from MCAS-Yuma activities include fleeing, increased stress, and exclusion from habitat due to military overflights and ground-based military activities authorized by MCAS-Yuma, and the possible injury or death from ordnance delivery. The likelihood of these effects being realized are a function of the frequency and duration of the activities and the number and distribution of the pronghorn when the activities occur. Some of the factors mitigating the potential for adverse effects from these activities include:

    - WTI Course use of the tactical ranges within the current range of the pronghorn would be relatively limited to about nine days per year for an aggregate total of about 54 training hours. This level of use is about 2.8 percent of the total time that these ranges are activated for training. Marine Corps ordnance deliveries at these ranges constitute only about 2.5 percent of the deliveries by all users annually, do not include deliveries of high explosive ordnance, and do not include strafing-only missions.

    - The ground-based activities in the current range of the Sonoran pronghorn affect a relatively small portion of its suitable habitat. For example, such activities in R-2301W use only 0.21 percent of the suitable habitat. Further, in the ground support areas in the southern portion of the Mohawk Valley (#s 43, 44, 45, 46, and 67), most frequented by pronghorn, military activities are relatively light as opposed to other ground support areas. Between March 15 and July 15 use occurs for approximately six days, primarily during the spring WTI Course. The areas may be used for an additional 12 days during the remainder of the year, but this use is concentrated in the Fall WTI Course and is rarely scheduled before the beginning of October.

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- Low-level helicopter flights with the greatest potential for adverse interactions with the pronghorn would be limited primarily to four designated flight corridors, and would occur primarily during the Spring and Fall WTI courses. Low-level helicopter flights along the corridors follow straight-line paths and do not involve hovering flight. Moreover, these corridors have been aligned to minimize the potential effects on pronghorn. Two of the corridors are located over the Cabeza Prieta NWR and two over the current habitat of the Sonoran pronghorn within the Mohawk and San Cristobal valleys of the BMGR. Although low-level helicopter flights would occur in the latter half of March and sometimes the first week of April, during the remainder of the crucial period for fawn growth and survival, from March 15 to July 15, no low-level helicopter flights would occur. During this crucial time, non-WTI helicopter flights must remain west of east of 113° 53' west longitude, or on designated transit routes, or above 1,000 AGL.

- Biological monitors and procedures required by Luke Air Force Base will be used to minimize the likelihood of pronghorn being injured or harmed on the tactical ranges when ordnance is delivered. No Sonoran pronghorn have been demonstrated to have been injured or killed by ordnance delivery.

6. The likelihood of encounters between pronghorn and military activities, and the possibility that incidental take will result from MCAS-Yuma activities are significantly diminished due to the small size of the U.S. sub-population.

7. MCAS-Yuma has proposed conservation measures that significantly reduce the effects of the proposed action on the Sonoran pronghorn by:

    - reducing the likelihood of encounters between people and pronghorn during the crucial period for fawn growth and survival (March 15-July 15);

    - limiting most low-level aircraft use to specific corridors that have been designed to avoid areas of concentrated pronghorn use and fawning areas;

    - contributing to recovery actions, including important emergency actions such as forage enhancement that are designed to buffer the effects of drought and human disturbance on the U.S. sub-population;

    - strictly controlling use and cleanup of hazardous materials, and studying the effects of chaff and recommending measures to reduce effects of chaff on pronghorn,

    - complying with tactical range restrictions on North and South TACs that minimize the likelihood that pronghorn will be injured or killed due to ordnance delivery;

- implementing a military user-education program that includes information about regulations and protection for listed species; and

- implementing other measures described under "Conservation Measures" that minimize the effects of the proposed action.

In summary, the status of the listed Sonoran pronghorn rangewide is poor, with sub-populations in the Pinacate Region of Mexico and in the United States facing possible extirpation. Fragmentation of populations, loss of historical habitats, disease, and human-caused degradation of remaining habitats and disturbance of pronghorn are the most important causes of poor rangewide status. As discussed in the "Environmental Baseline" section above, within the action area, we believe the aggregate effects of limitations or barriers to movement of pronghorn and continuing stressors - including habitat degradation and disturbance within the pronghorn's current range resulting from a myriad of human activities and disease exposure - combined with periodic dry seasons or years, are responsible for the present precarious status of the Sonoran pronghorn in the U.S. The dramatic impacts to the U.S. sub-population of pronghorn resulting from the 2002 drought have undoubtedly been exacerbated by the human-induced degradation of their habitat and human-created barriers, which restrict their movements to search for more favorable habitat conditions outside of their current range. Cumulative effects, particularly illegal crossings of the border and travel through pronghorn habitat by smugglers and undocumented immigrants, add additional stressors to pronghorn populations.

At the current time the environmental baseline with respect to the Sonoran pronghorn is declining. However, the high fawn-to-doe ratio experienced in 2001 when rainfall was abundant and timed well for forage production provides evidence of the reversible nature of the current decline. The potential for the U.S. sub-population to rebound will be enhanced by the emergency recovery actions, such as forage enhancement plots, water developments, and the semi-captive breeding facility. When added to the environmental baseline, and cumulative effects, the effects of MCAS-Yuma's proposed action, which includes significant conservation measures, do not reduce appreciably the likelihood of survival and recovery of the Sonoran pronghorn in the wild. As proposed, MCAS-Yuma actions affect only a very small proportion of suitable pronghorn habitat within the current range of the U.S. sub-population. Under normal circumstances, the likelihood for interaction between the military activities and pronghorn are mitigated by the duration and frequency of the activities and the conservation measures that will be undertaken by MCAS-Yuma. The interactions, however, are currently less likely to occur because of the very small sub-population remaining in the United States. Moreover, water development and forage enhancement plots should make the pronghorn less susceptible to biologically significant threats during drought conditions.

In determining that the proposed action is not likely to jeopardize the continued existence of the pronghorn, we assume that the conservation measures will be implemented fully and promptly, as proposed by MCAS-Yuma, and that take of pronghorn is not reasonably certain to occur. If the emergency recovery actions are not successful, or the number of Sonoran pronghorn increase

to the point where the MCAS-Yuma activities are reasonably certain to result in take of the species, it may be necessary to reinitiate consultation to confirm that the activities are not likely to jeopardize the continued existence of the species.

## INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA 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 17.31) 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 CFR17.31) 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 ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

### Amount or Extent of Take Anticipated

In the "Effects of the Proposed Action" we have identified several ways in which incidental take may potentially occur, including strafing or ordnance delivery at targets in BMGR-East during WTI, collisions with vehicles on roads, and disturbance of pronghorn or exclusion from important foraging or fawning habitat during drought when pronghorn are particularly stressed and in poor condition. Nonetheless, we are not aware that any incidental take of pronghorn has occurred as a result of the activities of the MCAS-Yuma. With only 21 pronghorn in the U.S. sub-population, the likelihood of any one pronghorn being harassed or otherwise taken is greatly reduced compared to the 1990s when the population was over 100, and at most times, well over 100. Also, conservation measures are in place to minimize the likelihood of take from these activities. As a result we do not believe incidental take of pronghorn is reasonably likely to occur at current population levels.

If the number of Sonoran pronghorn increases to the point where the MCAS-Yuma activities are reasonably certain to result in take of the species, it will be necessary to reinitiate consultation to reevaluate the incidental take statement including the level of take that can be tolerated without reducing appreciably the likelihood of survival and recovery of the Sonoran pronghorn in the wild. Pursuant to 50 CFR 402.16(a), reinitiation would also be required if incidental take occurs and exceeds that anticipated herein or in subsequent reinitiatons.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened 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. The Service recommends that MCAS-Yuma implement the following:

1. Continue to fund and support basic research, inventory, and monitoring of the pronghorn.

2. Fund or staff projects in Appendix 1 of our 2001 opinion, especially funding of projects 3, 5, 6, 11, 14, 21, 26, 27, 35, 36, 38, 39, 44, and 51.

3. Eliminate use of ground support areas 43, 44, 45, and 67 because they are in significant use areas of the pronghorn, including areas used by fawns and their mothers.

4. Use its authorities to seek funding, resources, and/or staff for development and operation of a forage enhancement plot in the Mohawk Valley of BMGR-West and other emergency recovery actions.

5. Monitor implementation of the pronghorn conservation measures in the "Description of the Proposed Action" and monitor and record any observed encounters of pronghorn, particularly pronghorn response to military activities and incidental take resulting from the proposed action. Such monitoring should be summarized in the annual report to this office, with a copy to the Regional Supervisor, Arizona Game and Fish Department, Yuma, and Cabeza Prieta NWR, Ajo. The annual reports should be structured so each conservation measure and recommendation are listed with accomplishments achieved under each of those measures and recommendations. Final reports should be due March 1 of each year. Reports that may be produced in association with implementation of the conservation measures or this opinion should be appended to the annual monitoring report.

6. Increase the elevation of helicopter flights over key pronghorn areas, particularly during the crucial period for fawn survival, from March 15 to July 15.

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

STATUS OF THE SPECIES

**Lesser Long-Nosed Bat**

**Species Description**

The lesser long-nosed bat is a medium-sized, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations to feeding on nectar from the flowers of columnar cacti, such as the saguaro and organ pipe cactus, and from paniculate agaves, such as Palmer's agave (*Agave palmeri*), and Parry's agave (*A. parryi* Hoffmeister 1986), *A. desertii*, and *A. schotti* (Engelman 1875). Palmer's agave exhibits many characteristics of chiropterophily, such as nocturnal pollen dehiscence and nectar production, light colored and erect flowers, strong floral order, and high levels of pollen protein with relatively low levels of nectar sugar concentrations (Slauson 1996). Parry's agave demonstrates many (though not all) of these same morphological features (Gentry 1982).

The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988a). No critical habitat has been designated for this species. A recovery plan was completed in 1994 (U.S. Fish and Wildlife Service 1994b). 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 United States, and three maternity roosts in Mexico have remained stable or increased in size for at least five years.

**Distribution and Life History**

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 has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Peloncillo Mountains (Cochise County), and south to the international boundary. Two records for the species exist for the Phoenix area, and a possible lesser long-nosed bat was reported from the McDowell Mountains (Maricopa County). Roosts in Arizona are occupied from mid April to September (Cockrum and Petryszyn 1991, T. Tibbitts, pers. comm. 2002) and on occasion, as late as November (Sidner 1999, 2000); the bat has only rarely been recorded outside of this time period in Arizona (U.S. Fish and Wildlife Service 1994b, Hoffmeister 1986, Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona gathering into maternity colonies. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts

forming bachelor colonies. Males are known mostly from the Chiricahua Mountains and recently the Galiuro Mountains (T. Snow pers. comm. 1999), but also occur with adult females and young of the year at maternity sites (U.S. Fish and Wildlife Service 1994b). Throughout the night between foraging bouts both sexes will rest in temporary night roosts (Hoffmeister 1986).

The primary food source for the lesser long-nosed bat in southeastern Arizona from mid-summer through fall is Palmer's agave, which typically occurs on rocky slopes or hill tops, scattered within the desert grassland and oak woodland communities within the elevational range of 3,000-6,000 ft (Gentry 1982). Parry's agave reaches higher elevations than Palmer's, extending from grasslands into oak woodland, chaparral, pine/oak forests, and mixed conifer with an elevational range of approximately 4,900-8,200 ft (Gentry 1982). Like Palmers' agave, Parry's is typically found on rocky slopes (Gentry 1982). Concentrations of paniculate agaves are generally found on the rocky, shallow soils of hills and ridges. Palmer's and Parry's agaves are also found scattered in areas of deep, heavy soils within grasslands or where there may be thick stands of shrubs, mesquite, oak, and other trees.

The ecology of Palmer's agave is poorly understood, especially as it is affected by livestock use and fire (Slauson, pers. comm., 1997; Wendy Hodgson, Desert Botanical Gardens, Phoenix, pers. comm., 1997). Agaves are perennial succulents. Agave seeds germinate readily with adequate moisture, typically in open areas with limited competition from other plants (Tony Burgess, Biosphere Two Center, Tucson, pers. comm., 1997). Palmer's agave is relatively slow growing, often taking 20 or more years before initiating the single reproductive event in its life (Slauson 1996, 1999). A flowering stalk erupts from the rosette of a mature plant, growing rapidly through the spring and early summer. During the summer 8-12 flowering panicles are displayed on the upper third of a stalk 10-16 feet tall (Gentry 1982). Slauson (1996, 1999) completed a pollination ecology study of Palmer's agave, finding that many pollinator species contribute to establishing seed set. Lesser long-nosed bats have been recorded visiting individual blooming Palmer's agaves more than 1,000 visits per night (R. Sidner, Tucson, pers. comm., 1997; Petryszyn, pers. comm., 1999), while they may not visit other agaves at all (Slauson, pers. comm., 1997). Bat visits generally last less than one second (Slauson 1999).

Apparently there are many factors that influence the year a particular plant may bloom. Precipitation one to several years before blooming is probably of special importance. In the Peloncillo Mountains, Arizona, about 2-5 percent of the agave population flowers each year (Peter Warren, Nature Conservancy, Tucson, pers. comm., 1997). Palmer's agave may occasionally produce off-sets (vegetative reproduction or cloning of "pups" produced from rhizomes), though this is less likely than for many other agave species (Hodgson, pers. comm., 1997). Parry's agave freely produces off-sets (Gentry 1982).

The importance of Parry's agave, as well as desert agave and amole, as a forage resource for *Leptonycteris* bats is unknown. As discussed, Parry's agave generally occurs at higher elevation than Palmer's agave, and occurs in forest openings. Benson and Darrow (1982) note that it typically flowers in June and early July, which is before the lesser long-nosed bat arrives at roosts in southeastern Arizona. However, J. Rorabaugh (AESO, pers. comm., 1998) noted many Parry's agave in flower high in the Huachuca Mountains on the crest trail during late July in

1997. It may be that agaves at high elevation bloom later than at lower sites, and could potentially be blooming and be used as a forage resource when lesser long-nosed bats arrive in July or early August. In addition, Parry's agave may be very important as a forage plant for those bats that arrive in southeastern Arizona during late spring and early summer.

As indicated above, the lesser long-nosed bat consumes nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. These bats often forage in flocks. Nectar of these cacti and agaves is high energy food. Concentrations of some food resources appear to be patchily distributed on the landscape and the nectar of each plant species used is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. Columnar cacti occur in lower elevational areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak woodland (Gentry 1982).

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. Seasonally available food resources may account for the seasonal movement patterns of the 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 15 miles, and in Mexico at 25 miles and 38 miles (one way; Dalton *et al.* 1994; V. Dalton, Tucson, pers. comm., 1997; Y. Petryszyn, University of Arizona, pers. comm., 1997). Steidl (pers. comm. 2001) found that typical one-way foraging distances for bats in southeastern Arizona is roughly 12.5 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in Organ Pipe Cactus National Monument (U.S. Fish and Wildlife Service 1994b). Horner *et al.* (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Yar Petryszyn, pers. comm. 1997).

**Status and Threats**

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. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (U.S. Fish and Wildlife Service 1994b). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever the factors are that determine selection of roost locations, the species appears to be sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate

roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements.

There are 16 known large roost sites in Arizona and Mexico (U.S. Fish and Wildlife Service 1994b). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys, the maternity roosts are occupied by over 150,000 lesser long-nosed bats and of these, just over 100,000 are found at just one natural cave at Pinacate National Park, Sonora, Mexico (Cockrum and Petryszyn 1991). Several new large roost sites have been located in Arizona, bringing the total number of large roosts to 21 (Mike Coffeen, AESO, pers. com. 2003). The numbers above indicate that although a relatively large number of these bats are known to exist, the relative number of known large roosts is quite small. Disturbance of these roosts, or removal of the food plants associated with them could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

Suitable day roosts and concentrations of food plants are the two resources that are crucial for the lesser long-nosed bat (U.S. Fish and Wildlife Service 1994b). Caves and mines are used as day roosts. The factors that make roost sites useable have not yet been identified. Whatever determines roost suitability, the species seems sensitive to human disturbance. Instances are known where a single brief visit to an occupied roost is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their day roost and move to another. Perhaps most disturbed bats return to their preferred roost in a few days. However, this sensitivity suggests that the presence of alternate roost sites may be critical when disturbance occurs. Interspecific interactions with other bat species may also influence lesser long-nosed bat roost requirements. Threats that may contribute to the decline of lesser long-nosed bat populations are excess harvesting of agaves in Mexico, the collection of cacti in the U.S., and the conversion of habitat for agricultural uses, livestock grazing and production of bufflegrass, wood-cutting, and other development.

The lesser long-nosed bat recovery plan (U.S. Fish and Wildlife Service 1994b) identifies the need to protect foraging areas and food plants. Columnar cacti and agaves provide critical food resources for this bat. Populations of these plants need continued protection to sustain nectar-feeding bat populations. A critical need in this area is information about the size of the foraging areas around roosts so that adequate areas can be protected. This information will show the minimum area needed to support a roost of nectar- and fruit-eating bats, provided the roost locations are known. Additional life history information can be found in the recovery plan and other references cited therein.

We have produced numerous biological opinions on the lesser long-nosed bat since it was listed as endangered in 1988. Some of these opinions have included incidental take statements, although typically only for a small number of individuals. Survey data indicate that the number of bats estimated to occupy known sites is approximately 200,000.

ENVIRONMENTAL BASELINE

**Action Area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area for the bat includes BMGR-West, Stoval Field, AUX-11, all three the TACs, and airspace above BMGR-East and Cabeza Prieta NWR used by MCAS-Yuma. Figure 5 includes radii from known roosts (40-mile maximum foraging distance and a 12.5 mile likely foraging distance) where effects to bats are most likely to occur (see Effects of the Proposed Action).

**Terrain, Vegetation Communities, and Climate in the Action Area**

A complete description of the region encompassing the action area has been previously provided (see "Environmental Baseline, Terrain, Vegetation Communities, and Climate in the Action Area" for the Sonoran pronghorn). The primary forage plant of the lesser long-nosed bat in the action area is the saguaro, which is distributed throughout the BMGR east of the most arid portions of the Yuma Desert. Agaves (*Agave deserti*) are found in mountainous areas, organ pipe cactus occurs rarely in the eastern portions of the BMGR and Cabeza Prieta NWR, and senita occur in the Agua Dulce Mountains.

**Status of the Lesser Long-Nosed Bat in and near the Action Area**

Several large maternity roosts occur in and near the action area. The proximity of these roosts to MCAS-Yuma activities is portrayed in Figure 5. Bluebird Mine along the eastern border of Cabeza Prieta NWR in the Granite Mountains is within 40 miles of the three TACs, fixed wing flights occur over Bluebird Mine, and low-level fixed wing and helicopter flight corridors occur within 25 miles of the roost. Numbers of bats at Bluebird Mine typically peak at about 5,000-6,000 (U.S. Fish and Wildlife Service files). Copper Mountain Mine, within Organ Pipe Cactus NM, is within 40 miles of the three TACs and low-level fixed wing and helicopter flight corridors. Higher level fixed wing flights occur directly over the mine. The most recent estimate of roost size was approximately 25,000 bats at the peak of annual occupancy (Organ Pipe Cactus NM 2002). As of May 28, 2003, approximately 17,000-20,000 bats occupied Copper Mountain Mine, which is typical for that time of year (T. Tibbitts, pers. comm. 2003). The largest maternity roost in the area is Pinacate Cave in northern Sonora, Mexico. It occurs within 40 miles of the southern low-level fixed wing flight corridor across Cabeza Prieta NWR (Figure 5). This roost is estimated to support a peak of 130,000 bats each year (U.S. Fish and Wildlife Service 1994b). Slate Mountain, another large roost (recently about 2,000-6,000 bats at peak numbers), occurs nearby on Tohono O'odham lands and is within 40 miles of East TAC. A small roost or roosts in the Agua Dulce Mountains in the southeastern corner of Cabeza Prieta NWR, which has not been confirmed as a maternity roost, likely peaks at less than 100 bats.

Before they give birth, female bats occasionally move between the Bluebird and Copper Mountain roosts, and it has been recommended that these two roosts be censused simultaneously to avoid double-counting bats (U.S. Fish and Wildlife Service 1994b). Observations at Copper Mountain and at Pinacate Cave indicate that they are occupied from mid-April to early-to-mid-September (U.S. Fish and Wildlife Service 1995), although these roosts reach their peak occupancy in late spring/early summer.

Potential roosts of the BMGR were surveyed in 1994 (Dalton *et al.* 1994). No lesser long-nosed bats or their potential roosts were found, with the exception of one possible transitory shelter. Potential roosts on Cabeza Prieta NWR have been surveyed to a lesser extent, resulting in the discovery of the roosts in the Agua Dulce Mountains and in the Growler Mountains. From east to west across the BMGR, precipitation declines, and the primary forage plants of the bat, including organ pipe cactus and senita, rapidly drop out, and saguaro populations decline or become relegated to drainages. At some point, declining densities of columnar cacti probably become limiting for lesser long-nosed bats on the western side of the BMGR. If day roosts are currently undiscovered in the action area, they probably occur in BMGR-East or Cabeza Prieta NWR, or less likely, in the southeastern portions of BMGR-West.

A number of past activities in the action area have affected bats. Our 1997 biological opinion on the Organ Pipe Cactus NM General Management Plan found that the proposed action could result in take of bats from recreation; specifically from unauthorized human disturbance to the Copper Mountain maternity roost. In our May 8, 2003, opinion on improvements to SR 85 in Organ Pipe Cactus NM, we found that approximately 57 saguaros and two organ pipe cactus would be lost due to construction activities, and the interpretive waysides may increase the likelihood of human disturbance to the Copper Mountain roost. The dramatic increases in undocumented immigrants and the associated damage resulting to the landscape from their activities, as well the activities of law enforcement in pursuit of undocumented immigrants, is becoming an increasing threat, not just to bats but to all wildlife of the region. The Bluebird Mine on Cabeza Prieta National Wildlife Refuge was vandalized in June 2002, probably by smugglers from Mexico, and resulted in at least four dead bats. The population of the roost subsequently dropped from about 6,000 to about 400 bats. Surveys in 2003 suggest the bats have returned to Bluebird Mine.

EFFECTS OF THE PROPOSED ACTION

As discussed above, lesser long-nosed bats are most sensitive to human disturbance at day roosts. No ground-disturbing activities are proposed by MCAS-Yuma at or near any known roosts. However, aircraft will fly over roosts; low-level aircraft flights could generate noise or winds that may disturb foraging bats, and some ground-based activities will disturb habitat and may locally reduce densities of bat forage plants.

No low-level fixed-wing or helicopter aircraft flights are proposed over any of the maternity roosts in or near the action area; however, fixed-wing aircraft flights above 1,500 feet AGL could occur over the roosts in the Agua Dulce Mountains and at Bluebird Mine. Dalton and Dalton

(1993) investigated the effects of low-level (500 feet AGL) military jet flights on the lesser long-nosed bat at the Copper Mountain roost at Organ Pipe Cactus NM. Bats exposed to low-level flights exhibited no acute responses (panic flights, falling young bats, or startle responses). No significant differences in bat orienting responses were noted before, during, or after jet flights, but depressed levels of bat flights were noted for up to 30 minutes following the jet noise. Lesser long-nosed bats are not very sensitive to sounds below frequencies of 10 kHz (Howell 1974) and the high frequency sounds to which the bat is sensitive attenuate very rapidly with distance and terrain (Howell 1992). Low-level jet noise attenuated rapidly within Copper Mountain Mine, particularly the high frequency sounds. Dalton and Dalton (1993) note that extrapolation of the results to other sites with different terrain or mine tunnel geometry may not be valid. They also found that the study did not address any potential long-term effects to the bat colony. As only higher level fixed-wing flights over bat roosts (above 1,500 AGL) are proposed by MCAS-Yuma, the effects of such flights would be less than what were described by Dalton and Dalton (1993).

Low-level aircraft overflights have the potential to disturb foraging lesser long-nosed bats. As described above, the maximum documented one-way foraging flight is 38 miles; however, in southeastern Arizona, a typical one-way foraging flight is 12.5 miles. MCAS-Yuma (2003) drew 40 mile and 12.5 mile radii around roosts in and near the action area (Figure 5). No proposed activities lie within the 12.5 mile radii of the Pinacate, Copper Mountain, or Slate Mountain roosts. One low-level fixed wing aircraft corridor lies within 12.5 miles of the Agua Dulce Mountain roost or roosts. A Goldwater Range Measurement and Debriefing System (GRMDS) site is shown on Figure 5 within a few miles of Bluebird Mine; however, that instrument site is operated and maintained by Luke Air Force Base and is not part of MCAS-Yuma's proposed action. Low level helicopter corridors across Cabeza Prieta NWR and BMGR-West and -East, areas of low-level helicopter and fixed-wing aircraft use in the Mohawk Valley, all three TACs, ground support area 67, and two TACTS range tracking instrument stations occur within the 40-mile foraging radius of one or more of the five known maternity roosts in or near the action area (see Figure 5).

Lesser long-nosed bats typically begin arriving at roosts in southwestern Arizona and at Pinacate Cave in mid-April, just after the end of the spring WTI in late March or early April. For instance, in 2002, no lesser long-nosed bats were found at Copper Mountain mine on March 31 or April 10, but on April 17 a minimum of 2,500 lesser long-nosed bats were roosting there (T. Tibbitts, pers. comm. 2002). The bats have abandoned the roosts for alternate sites in southeastern Arizona or elsewhere by the time of the fall WTI. Thus, activities during WTI are unlikely to directly affect roosting or foraging lesser long-nosed bats. Outside of WTI, low-level (as low as 200 feet AGL) fixed-wing aircraft and low-level (as low as 50 feet AGL) helicopter flights will occur occasionally, primarily in BMGR-West. Helicopter flights occur both during the day and at night. Between March 15 and July 15 of each year, all helicopters using R-2301W, except those participating in WTI, will remain west of 113 degrees, 53 minutes, on designated transit routes, or above 1,000 feet AGL In practice, all such non-WTI helicopter flights will occur in the designated transit routes. As shown on Figure 5, some helicopter flights would ~~also~~ occur throughout the summer on the transit route that crosses the southern end of the Mohawk Mountains. This transit route is within the 40-mile radii of both the Agua Dulce

Mountain roost(s) and Bluebird Mine. The wind and noise generated by low-level, large helicopters could be considerable. Lesser long-nosed bats flying beneath a helicopter at 50 feet AGL would likely be blown to the ground or into trees, shrubs, or cacti and possibly injured. Bats could also potentially collide with helicopters flying at low levels. The frequency of such encounters is probably low because few helicopter flights on the southern transit route occur outside of WTI.

Most fixed-wing aircraft flights occur during the day and all are above 200 feet. These flights may occur at any time in BMGR-West; however, relatively few such flights occur in the southeastern portion of BMGR-West within 40 miles of the Agua Dulce Mountains roost(s) (MCAS-Yuma 2003). The relatively high altitude of fixed-wing flights greatly reduces the likelihood that a bat would collide with an aircraft. Although noise associated with low-level fixed-wing flights may be intense, it is of short duration and, unlike low-level helicopters, no winds are associated with low-level fixed-wing flights. Although we do not know how aircraft noise affects foraging lesser long-nosed bats, there is probably a much less chance of adverse effects to foraging lesser long-nosed bats from fixed-wing aircraft as compared to low-level helicopter flights.

Bats are occasionally killed during collisions with communications towers. Fifty four bats of seven species were found dead below a television tower in Florida (Crawford and Baker 1981). Hebert *et al.* (1995) noted bat kills below communications towers in Canada, Florida, Missouri, North Dakota, and Tennessee. They also note a bat found dead below a 115KV transmission line. The susceptibility of lesser long-nosed bats to collision with towers is unknown, and we are not aware of any lesser long-nosed bats found dead under communications towers, powerlines, or other structures. However, there is a small potential for lesser long-nosed bats to collide with antennae or towers at the two TACTS Range Tracking Instrument Sites within 40 miles of the Agua Dulce roost(s) (Figure 5).

South, North, and East TACs are within the 40-mile foraging radii of several roosts. The Agua Dulce Mountain, Blue Bird Mine, and Copper Mountain roosts are all within 40 miles of North and South TACs. The later two roosts are also within 40 miles of East TAC, as is the Slate Mountain roost. The only use of the TACs by MCAS-Yuma is during WTI; as discussed above, the spring WTI occurs before most bats arrive in southwestern Arizona, and the fall WTI occurs after they leave. Thus, aircraft flights or ordnance delivery at the TACs by MCAS-Yuma are unlikely to directly affect foraging lesser long-nosed bats.

Activities of MCAS-Yuma disturb relatively small amounts of foraging habitat of the lesser long-nosed bat in southwestern Arizona. Ground support area 67 is just within the 40-mile radius of the Agua Dulce Mountains roost(s); however, its presence in the arid Mohawk Valley and years of past use make it unlikely to support substantial numbers of saguaros. Agaves are not expected at the site (in southwestern Arizona agaves occur primarily in the mountains). No further disturbance of habitat is anticipated from operation or maintenance of the two TACTS Range

Tracking Instrument Stations within 40 miles of the Agua Dulce roost(s). Use of the tactical ranges for delivery of ordnance is restricted to specific targets (Gary Blake, Luke Air Force Base, pers. comm.). Such targets have been in use for many years and much of the vegetation at the target areas has already been impacted. The targets are estimated to represent three percent of the area of the tactical ranges. No random deliverance of ordnance, including strafing, occurs on the tactical ranges. As a result, vegetation is severely affected at the targets and associated core munitions impact areas (MCAS-Yuma 2003). However, outside of the targets, effects are minimal or absent. Because new target areas are not proposed, no significant new disturbance is anticipated to vegetation or foraging habitat of the bat. However, continued use of the target areas will prevent recovery of vegetation communities. In the absence of ordnance delivery it is unknown how long such a recovery would take. But natural recovery of severely disturbed soils and then reestablishment of saguaros capable of flowering and providing nectar and fruit for lesser long-nosed bats is a process that would likely take centuries.

**CUMULATIVE EFFECTS**

Most lands within the action area are managed by Federal agencies; thus most activities that could potentially affect the lesser long-nosed bat are Federal activities that are subject to section 7 consultation. The effects of these Federal activities are not considered cumulative effects. Relatively small parcels of private lands occur within the action area near Ajo and Why. State inholdings in the BMGR were recently acquired by the Department of Defense. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private lands may adversely affect bats or their foraging habitat.

As detailed in the Cumulative Effects for the Sonoran pronghorn, increasing illegal border crossings by undocumented migrants and smugglers have resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires, and increased chance of wildfire. A visit to Bluebird Mine in late June 2002 revealed that undocumented migrants, probably drug smugglers, had apparently been camping in the mine. Bags of garbage and possible evidence of a fire were found. Only 390 bats were observed, and four dead bats were found on the floor of the mine. A month earlier over 6,000 lesser long-nosed bats had been observed there. The entrance to the mine has been lined with cholla segments in an attempt to discourage future entry. Monitoring in 2003 indicates the bats are returning to Bluebird. Increased presence of Border Patrol in the Douglas, Arizona area, and in San Diego (Operation Gatekeeper) and southeastern California, have pushed undocumented migrant and smuggler traffic into remote desert areas, such as Cabeza Prieta NWR, Organ Pipe Cactus NM, and BMGR (Klein 2000). Some discussions are occurring between Mexican and U.S. officials about the creation of a guest worker program whereby Mexican nationals could legally cross the border to work in the U.S. If such a program was initiated, it might greatly reduce illegal immigration and law enforcement response, with concomitant reductions in habitat degradation and suspected disturbance of pronghorn that have increased so dramatically in recent years.

**CONCLUSION**

After reviewing the current status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of MCAS-Yuma's proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat. No critical habitat has been designated for this species, therefore, none will be affected. In making our determination, we considered the following:

1. The lesser long-nosed bat occurs in the action area from April into September. Five maternity roosts occur within foraging distance of the activities proposed by MCAS-Yuma, but no roosts occur near any proposed activities, with the exception of fixed-wing aircraft which overfly two of the roosts at 1,500 feet AGL or above.

2. The action area is a small portion of the range of the bat, which includes most of southern Arizona and extreme southwestern New Mexico south through western Mexico to El Salvador.

3. Bats in roosts are expected to be affected minimally, if at all, by the proposed action.

4. Activities during WTI courses occur when the bat is absent or present in very small numbers.

5. Fixed wing aircraft flights are not expected to significantly adversely affect lesser long-nosed bats, although some uncertainty exists regarding effects of jet aircraft noise on foraging bats.

6. From July 15 through August, low-level night flights by helicopters on the transit route through the southern end of the Mohawk Mountains are likely to fly over foraging lesser long-nosed bats. Winds created by low-flying helicopters may blow bats onto the ground or into trees, shrubs, or cacti and injure them. Bats could also collide with helicopters. However, the number of bats expected to be taken is relatively small (see Incidental Take Statement, below).

7. Continued use of the tactical ranges prevents recovery of lesser long-nosed bat foraging habitat, but habitat disturbance resulting from the proposed action affects relatively little of the foraging habitat available to the bat in southwestern Arizona.

8. Increasing illegal undocumented migrant and smuggler activity threatens lesser long-nosed bat roosts in the action area. One of the maternity roosts in the action was vandalized, apparently by smugglers, in 2002. Action has been taken to discourage further entry into that roost. We are in consultation with the Border Patrol on their activities in southern Arizona, and hope to address, in part, affects to bats resulting from illegal migrant and smuggler activities through those consultations

**INCIDENTAL TAKE STATEMENT**

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA 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 17.31) 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 17.31) 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 ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the MCAS-Yuma so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. MCAS-Yuma has a continuing duty to regulate the activity covered by this incidental take statement. If the MCAS-Yuma (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the MCAS-Yuma must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

**Amount or Extent of Take Anticipated**

In the "Effects of the Proposed Action" we have described how bats could be blown to the ground or into shrubs, trees, or cacti by low-flying helicopters or could collide with helicopters during the summer months on the helicopter transit route that traverses the southern end of the Mohawk Mountains. Bats from the Agua Dulce Mountains roost(s) and Bluebird Mine are expected in the Mohawk Mountain helicopter transit route. The Agua Dulce Mountains roost or roosts, is thought to be a small roost of 100 or fewer bats; Bluebird Mine has peaked at 5,000-6,000 bats in recent years. Other foraging areas are overflown by helicopters during WTI, but bats are either rare or absent during the spring WTI and almost certainly absent during the fall course. The low-level helicopter flight areas are near the maximum one-way foraging flight distance from these roosts, so probably relatively few bats are at risk on any one night. Also, few helicopter flights occur on the transit routes outside of WTI. But because the term of the proposed action is open-ended - until reinitiation is needed - incidental take as a result of these helicopter flights is reasonably certain to occur, although it would probably be a relatively uncommon event. Take would be in the form of direct mortality or injury, estimated at five bats every 10 years. Incidental take due to harm (habitat loss or degradation), low-level fixed-wing aircraft operations, collisions with vehicles, or from other MCAS-Yuma activities is not considered reasonably likely to occur.

Incidental take of lesser long-nosed bats will not be possible to monitor directly. Bats killed or injured due to helicopter flights will be in a remote portion of the BMGR and would be quickly scavenged. Incidental take will have been exceeded if nocturnal low-level helicopter flights in the southeastern portions of BMGR-West or on the transit routes outside of WTI increase significantly over current levels, or if numbers of bats in the Agua Dulce roost(s) or at Bluebird Mine decrease significantly, and MCAS-Yuma activities are an important cause of the decline.

**Effect of the Take**

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

**Reasonable and Prudent Measure**

Through previous consultations helicopter flight routes have been relocated and reduced in number to minimize effects to the Sonoran pronghorn. Also, non-WTI low-level helicopter flights mostly stay west of 113 degrees, 53 minutes, which is likely west of bat foraging areas, or above 1,000 feet AGL, which is at an elevation that would not affect bats. The only low-level helicopter flights across Cabeza Prieta NWR occur during WTI at a time when bats are few in number or absent. Thus, further modifications to helicopter flight routes or times of year are probably not warranted or reasonable. The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of Sonoran pronghorn:

MCAS-Yuma shall monitor levels of low-level helicopter flights in foraging areas of the lesser-long nosed bat during periods when the bat is present, and report to us the results of that monitoring.

**Term and Condition**

In order to be exempt from the prohibitions of section 9 of the ESA, the Marine Corps must comply with the following term and condition, which implements the reasonable and prudent measure described above. This term and condition is non-discretionary.

1.1 MCAS-Yuma shall monitor levels of low-level (<1,000 feet AGL) helicopter flight use in southeastern BMGR-West and on the transit route through the southern end of the Mohawk Mountains from April 15 to September 15 of each year and report to us the results of that monitoring in the March 1 annual report (see Conservation Measure #15 and the pronghorn Conservation Recommendation #6).

The reasonable and prudent measure, with its implementing term and condition, is designed to minimize the impact of incidental take that might otherwise result from the action. If, during the

course of the action, the anticipated level of take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The Federal agencies must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measure.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened 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. The Service recommends implementing the following actions:

1. Assist us and other cooperating agencies in the implementation of the lesser long-nosed bat recovery plan.

2. Fund research on the effects of low-level aircraft flights on foraging behaviors of lesser long-nosed bats.

3. Continue regular surveys of caves and mines in BMGR-West to locate roosts of the lesser long-nosed bat.

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

## DISPOSITION OF DEAD, SICK, OR INJURED LISTED ANIMALS

If a dead, injured, or sick individual of a listed species is found by MCAS-Yuma in the action area, initial notification must be made to Service Law Enforcement, Federal Building, Room 105, 26 North McDonald, Mesa, Arizona, 85201 (telephone: 480/835-8289) within one working day of its finding. Additionally, Cabeza Prieta NWR must be contacted at (520) 387-6483. These telephone contacts will be documented in telephone logs by the reporting agencies. Written notification must be made within five calendar days and include the date, time, and location of the finding, a photograph of the animal, and any other pertinent information. The notification shall be sent to Law Enforcement with a copy to the Arizona Ecological Services Field Office, 2321 W. Royal Palm Road, Suite 103, Phoenix, AZ 85021. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state possible. If possible, the remains shall be placed with educational or research institutions holding appropriate State and Federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass

left in place but protected from predators. Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured pronghorn should be transported to the Phoenix Zoo for treatment and rehabilitation. You should contact us and Kevin Wright (602) 914-4373, Curtis Eng (602) 689-7427, or Kathy Orr (602) 573-1696 at the zoo prior to transport.

## REINITIATION STATEMENT

This concludes formal consultation on use of the Arizona portion of the YTRC by the MCAS-Yuma. 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 a 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.

Thank you for your cooperation and assistance throughout this consultation process. Any questions or comments should be directed to Jim Rorabaugh (x238) or Sherry Barrett (520) 670-4617 of my staff.

Sincerely,

/s/ Steven L. Spangle
Field Supervisor

W:\Jim Rorabaugh\MCASBOrev603fin.wpd:jg

cc: Regional Director, Fish and Wildlife Service, Albuquerque, NM (ARD-ES)
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Regional Solicitor, Department of the Interior, Albuquerque, NM
Manager, Cabeza Prieta National Wildlife Refuge, Ajo, AZ
Robert Gulley, Department of Justice, Washington, D.C.

State Director, Bureau of Land Management, Phoenix, AZ
Field Office Manager, Yuma Field Office, Bureau of Land Management, Yuma, AZ
Field Office Manager, Phoenix Field Office, Bureau of Land Management, Phoenix, AZ
Colonel James Uken, Barry M. Goldwater Executive Council, Luke Air Force Base, AZ
Park Superintendent, Organ Pipe Cactus NM, Ajo, AZ

Captain William Fay, Arizona Army National Guard, Phoenix, AZ
Peter Ruiz, Director of Natural Resources, Tohono O'odham Nation, Sells, AZ
John Kennedy, Arizona Game and Fish Department, Phoenix, AZ
Larry Voyles, Arizona Game and Fish Department, Yuma, AZ

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Table 1. A summary of population estimates from literature and field surveys for Sonoran pronghorn in the U.S.

| Date | Population estimate (95 percent CI[a]) | Source |
|---|---|---|
| 1925 | 105 | Nelson 1925 |
| 1941[b] | 60 | Nicol 1941 |
| 1957 | <1,000 | Halloran 1957 |
| 1968 | 50 | Monson 1968 |
| 1968-1974 | 50 - 150 | Carr 1974 |
| 1981 | 100 - 150 | Arizona Game and Fish Department 1981 |
| 1984 | 85 - 100 | Arizona Game and Fish Department 1986 |
| 1992 | 179 (145-234) | Bright *et al.* 1999 |
| 1994 | 282 (205-489) | Bright *et al.* 1999 |
| 1996 | 130 (114-154) | Bright *et al.* 1999 |
| 1998 | 142 (125-167) | Bright *et al.* 1999 |
| 2000 | 99 (69-392) | Bright *et al.* 2001 |
| 2002 | 21 (18-33) | Bright *et al.* 2002 |

[a] Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.
[b] Population estimate for southwestern Arizona, excluding Organ Pipe Cactus National Monument.

Table 2. Comparison of U.S. Sonoran pronghorn population surveys, 1992-2002.

| | Pronghorn observed | | Population estimates | | |
|---|---|---|---|---|---|
| Date | On transect | Total observed | Density estimate using DISTANCE (95 percent CI[a]) | Lincoln-Peterson (95 percent CI) | Sightability model (95 percent CI) |
| Dec 92 | 99 | 121 | 246 (103-584) | --- | 179 (145-234) |
| Mar 94 | 100 | 109 | 184 (100-334) | --- | 282 (205-489) |
| Dec 96 | 71 | 82 (95[b]) | 216 (82-579) | 162 (4-324) | 130 (114-154) |
| Dec 98 | 74 | 86 (98[b]) | --- | 172 (23-321) | 142 (125-167) |
| Dec 00 | 67 | 69[b] | --- | --- | 99 (69-392) |
| Dec 02 | 18 | 0 | --- | --- | 21 (18-33)[c] |

[a] Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.
[b] Includes animals missed on survey, but located using radio telemetry.
[C] Jill Bright, Arizona Game and Fish Department, pers. comm. 2003

Table 3. Comparison of Sonoran pronghorn surveys in Mexico, 1993, 2000, and 2002.

| | Total number of pronghorn seen | Sightability model (95 percent CI[a]) |
|---|---|---|
| *March 1993* | | |
| Southeast of Highway 8 | 163 | 289 (226-432) |
| West of Highway 8 | 51 | 124 (91-211) |
| Total | 214 | 414 (317-644) |
| *December 2000* | | |
| Southeast of Highway 8 | 249 | 311 (261-397) |
| West of Highway 8 | 17 | 34 (27-48) |
| Total | 266 | 346 (288-445) |
| *December 2002* | | |
| Southeast of Highway 8 | 19 | 25[b] |
| West of Highway 8 | 195 | 255[b] |
| Total | | |

[a] Confidence interval; there is only a 5 percent chance that the population total falls outside of this range.
[b] These estimates are tentative and confidence intervals have not yet been generated.

Table 4. Diseases transmissable between cattle and pronghorn.

| Actual Documented Disease | Reservoirs/Oddities/ Transmission Routes | Clinical Signs | Control | Citation(ts) |
|---|---|---|---|---|
| **BACTERIAL DISEASES** | | | | |
| Leptospirosis<br>*Leptospira interrogans* serovar *hardjo* | transmitted thru infected urine, fetal tissues or rarely aerosol; organism can live outside host for up to 6 months in soil, water or on vegetation; asymptomatic shedders can transmit the disease over the long-term | fever, blood-tinged urine, jaundice, renal failure, abortion | reduce contact among domestic and wild animals; reduce incidence of stagnant water and moist, warm conditions; control situations where virus can be shed | Merck (1986)<br>Kreplin (2002)<br><br>Leighton and Kuiken (2001) |
| **VIRAL DISEASES** | | | | |
| Bluetongue<br>Bluetongue orbivirus (BTV) | vector = infected biting midge *Culicoides sonorensis*; BTV also associated with cattle lice *Haematopinus eurystemus*; infected blood and semen can also directly transmit disease; highest incidence of disease in July-Sept | fever, inflamed, ulcerated erosion in mouth; lameness; abortion; emaciation; sterility, growth delay, death | reduce vector attraction to fetid water sources; reduce contact, overcrowding and competition, particularly July to September | Howerth, *et al.* (2001)<br><br>World Organisation for Animal Health (2002)<br><br>Stott (2002) |
| Epizootic hemorrhagic disease<br>Epizootic hemorrhagic disease orbivirus (EHDV) | vector = infected biting midges *Culicoides sonorensis* and *C. insignis* | depression, fever, uncoordinated gait (ataxia), "running fits"/convulsions/ seizures, sudden death; sick and dead animals often found in or near water | reduce vector attraction to fetid, fecal-infested water sources; reduce contact, overcrowding and competition, particularly July to September | Howerth, *et al.* (2001)<br><br>Howerth and Stallkneckt (2002)<br><br>Stott (2002) |

| **Pronghorn Exposure Documented by Antibody/Seroconversion** | | | | |
|---|---|---|---|---|
| **BACTERIAL** | | | | |
| Arcanobacterium Infection associated with Fusobacterium Infection<br>*Arcanobacterium pyogenes* (previously known as *Corynebacterium pyogenes*) and<br><br>*Fusobacterium necrophorum* | wound contact<br><br>associated with bacterial buildup at overcongregated water sources, particularly during summer drought | mucopurulent, suppurative abscesses; swollen mandible; difficulty chewing; bronchopneumonia;intracranial abscesses leading to derangement<br><br>lameness when footrot exists, mouth lesions result in excess salivation, difficulty chewing and swallowing, infections of the stomach lining and labored breathing with debilitation | separate animals so that contact does not occur;<br><br>keep animals from overcrowding watering sources | Wobeser (2001)<br><br>Canadian Cooperative Wildlife Health Center (1999)<br><br>Leighton (2001)<br><br>Mikkelsen and Woodbury (2000) |
| **VIRAL** | | | | |
| Parainfluenza<br>Parainfluenza 3 Virus (PI-3V) | aerosol | fever, runny nose, coughing, difficulty breathing, ocular discharge, depression, poor appetite | handle animals with care; provide adequate feed and water; minimize exposure to contributing environmental conditions; avoid overcrowding; reduce stress | Arizona Game and Fish Department, unpubl.data<br><br>Pfizer Animal Health (2002) |
| St. Louis Encephalitis<br>St. Louis Encephalitis arbovirus (SLEV) | vectors = mosquitoes; bats may serve as overwintering hosts | meningitis, encephalitis; central nervous system disease; death | mosquito control; surveillance of disease epidemic cycles | Yuill and Seymour (2001) |
| Vesicular Stomatitis<br>Vesicular Stomatitis-New Jersey rhabdovirus (VSNJ) | vector = sand flies; disease of No. Am. horses, cattle, swine; documented in Mexico in pronghorn, bighorn sheep and deer | fever, large fluid-filled blisters on mouth, nose, lips, muzzle, above hoof, teats, loss of appetite, depression, excessive salivation | vector control; separation of affected species of ungulates | Yuill and Seymour, (2001) |

| | | | | |
|---|---|---|---|---|
| Malignant Catarrhal Fever<br>Malignant Catarrhal Fever (MCF) gammaherpesvirus | aerosol or contact with nasal or ocular fluids; fecal contamination | Fever, profuse nasal discharge, corneal opacity, swollen lymph nodes, inflamed oral, ocular and nasal mucosas; occasionally central nervous signs with diarrhea, skin lesions and arthritis; high mortality rate | cattle kept separated from potential reservoirs; "stocking of cattle ranches with ...antelope, wild sheep or goats should be discouraged" | Heuschele and Reid (2001)<br><br>Heuschele (2002) |